“When Are We Ever Going to Need This?”

Relevance and Success in High School Social Studies and Mathematics

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Abstract

Students often ask their teachers about why they need to learn a piece of content or skill. “When will we use this in real life?” The question they are asking is one of relevance. How is this lesson relevant to them? It is well known that students who see a connection between what they are learning and what they care about, will be more motivated. This study looked at how the researcher's own instructional strategy influenced student perceived relevance, motivation, and success. Data was collected through student responses to surveys, colleagues viewing student engagement throughout lessons taught by the researcher, student success in classroom assessments through turning in work and how well that work was completed, and informal observations by the teacher researcher. From this data it could be determined that perceived relevance of a topic by students feeds their motivation and their success, connecting content to future careers and uses has limited utility in communicating relevance, hands-on and gamified activities have great effects on student motivation and success, and there is a feedback loop between success and perceived relevance. The implications are that while driving success requires student interest and motivation, practical usefulness isn’t the most effective way to produce those results.

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Table of Contents

Chapter 1
Introduction

There are many questions students ask their teachers, usually pertaining to the subject a class is focused on, but one question is asked in all academic subjects, and that is the question of relevance. “Why should we learn this? When will we use this in real life?” These questions can be heard in math classes, science classes, history classes, and English classes. The only classes that might be immune to this would be ones that are explicitly application classes, like woodworking or machine shop classes. What this means is that teachers need to, at minimum, have a response to this question and, more effectively, work the relevance and meaning of the subject into their lessons so that most students can discern the answer to those questions on their own. This research project will explore how teachers can most effectively communicate the relevance of their subject matter to students.

Ultimately, this question about relevance is about student motivation. If students see why they should learn a subject, they are more motivated to learn it. The student will put forth more effort and, with good teaching practices, succeed. It is this increase in success, caused by student motivation, that this project is looking to maximize. To accomplish this, this study will be looking to find ways to articulate relevance to students in a way they understand, agree with, and can articulate.

The question of relevance is informed by my own experiences from K-12 education and the experiences I had watching my younger siblings go through it as well. To start with, my own learning was made relevant to me by teachers that fostered my early interest in math and history. I became interested in history thanks to some historical video games, and my 4th grade teacher and elementary school librarian encouraged me in these interests. My 4th grade teacher helped direct my research, and hinted at the complexity of history, as much as a 4th grader can

understand. My librarian helped me find great books that were at my level of reading and understanding. My story of relevance is not the same as many others; I became interested in history and math for their own sakes, but there is a common underlying principle. The educator needs to learn what his or her students enjoy, what interests the students already have, whether said interests are budding or already well developed. Then the educator needs to cater their lessons towards encouraging those students down those pursuits. Best practices such as giving students meaningful choice in assignments or content focus, can be how teachers connect to this type of relevance, and therefore motivate their students

A second way teachers encouraged and motivated me in a way that I found relevant was to focus on skills, instead of content. In math this is automatic, it's all about process and analysis, and my math teachers did a good job instilling this in me. Application problems and problem-solving activities were done by my geometry and algebra two teacher, it had the same teacher for both, to help me see the uses of these skills.

The final way my teachers motivated me was through the cultivation of good character traits, namely things like perseverance. Another of my teachers made a strong impression on me, helping me grow as a person. She was my high school English and Spanish teacher. She had high expectations of her students, but she genuinely cared about us, both our education and our growth as human beings. We had an assignment due for the English class, I don't remember what exactly, and I hadn't done it. She gave me and others an extra day to get it done, making it clear that this was the last deadline. I then proceeded to not do it that same day, or the due date. That second day I stayed after school to play board games with my friends in a club we had. She saw me as she was walking through the hallway, and she was upset. She confronted me, telling me she was disappointed in me. I felt embarrassed about being confronted in front of my friends,

but one of my friends actually helped push me to go and do the paper anyway. I spent the rest of my evening, between school and home, doing the paper and writing a letter of apology. I made it obvious in the letter that I didn't expect any credit, but I asked her to still correct it so I could be a better writer. I turned in both the paper and letter the next day, a day late even for her extension, but she ended up giving me full credit and saying that I impressed her with my letter. She told me I acted very mature and she was proud of me. This story had a profound impact on my maturing as a person. One way to motivate students and relate their work to their lives is to connect it with their next stage of life, such as telling them a particular behavior is very mature, or grown-up. It's a great way to call out the best in students.

Students also made an impact on my philosophy of education. I like to say that I went to a nerd high school, and I often tell people that instead of gossiping about relationships or talking about sports we shared what we knew. I learned about nuclear fusion, had political debates, and discussed history with my peers. For fun. The social environment I lived and breathed in valued knowledge and understanding. Maybe that's why the answer to the question "why do we need to learn this?" never really bothered me, other than to be able to communicate it to others. But that doesn't mean it doesn't inform the answer to that question.

My story is one of teachers and peers making content, skills, and character traits that I was learning important to my interests and my future. Relevance is not something I usually struggled with, but I encountered many other students who did. Going through school I would encounter students asking teachers why they were doing an activity and the responses being less than convincing. I don't remember the exact reasons given, which already says something about the impression left by the answer, but I just remember neither the students nor myself ever being convinced by it. This always bothered me. As a teacher I want to be able to answer that

question in a true way that resonates with my students. I want to engage with them where they are and how they see the world.

That's the essence of my research question: how can I relate the needed content, skills, and character traits my students will need to be successful economically, socially, and personally, and communicate that relevance in a way that motivates them? How can I connect with my students in a way that I can see how they see the world and use that understanding to communicate why school is important? Motivation is so important, and the relevance of a student's efforts will have a major determining effect on how much effort they give in the classroom. Students are tremendously hard working, if they feel their efforts bring meaningful returns to them.

Guiding Pedagogical Theory

Looking at student connection and motivation means that I have to consider theories on motivation on top of theories on general student learning. Many theories of student motivation include the important aspect of material relevance to students. The guiding frameworks of this project are social constructivism and expectancy-value theory. Social constructivism (Vygotsky,1978) is a theory of learning in which learning is primarily done within social contexts, then internalized. As a baseline it argues that learning isn't so much about learning some unbiased objective truth, but connecting new knowledge to already existing knowledge, constructing a general worldview and creating meaningful knowledge to the social and physical contexts students find themselves in.

This learning begins through social interaction. Students often see how a skill is modeled, then they gradually assimilate it into their previous understanding or accommodate the new knowledge by changing their understanding. Even the way students engage best with the

content and skills is through social interactions. This is deeply connected to my educational experiences. Knowledge and skills I best retained were those that I discussed with peers and teachers, working through disagreements and misunderstandings. A topic can be examined from more angles if multiple people engage in the examination.

Social interaction also gives students a context through which to initially engage a new topic, which can help them see multiple points of entry to a new skill. Social constructivism lends itself to some important concepts in teaching. The first is rooted in the idea of the zone of proximal development. The idea here is that a learner can only do so much on their own, and those tasks don't grow the learner very effectively. This is their actual developmental level. Beyond this is the zone of proximal development, or the level which students achieve with outside help. Working within this zone can help students pull skills and tasks from this zone into their actual developmental level, allowing them to now do the task independently and growing the student.

Vygotsky's theories would lead to the development of multiple teaching strategies. A popular one is scaffolding, where students will perform a task with substantial support from the teacher, or even have the teacher model it, then gradually students will do more of the task with less support until they can do it on their own. Similar to this, so much so it might be considered a subset of scaffolding, is the gradual release of responsibility (Pearson & Gallagher, 1983). In this strategy students and the teacher work through tasks together, then students do the same task in small groups, then finally the students do it individually. This gives students tons of support at the beginning and gradually removes it. Scaffolding can also take other forms, such as feedback, where teachers give corrective and constructive feedback to help students see where they need to improve. Students can also give themselves feedback, if they grade some of their work based on

a teacher-provided rubric. Vygotsky's social constructivism also encourages group-based projects, letting students learn from each other and develop understanding with conversation and group problem solving.

The other theory key to this Action Research Project is Expectancy-Value Theory. This is a theory of motivation. What drives students to put in the work? The short description of this theory is that students are motivated when they believe that the task they are being asked to do is relevant to them in some way, whether that's by student interest or real world application, and if they can expect to succeed at the task, or at least engage in the task competently. The primary question asked here for this research project is how to maximize the value part of that equation in a students' eyes, but nothing in a system as complex as a school environment exists in isolation, and so the answer is certain to be multi-faceted. The key to understanding this question lies in what interacts with value, both through expectancy and the social constructivist lens I am using. Using tools like scaffolding and constructive feedback will help students build their self-efficacy, or their belief in their ability to fulfil a specific task or goal, and their self-confidence more generally. Creating a social environment that values the subject we are teaching them will help build value for students, as value is socially constructed. Then successive successes will reinforce both value and expectancy in a positive feedback loop within the social learning environment.

These theories connect with my educational experiences in fundamental ways. My expectations of success and my value of education were built by those around me, students and teachers alike, especially in high school. The social contexts I found myself in affected how I understood the value of learning academic subjects, and my understanding of that value

motivated me to work hard and succeed, which in turn built my expectation of success, creating a positive feedback loop of learning.

These theoretical lenses connect on a very deep level with my research question. Knowledge is socially constructed, at minimum in its formulation and categorization, and what is viewed as important to someone is socially constructed by their interaction with those around them. This leads me to believe that there is no single answer to the question "why do we need to learn this?" but that we need to connect our teaching to students in a way that connects to their socially constructed importance structures in a meaningful way and to the needs of the local community. Straight answers are great, but our pedagogy should ooze this meaning so that students, families, and community members alike see the importance of the skills and content the students are learning. This will be done by learning the cares of the school and greater local community, as well as students individually, and infusing connections to those cares throughout the lessons. Building relationships with students and their families is also pertinent to have the connections of meaning taken seriously. Then not only will you have a well-developed answer to the question of relevance, but most students will be able to see it themselves.

Connection to InTASC Standards

One of the ultimate goals of education is for students to become lifelong learners. This means they enjoy learning and collaborate with others to engage in the social construction of learning through discussion and connection. A major aspect of this is to instill a growth mindset in students, so they know their learning is never obstructed by their perceived ability to learn. Once students have this understanding they can go on to continue learning and even building new knowledge using their own experiences and perspective. One way to achieve this is through

connecting their lives to the content and skills, helping them relate to people in the past or connect to mathematical ideas, no matter the student.

This goal is closely aligned with an understanding of knowledge construction and student motivation based around social constructivism. This will help students develop a high value of learning in general, and apply that to the rest of their lives. The result will improve a student's expectation of success as they learn and become more competent. And the way to pursue this is through building an educational environment that encourages students to construct knowledge through their interactions with their peers and teachers, scaffolding their learning as they push themselves and each other.

This goal aligns primarily with INTASC standard four: The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content. This desire for accessibility and meaning both connect directly with expectancy and value of expectancy-value motivational theory, and building an understanding of the structures of a discipline will teach students the social component of that discipline, such as how experts build knowledge through interactions in peer reviews.

Another important INTASC standard in regards to this research is standard five: The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues. If learning is social, then it has to incorporate different perspectives, from primary sources from different people and cultures to math concepts with multiple entry points for learning, and solving authentic problems ties right into the value students will place in the learning.

The final INTRASC standard tied in is standard eight: The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways. If students can see the answer to the 'why' questions, then this can help motivate them to build and apply knowledge in ways they find meaningful, and they will ultimately be more successful.

Summary

Students in all subjects often ask a common question "Why should we learn this?" This question of relevance lies at the heart of student motivation. When students see value and meaning in their learning, they engage more deeply and perform better. My personal experiences from my K–12 education show how effective teachers connect learning to individual interests, emphasize relevant skills, and encourage personal growth. These experiences shaped my belief that motivation grows when students understand how learning connects to their own goals and development.

Two major theories guide this project. These are Social Constructivism and Expectancy-Value Theory. Social Constructivism views learning as a social process, where knowledge is built through interaction, discussion, and collaboration. Strategies such as scaffolding, gradual release of responsibility, and constructive feedback help students move from supported learning to independent mastery. Expectancy-Value Theory explains motivation as a combination of students' expectation for success and the value they attach to a task. Together, these theories highlight that both learning and motivation are socially constructed. Students' confidence and sense of relevance develop through relationships and shared meaning. Thus, there is no single answer to "Why do we need to learn this?"—teachers must instead design classrooms that continuously demonstrate relevance through authentic, student-centered learning.

This approach aligns closely with INTASC Standards four, five, and eight. These standards emphasize meaningful instruction, engagement with diverse perspectives, and the use of varied instructional strategies that help students apply learning in real world contexts. Ultimately, the goal of this project is to cultivate lifelong learners who see learning as a meaningful, socially collaborative, and personally relevant pursuit.

ARP Chapter 2
Annotated Bibliography

To become a more successful teacher, it's necessary to learn how to motivate students with greater efficacy. Primarily, the focus of this study is how to make the subjects of history and mathematics relevant to the students' lives. Why should they learn this stuff? To be able to answer this, this study will explore articles that tried to answer the same, or a similar, question. Most of the literature were studies that dealt with what students thought of the relevance of history and math. Some were one-off questionnaires about students' thoughts, some were about changes in students' thoughts after applying a particular teaching strategy, and some were about how students retained information under a particular strategy when compared with traditional ones. One article was all about the development of a particular framework for future studies. One was to look at how teachers and professionals can collaborate to create lessons that tie directly to careers.

Generally, these articles were found through searching the WOU library website. Search terms used were ones like "history relevance high school students" and "mathematics relevance high school students". Limiting the search to peer reviewed articles and using the WOU libraries constraint options narrowed the search further. When that resource was tapped out, at about 8 articles, the last 4 articles were found by going to the best articles and looking into their reference lists to find other, slightly older articles.

Berg, C. (2019). Why study history? An examination of undergraduate students' notions and perceptions about history. *Historical Encounters*, 6(1), 43–71. https://doi-org.wou.idm.oclc.org/10.13140/RG.2.2.27068.90248/1

Focusing on undergraduate students, this study is looking to understand the "notions and perceptions about history" that students have coming out of high school. The methods used were survey questionnaires, asking open-ended questions to allow students to describe their thoughts

thoroughly. Eleven questions were asked, six about the student, to see how demographics might interact with perceptions of history, and five questions about the relevance of history itself. The conceptual lens this author used was a synthesis of William McNeill's (1985) and Peter Stearns' (1998) frameworks. The study found that the primary way students in undergraduate studies saw the relevance in history was to learn lessons from the past that could be used in the present, guiding them into the future. History also helped these students "live more purposeful lives through greater self-understanding and personal growth." Ideas like learning history for its own sake and to build historical imagination didn't resonate well with these students. The strength of this article is looking at a population that isn't examined as often, undergraduates. Seeing how students might leave high school thinking about history tells us a good deal. One way to think about this study is how we, as social studies teachers, want our students to enter this population thinking about history.

Brown, M., Brown, P., & Bibby, T. (2008). "I would rather die": reasons given by 16-year-olds for not continuing their study of mathematics. *Research in Mathematics Education*, 10(1), 3–18. https://doi-org.wou.idm.oclc.org/10.1080/14794800801915814

These authors are examining why secondary students in England don't pursue specialist mathematics after their compulsory mathematics classes are completed. To examine this the authors surveyed students after they have completed their general education examinations, though before the scores for those examinations have been posted, and asked them if they planned to continue their education next year, why or why not, what subjects they intend to study, if they intend to study higher level mathematics, and why or why not. The analysis is done through an expectancy-value lens. The study found several categories of reasons why students did not intend to continue their mathematics education. First, many found math too hard. Some believed that they didn't have the personal ability to push further in mathematics,

some heard how hard it was from older siblings, and some were even dissuaded by teachers. A second category of reasons given was that math was boring. Even if a student found math relatively easy, they just had no interest pursuing the subject beyond what they had to. Students also cited a lack of usefulness in their future plans for math, not seeing the relevance of the subject. This category was particularly used by students who thought they did well. This last category is where the focus of this study lies. Math will seldom be exciting, and difficulty can be mitigated, but this study gave various statements as to how students characterize their thoughts on math's usefulness. We need to reach students on the importance of mathematics in their careers and in everyday life. One potential weakness is that this study took place in the UK, which has a different educational structure than in the US.

Dessingué, A. (2024). Rethinking Historical Relevance in the 21st Century: An Exploration of Historical Consciousness Among High School Students in Norway. *Nordidactica*, 14(2024:3), 48. https://doi.org/10.62902/nordidactica.v14i2024:3.26118

The author is examining the interest or disinterest in history of high school students in western Norway and how the students justify their position. The study looks to develop both quantitative and qualitative data using a survey with both scaled questions on statements about history and open-ended questions where the students can share their thoughts. The author developed a survey of two groups of questions. The first assessed student views on the nature and relevance of history. The second group of questions assessed students' interest in different historical periods and topics. The analytical framework used in this work is a dual lens of history as formal knowledge and skills, and memory as the informal experience of a person or people. The study found that many students found history interesting and relevant, while many others found it the opposite. The important distinction made by the two groups was whether the student believed history was important for understanding modern society and modern issues. Students

who believed that history shaped the present saw it in a more positive light.. Knowledge of a historical topic also played a role in interest and relevance, the more familiar a student was with a topic, the more likely they were to see its importance and have an interest in it. Though, it's not obvious what order that happens in, perhaps a student first sees the relevance of a historical topic and, as a consequence, learns more about it. This article is important to this study because it shows how important relevance is for students to have interest in a topic. If students find a topic, or history generally, meaningful, then they are far more likely to study it, developing a greater level of historical consciousness. One thing to keep in mind about this article is the research was done in Norway, which has a different educational system than the US does, so the relevance of the study might be a bit weaker than if it had been done in a US school.

Foster, F., & Wise, J. (2022). Social tensions in studying ancient history. *Curriculum Journal* (London, England), 33(4), 536–552. https://doi.org/10.1002/curj.150

The author of this article investigates the perceived tension of high school students in England studying the ancient world between their interest in the content and the teaching of it as a circular subject. To understand how students viewed the study of ancient history, the authors went to three state schools in England to survey students aged 14 or 15 about their views of the ancient world or the study of the ancient world as an academic subject. They also "asked students about their parents' and guardians' education and occupations, whether they had visited any museums or ancient sites with school or family, and what exposure they had to the ancient world outside school." The authors interviewed the students in groups, asking them about these things in a group discussion environment. The analytical lens used here is one the authors call "powerful knowledge" and "knowledge of the powerful". The authors found that to students studying ancient history there is the belief that ancient history study is a mark of power and privilege, aligning with the knowledge of the powerful analytical lens used, but that there are

important historical concepts, powerful knowledge, that are useful to students. It therefore feels somewhat strange for many of these students to study it, because it isn't 'for them'. The authors use this data to argue that ancient history curriculum should be mandatory across the UK, so the privileged stigma associated with the class disappears. This article is more tangentially connected to the topic of this study, but relevance is also how a student can see themselves within a discipline. The analytical lens is a useful tool as well, examining knowledge traditionally associated with privileged status and extracting the 'powerful knowledge', or important skills and concepts, and teaching them to less privileged groups, thereby tearing down the privileged stigma of the study.

Grever, M., Pelzer, B., & Haydn, T. (2011). High school students' views on history. *Journal of Curriculum Studies*, 43(2), 207–229. https://doi-org.wou.idm.oclc.org/10.1080/00220272.2010.542832

This article studied Dutch, English, and French secondary school students in multicultural schools to investigate what history they find interesting and meaningful. The method used here was a questionnaire, with a mixture of closed, semi-open, and open questions for the students to answer. The researchers were also interested in how ethnic origin might affect the answers. The questions asked about "which kinds of history students find most important; which period of history they consider the most interesting; their interest in history for themselves; and their view on the social meaning of history." The analytical theory used here is the five profiles of history. The study found that religious history was a big deal among immigrant ethnicities, while not being a major interest among the native ethnicities of the countries. World history as a general subject was of moderate interest across the board, while national histories were of greater importance to native ethnic students and boys. Students often were either interested in ancient history or modern history. Non-native ethnicities were more

interested in the history of migrants. A strength of this article is how it handles historic relevancy. It's not asking how history is relevant to students, it's asking what history is relevant to students. The interest difference between native and non-native groups is also worth noting, and warrants further research. One limit of this research is that it deals with education systems outside the US.

Haj-Yahya, A., & Klieger, A. (2025). Collaborating with industry to highlight the relevance of mathematics. *Research in Mathematics Education*, 27(1), 162–182. https://doi.org/10.1080/14794802.2023.2263843

This article studies the effects of pre-service math teacher experiences in STEM industries on those teachers' teaching practices. The basic idea is that if teachers have experience in how math is used in the professional world, will they be able to create curriculum and activities that communicate that relevance to their students? To investigate this the authors selected 36 pre-service mathematics teachers who had at least a bachelor's in mathematics or a related field, but who didn't have any teaching experience. They had these pre-service teachers collaborate with professionals who work in industries that use mathematics to create mathematical modeling activities that actually modeled what the professionals do. They then interviewed the pre-service teachers, asking them about their authentic mathematical-modelling activities and if they would use these in the classroom. The authors use an analytical lens called the seven stage mathematical cycle, which is a seven step process to turn a real life problem into mathematics, solve it, and re-interpret the results back into the problem. The authors found that the activities created by the collaboration between pre-service teachers and STEM industry professionals showed how math would be used in prospective student careers. These activities were designed by professionals, so they come directly from the industry. These activities would be a direct response to claims about the uselessness of mathematics in students' futures. The

pre-service teachers recognized this and planned to use these activities in their future classrooms. This study does a great job showing how teachers and professionals can collaborate to create authentic activities, but there is a glaring weakness in the study. The pre-service teachers didn't have any teaching experience yet, which is great for their humility and receptivity to the process, but it limits how well they can gauge the actual effectiveness of these activities, without real world teaching experience to draw from. Secondly, and this could have resolved the previous issue, the study didn't have the teachers try these activities in classrooms for feedback on their effectiveness.

Rohenroth, D., Neumann, I. & Heinze, A. Conceptions of High School Students About the Relevance of Mathematics in Higher Education—their General Perspective and Their Views About Specific Mathematical Requirements. *J Math Didakt* 45, 26 (2024). https://doi.org/10.1007/s13138-024-00252-6

This article examines the relevance high school students believe mathematics to have on their future university endeavors generally, and the relevance of specific requirements on the specific subjects those students wish to pursue. To investigate this, the authors surveyed 984 students in their last couple years of high school. First, they asked students to give their estimation of what percentage of students in Germany, where this study was conducted, needed mathematics for their university studies. Then the students were asked how relevant math skills were for specific subjects, particularly "architecture, biology, English, economics, educational, science, medicine, physics, political science and social studies." The students were also asked about the importance of particular math requirements. The results were interpreted through the Person-environment fit lens. The authors find that high school students, while still believing that most undergraduate students will need mathematics, grossly underestimate the need for mathematics in general, and high school math in particular. The students believe that 65% of undergraduate students will need mathematics, when the number is actually at 80%. Students

also thought that elementary mathematics, like arithmetic, were more necessary than high school mathematics, like algebra. One group of subjects in which students really underestimated the need for math were the social sciences. Even students who planned to go into those subjects underestimate the math load of them, a belief that the authors believe feed into a higher dropout rate among those subjects. This article makes a strong case for bringing students' attention to the need of math, even outside STEM fields. Most social sciences require math, really anything outside of pure humanities like English. The strong suit of this article is identifying the problem, what and where it is, but it doesn't answer why, something the authors acknowledge in their conclusion. This focus on what careers students want to pursue and explaining how math might be used in their higher education studies and eventual career is a powerful conclusion coming out of this study. One place where more research can be done is to look into why students underestimate the need for math in their lives.

Stone, J. R., Alfeld, C., & Pearson, D. (2008). Rigor and Relevance: Enhancing High School Students' Math Skills through Career and Technical Education. *American Educational Research Journal*, 45(3), 767–795. https://doi.org/10.3102/0002831208317460

This article tested the effect of teaching math skills in career and technical classes to see if seeing math in the context of potential careers, or simply subjects they enjoyed, improved learning. To test this, the authors gathered career and technical classes, specifically agriculture, auto technology, business and marketing, health, and information technology. 78 classes were a control group, studying the subject-specific material as they always had, while 59 classes were infused with mathematical application. The career and technical teachers worked with math teachers to come up with a math curriculum for their classes that was relevant to the subject. After a year, data was collected on the occupational assessments students fulfilled for the class, as well as student data on two standardized math tests. The analytical theory used here is called

the seven elements theory. The study found that students in the class that incorporated mathematics both: learned the occupational curriculum just as well as the students in the traditionally taught class, and did better on the standardized math tests, one of which was similar to many colleges' math placement tests. From here the authors concluded that high school occupational classes should include rigorous math where it applies in their field. If done well it will feel like a natural outgrowth of the subject and students will see the applicative relevance of the math. At first glance, this article seems barely related to this study, but it brings a lot of relevant information. When students see where high school math relates to a subject they are interested in, perhaps something they'll continue studying on their own or even make a career out of, they are more motivated to learn it. One weakness of this study was that the teachers studied volunteered, so are probably amongst teachers who try to improve their teaching skills actively. It's not clear how teachers who might be set in their style would respond to trying to push math into occupational studies.

Miguel-Revilla, D. (2022). What is history education good for? A comparative analysis of students' conceptions about the relevance of history. *Journal of Curriculum Studies*, 54(1), 70–84. https://doi.org/10.1080/00220272.2021.1896784

The purpose of this article is to examine the understanding of high school students, history undergraduates, and social studies pre-service teachers in how they understand the relevance in history for developing personal identity, becoming a citizen, and understanding the human condition. To study this question, researchers created a survey of statements about how history is relevant to the three areas mentioned, with the survey subject giving a number 1 through 6, with 1 meaning 'strongly disagree' and 6 being 'strongly agree'. The researchers asked 4 questions on the relevance of history in personal identity development, 8 questions on the relevance of history to becoming a citizen, and 4 questions on the relevance of history to

understanding the human condition, weighting the values equally between the categories, and then giving each participant a sub-section score in addition to a total score. The theoretical framework is one developed by Van Straaten et al. It pulls from educational philosophy, philosophies of history, and a constructivist learning framework. What the survey found was that secondary students average about 3.6 across all questions, agreeing there is a mild-to-moderate relevance of history in their world. Pre-service social studies teachers averaged about 4.2, with their history major counterparts scoring an average of 4.6, both generally pointing to a moderate to major relevance for history. One result that the authors specifically point out is that, while pre-service teachers and history undergraduates basically agreed on the relevance of history to understanding the human condition, pre-service teachers were significantly lower than history undergraduates on the other two questions, the relevance of history to identity and to citizenship. One of the conclusions the authors come to is that pre-service teachers should look to understand the higher relevance placed on those two areas by the history undergraduates, and look to increase their understanding of the relevance of history in those areas so that they can impart that understanding better to their students. It's useful to consider the two groups, history undergraduates and preservice teachers getting an undergraduate degree in education, because they will have different priorities and it is good to examine how a focus on students might change someone's view on the relevance of history.. As far as this research, separating the question of relevance into the three categories could help structure this study.

Van Straaten, D., Wilschut, A., & Oostdam, R. (2016). Making history relevant to students by connecting past, present and future: a framework for research. Journal of Curriculum Studies, 48(4), 479–502. https://doi-org.wou.idm.oclc.org/10.1080/00220272.2015.1089938

The purpose of this article is to answer two questions. What kind of objectives should play a central role in teaching history if we want to make it more relevant to students? What

teaching strategies achieve those objectives? The methodology here is different because this isn't specifically a single study, but more the development of a theoretical framework for future studies. For the first question the authors stay squarely in the realm of historical and educational theory, developing a theoretical framework connecting historical skills and knowledge, theories about how to teach so students learn, and constructivist learning theories. To answer the second question they examine already existing studies in the literature and categorize them within four kinds of historical teaching, and assess how well they touch the different criteria the authors had developed. The theoretical basis is a historical theory based on connecting the past to the present and future, coupled with an educational theory that states the function of education is qualification, socialization and subjectification. For the first question the authors develop a theory of history education that focuses on history's part in understanding the human condition, becoming a citizen, and developing a personal identity. For the second question the authors categorize the studies into longitudinal studies, asking enduring questions, historical analogies, and scenario thinking and decision making. The authors found that generally enduring questions and scenario thinking and decision making fit all three of their effective historical education criteria. Even though it's not a single study, this is a very useful framework. The educational criteria, how they fulfill the functions of education, and how they interact and build on each other make a robust theory of historical education.

Van Straaten, D., Wilschut, A., Oostdam, R., & Fukkink, R. (2019). Fostering Students' Appraisals of the Relevance of History by Comparing Analogous Cases of an Enduring Human Issue: A Quasi-Experimental Study. *Cognition and Instruction*, 37(4), 512–533. https://doi.org/10.1080/07370008.2019.1614590

The purpose of this article is to examine how students understand the value and relevance of history education in three contexts: traditional instruction, instruction about an enduring human issue, and instruction about an enduring human issue that is explicitly connected with the

present state of that issue. This study took three groups of classrooms, one taught in the traditional way, one taught with case studies of an enduring human issue, refugees, throughout history, and one taught with those same case studies but with explicit connections between each other and to today. Students performed a pre-test of historical knowledge and a pre-survey about historical relevance. After the five week unit students were tested and surveyed again. The survey used the Relevance of History Measurement Scale (RHMS), giving a series of statements about the relevance of history to their lives, and having students rate them from one, or strongly disagree, to six, or strongly agree. The analytical framework is a cognitive psychological theory based in analogical reasoning and case-comparison learning. The study found that students' opinions of the relevance of history to their lives was greater in both case-study curricula over the traditional history curriculum, with the highest opinion of relevance in the case-study curriculum that drew direct connections to issues today. In addition, students found the content easier to digest in the same pattern, case-studies with connections over case-studies without connection over traditional history curriculum. On top of that, the focus on case-studies and connection with modern issues did not hurt student's historical knowledge, students of all groups scored similarly in their historical knowledge. This article answers two important questions for this study. First, it gives a concrete method for making history more relevant for students, by making explicit connections with important issues today. Second, it answers a concern about the sacrifice of content knowledge. It seems that students who underwent this approach weren't lacking general content knowledge, something that is very important for drawing understanding across periods. A weakness the authors point out is the limited difference they observed in opinions of historical relevance, but the study was only five weeks. The effect would compound if this was the perspective of the majority of students' history education.

Voet, M., & Wever, B. D. (2017). History Teachers' Knowledge of Inquiry Methods: An Analysis of Cognitive Processes Used During a Historical Inquiry: An Analysis of Cognitive Processes Used During a Historical Inquiry. *Journal of Teacher Education*, 68(3), 312-329. https://doi.org/10.1177/0022487117697637

The purpose of this article is to test how well high school history teachers understand historical inquiry methods. The authors studied this question by having the teacher do an inquiry project on the English Peasant Revolt of 1381. The teachers were asked a series of questions which they would have to do research and employ inquiry methods to complete. The analytical theory employed is the five core cognitive processes of historical inquiry: sourcing, appraising, specifying, constructing, and arguing. The results were that less than half of the teachers employed all of the five core cognitive processes, indicating that most teachers have gaps in their understanding of how to conduct robust historical inquiry, and so they cannot teach it to their students effectively. A strength to this study is its focus on teachers, the guides to students' navigation of history. If a teacher can't use a skill well, then it is very difficult for them to teach it to their students with any effectiveness.

Obviously math and history are very different subjects, but we can still pull similar threads through both. The best way to promote the belief in the value or relevance of both history and math is to connect it to the present and future of the student. For math this can manifest in teaching skills that can be used in their current daily lives, but the primary usefulness here is in their future. Generally students have goals for the future that involve some professional job, and most of these jobs require a certain amount of mathematical knowledge. Even a successful social media influencer, which many students want to be, needs to analyze quantitative data. So pulling from these jobs for current math practices will help students see this relevance.

History equally needs to be connected to the present and future for students, though this can be a little more amorphous. Students need to be able to see how history, whether individual, social, political, or otherwise, connects to what humans are and how they behave. On top of this history should be taught so students can see where they fit within the historical narrative. They are historical actors just as much as the people they are learning about. The studies show that history must be taught in such a way that students can see how they connect to the communities around them and can help build their own personal identities around connections to history. History should be taught in such a way that these ideas are taught both explicitly and implicitly.

ARP Chapter 3
Methods

The purpose of an Action Research project is to help the researcher refine his or her practice, in this case in teaching. In the teaching profession it is unethical to do traditional studies with students, with different groups of students given different treatments to study their reactions. Instead action research focuses on the researcher, studying their own actions for the purpose of improving their craft (Sagor, 2000). In the case of teaching, students are still involved, and their reactions to differences in practices is measured, but the test is related to the teacher. The control in this case would be the teacher's practice before the experiment, for example. Action research is a decades old process that can be broken down into multiple steps.

The action research process has many steps, each building upon the last. The first step is to pick a focus. This is like the theme of a research essay, a narrowed topic that doesn't yet ask a specific question or take a specific stance. The focus of this action research project, for example, is the connection between student relevance and motivation. Second, a researcher must clarify theories regarding their focus, reviewing the literature that already exists about it. This is what was done in the previous chapter, and this helps narrow the focus further to a specific question the researcher wants to answer. The third step is for the researcher to then use the existing literature to develop the specific question that they want to answer out of their initial focus (Sagor, 2000). The research question of this project is how can a teacher relate the needed content, skills, and character traits their students will need to be successful economically, socially, and personally, and communicate that relevance in a way that motivates them?

The remaining steps of an action research project is to collect data, analyze that data, report the results, and take informed action. Collecting data is the step where the researcher designs what forms of data collection will give important information towards answering the

research question, does that data collection, and records it in an unanalyzed form. Then the researcher analyzes the data, drawing connections between the new information and the original research question. Both of these steps have been done within the confines of the chapter. Reporting the results is the discussion and synthesis of the research project, synthesizing new information and making connections to the literature. The final step, taking informed action, is all about what the researchers should do next. How should the conclusions made in this project affect their practice going forward? What new questions or directions should be researched next? The remainder of this chapter details the setting of this study, where the classroom and students that will be taught are described, the types of data collected and why are detailed, and the position and biases of the education researcher.

Participants and Setting

The school where this student was conducted, we will call it Samson High School, is within a small city in Oregon surrounded by rural areas. This study was conducted within two classrooms taught by the researcher, one in a US history class and one in an Algebra I math class. The history class has 17 students, 12 freshmen and seven sophomores. The racial breakdown of the class is 12 White students, four Hispanic students, and one American Indian student. There are 10 boys and seven girls. None of the students are identified, or were ever identified, as English Language Learners. Among this class there are four IEPs and zero 504s. The IEPs range from minor accommodations, such as more time on assignments and tests, to modifications of reading and instruction to a third grade reading level.

The algebra class has 13 students. 12 of the students are freshmen and one is a sophomore. There are eight White students, two Hispanic students, two Pacific Islander students, and one Asian student. Eight students are boys, and five students are girls. None of these

students are identified, or were ever identified, as English Language Learners either. In this class there are three IEPs and one 504. All these accommodations are fairly minor, such as extra time and frequent check-ins to ensure a student is on task.

The researcher has worked with both of these classes as a teacher candidate for 11 weeks by the end of this study, and there is a good rapport with both sets of students. In the history class students respond excitedly to questions and instructions from the teacher candidate, and enjoy asking questions of the teacher candidate. The students in the algebra class are less enthusiastic, but it's because those students are more introverted. There is a quieter rapport there as well. Across both classes the teacher researcher focuses on student engagement and student thinking over simply delivering content. In history this manifests as heavy use of primary sources to get students to hear what people from the time under study say and think, and in math this manifests as inquiry-based explorations into different problems and engaging activities. Areas the researcher believes need improvement are maintaining student engagement. In both classrooms there are times where some students get bored and disengage. Part of the motivation for this study was how to increase motivation among students to stay engaged.

Both classes have many bright students with academic and cultural funds of knowledge that can be used to support learning, both theirs and their classmates. The students demonstrate a wide range of interests, most commonly in sports, video games, and personal hobbies like cooking. These are used to connect content and skills to their lives, and to draw examples to help them better understand academic content. Academically, the history class shows varied strengths, with many demonstrating strong understanding on assessments but inconsistent task completion due to differences in time management and focus. Socially and academically, several students emerge as natural leaders, both within small peer groups and classwide, helping set

behavioral norms and academic expectations for others. In the math class students are generally on top of both smaller assignments and assessments, showing a good ability to focus and ask questions when they don't understand something.

Data Collection and Analysis

This study collected many kinds of data to measure students' belief in the relevance of the respective subjects they are in class for, both math and history. Students were given a survey asking for their beliefs about their subject. Then, at the end of the unit of study, centered around the Vietnam War for history and Algebra with radicals for math, students were given a final survey about the relevance of the unit to them.. Observations at regular intervals were taken of particular students who represent a cross section of the class by colleagues as the teacher researcher teaches. The teacher researcher also kept a reflective journal detailing general class engagement during the lessons. Finally, student work was recorded for completion and analyzed for success in displaying learning. This was a strategy that combined existing data with created tools to gather data on student beliefs, motivation, and success (Sagor, 2000).

Surveys were given to students to help gather data about the perceived relevance they see in their subject class. To accomplish this the teacher researcher designed a survey inspired by Dessingué (2024), asking students questions about the general relevance of the subject, as well as their interest in certain topics. The end surveys cataloged student thinking, seeing how they tie current topics to things students care about and getting students to consider their topic in the context of their lives. Both these angles helped students acknowledge the relevance of history and math for them.

Observational class time data helped measure students' motivation to remain on task throughout classwork. Classtime usage is a constant, useful data source that the researcher can

connect to students' beliefs about their subjects. Where the predefined checklist gave detailed information on several representative students, the teacher researcher's journal reflections gave a general overview of the class's motivation for classwork on any given day. This data supported the identification and interpretation of trends and instructional impact of lessons on student motivation. (Sagor, 2000)

Student work was also collected to measure student success and academic outcomes. Student work is an authentic artifact of learning that can tell me a lot about what students are motivated to accomplish and at what level they will work. Analysis of student work also gives more authentic data than observational data alone. Changes in student success across time and across students can be discerned with this data. (Sagor, 2000)

The teacher researcher used all these methods to iterate on their teaching strategy, finding what students are interested in and implementing activities and strategies that use their interests to motivate them to learn. First, the researcher took the initial survey data, the observational data, and the data of students finishing work and work quality, and categorized everything. Student relevance in both math and history was broken down by scores on the survey and kinds of responses given in open-ended questions. Student engagement was categorized by amount of on-task behavior both in pre-defined checklist and open-ended teacher reflections. Student success was categorized by percentage of work completed and the quality of work of those assessments. The teacher researcher then looked for patterns and connections among this data. The researcher then reflected on changes in student engagement and success, and further surveying of thoughts on relevance through the end surveys, to see results and further iterate and tweak the learning process for their students. All these data points helped triangulate the connection between relevance, motivation, and student success, helping the teacher researcher

teach students more successfully. The researcher, as a teacher candidate in two subjects, asked both their clinical teachers to review this data, and they helped focus the process and notice patterns. (Sagor, 2000)

Researcher Positionality

The theories that influence the teacher researcher's philosophy of education are present throughout this study and the methods of data collection. Students are the primary arbiters of what they find relevant and why, so going to them to ask their opinion of subjects and topics is necessary for any evaluation of relevance to students. This is the same reason the exit tickets are to be used; students are best at communicating their thoughts and feelings. Translating that into understanding student motivations is much harder. This is why observational data of particular students and the class as a whole is necessary. Observational checklists can quantify student engagement and teacher reflections can qualify them, as well as catch the nuance of the process of students socially constructing knowledge together. Finally, a measurement of student success must include assessment data, both completion and success within the assessment. This is why these data are included; the final part of the expectancy-value model is this success.

The teacher researcher has a plethora of layered identities that have to be taken into consideration during data collection and analysis. The researcher is in a position of authority as a teacher, and has many privileged identity statuses, such as being a heterosexual white man. To keep it brief, the teacher researcher has to be careful that their identity status or authoritative position in the classroom doesn't bias the data. The researcher has to keep minority students in mind throughout the process, ensuring they are actually able to express their thoughts and don't feel like they have to answer a certain way to please the authority figure of the teacher. The teacher candidate can do this by stressing to students for them to be honest as they answer

questions, or that there is no special punishment for getting off task during data collection. Still, many students will look to please the teacher and answer how they think he would want them to, so in the analysis possible bias needs to be taken into account.

ARP Chapter 4
Data Analysis

While analyzing the data collected, four major themes emerged. First, the perceived relevance of a topic by students feeds their motivation and their success. Second, connecting content to future careers and uses has limited utility in communicating relevance. Third, hands-on and gamified activities have great effects on student motivation and success. Finally, there is a feedback loop between success and perceived relevance. Each theme is discussed here with supportive data.

Perceived Relevance Feeds Motivation and Success

It seems obvious that there would be a robust connection between the perceived relevance of a subject, or a topic within a subject, and the motivation to work on classwork and homework relating to that subject or topic. This increased motivation should then lead to greater success. But it is always important to test how strong this connection is. These connections can be seen in connections between the relevance perceived by the six students I had colleagues monitor throughout several classes and their revealed engagement during the monitored classes. This can also be seen from the teacher researcher's own lesson reflections and informal observations. The connection between motivation and success can then be seen from these sources and students' overall and recent successes with classroom assessments.

The teacher researcher had two colleagues, the clinical teachers in the researcher's respective classrooms, monitor 3 students in each class for engagement. Each student was looked at in turn. All students are assigned letters for anonymity. In US history class Student H has a middling opinion of the relevance of the subject as seen from the two surveys they filled out, one about general history and one about a unit on the Vietnam War at the end of that unit. They described history as boring, with low opinions of the relevance to them, but felt very

connected to the Vietnam War specifically. Fittingly, in the observation period Student H was found to be directly on task for around 77% of colleague check-ins. Student H does good work and is among the top students in the class. Student F is in a very similar boat, with moderate perceived relevance, more evenly distributed between the two surveys this time. Student F was observed to be directly on task for all check-ins, and is also among the top students of the class. To clarify, only one student in US history perceived a high level of relevance for the subject, so the moderate level of relevance is high relative to the class average.

In the Algebra One class, Student R had a high perceived relevance, and this reflects in their motivation to stay engaged in class, on task for 96% of colleague check-ins. This student is also among the top performers in math. Student T answered the math surveys with answers that point to a moderate level of relevance to them. When answering the question "Can you explain why you find the subject of math interesting or not interesting?" Student T answered "Math is in the middle because im okay at it, I just don't like doing math first thing in school." The student also gave math topics, on a scale of 1 through 6 for interest, mostly 4's and 3's. This moderate relevance translates to being on task for about 60% of the check-ins. As a result of this level of engagement, Student T has a fairly low grade. Finally, the third student observed in math was Student Y. This student has a low opinion of the relevance of math to their present or future, generally giving 2s and 3s for their interest in different math topics, though giving higher scores for a couple topics, like graphing. Their free responses to questions of relevance also show they don't think math will be useful to them in life. This student really struggles with the content, but they generally stick with it, motivated to stay engaged for about 79% of check-ins by my colleague. This translates to a middle level of success in class, in grades of Cs and low Bs.

From all these we can see a moderate level of connection between perceived relevance and motivation, and a strong connection between motivation and success.

One notable exception was Student B. Student B, from the history class, communicated a fairly high level of perceived relevance through the surveys, but this doesn't show up in their engagement, they're only found to be engaged in 46% of check-ins by a colleague. And this translates to a very low level of success, they just don't turn in work. It certainly raises questions about the answers given in the surveys. The trend still holds overall, however.

This trend is also seen from the informal observations made by the teacher researcher. Students who see more uses for the math or history content are more engaged in working through difficult tasks and internalizing the skill and content. An example is the plethora of readings students have to do in US history. The students who claimed no relevance about history were far likelier to not engage, or engage only with consistent reminders from the teacher researcher, whereas students who claimed a middle amount of relevance or higher were more willing to read through documents and answer questions. Students who agreed more with positive statements about the importance of history and disagreed more with negative statements also did better on summative assessments. For their track records of turning in smaller assignments, classwork and homework, however, it was less predictive.

When specifically working through the Vietnam War Unit in US history, students generally were able to connect more fully with the visceral experiences of soldiers, civilians, as well as protestors back home. In an activity focused around the draft students got a feel for what it meant to be uncertain if they would get drafted, and how they might react to getting drafted. Students found the human feelings they felt a powerful way to connect to citizens who might get drafted. This relevance through shared humanity motivated many students who usually struggle

with staying on task to remain almost effortlessly engaged, and every student participated in the activity and turned in the post-activity reflection. This shows how powerfully motivating it can be if students see the connection to their own lives, and was part of what made the Vietnam Unit be perceived as more relevant to students' lives and interests than earlier units.

In math, perceived relevance was a powerful predictor of general class participation and motivation to work through struggles. To compare the interest students showed between a unit focused on systems of equations to a unit focused on radical equations is illustrative. In the system of equations unit students could see concrete examples of problems these procedures could solve, and were significantly more engaged in learning and solving the problems, and what those solutions meant. In the radicals unit the procedures felt more abstract to students, because a topic like that is, and this meant students struggled to engage as meaningfully as the system of equations unit.

This is reflected in student success as well, as illustrated by summative assessment scores. The average score students achieved for the final test of the system of equations unit, disregarding two students scores who haven't taken the test, is about 88%, whereas the average score for the radical unit, also disregarding two zeros for students who haven't taken the test, is about 51%. This shows that the more concrete a skill, and the more readily students can see the usefulness of that skill, the easier students can successfully learn that skill. Tangibility also connects to the earlier observations of the US history class in the Vietnam Unit. When students could see the images of the soldiers in Vietnam, the civilians caught in the middle, and the protestors back home, the topic becomes more concrete and more real to them, encouraging more engagement and more success.

To illustrate the point for history, the comparison can be in the summative assessments for the Vietnam unit and the Richard Nixon unit. The average score among students who took the Vietnam test was about 93%. The average score for students who took the Richard Nixon test was about 92%, but this is with significantly fewer students taking it. The lower performing students who took the Vietnam test also didn't take the Nixon one. So not only is the average score lower, but this is in spite of being made up of a higher concentration of high achievers among the students.

This pattern is seen in math as well, between two units, one on radicals and one on systems of equations. The systems of equations unit was more readily connected to students in a concrete way. Working within constraints created by multiple relationships is something that students can see affect them, helping people make financial decisions, optimize travel, manage inventory, and allocate resources. The unit on radicals, in contrast, is much more abstract and arbitrary. There are connections that can be made to shapes, but the applications are from more advanced math than an Algebra One class will get to. This difference in relevance can be seen in the success of the classes in their summative successes. The final test of the systems of equations saw an average score of 80%. Meanwhile, the radical unit saw an average score of only 51%. This contrast shows just how strong perceived relevance is for students within a general education algebra class, where few students are motivated simply by a love of the subject.

In total, it is manifest that where students see relevance in their school work they are willing to work more and harder to understand new skills and content. This motivation then translates to greater learning and success in assessments. Students who report greater relevance are seen working more in class, both on an individual level and as a class. An even stronger

connection is seen in the connection between motivation and the number of assignments turned in and the scores students receive. The next question is then how do teachers maximize students' perceived relevance in their classes.

Connections to Future Careers and Adult Uses

One way the researchers in the literature have worked to increase perceived relevance to students is to show students how a topic is relevant to the possible jobs students might work when they are adults. Engineering is one obvious way to connect math to students. This can be done in a grand way, showing how small skills feed into large skills that are used in things like architecture and environmental engineering. This can also be done in a small way. An example can be showing students how the pythagorean theorem can be used to square a corner when building a small structure like a shed or chicken coop, something that many of them may build in their lives, no matter what career they follow, living in a small city that is surrounded by a lot of rural farmland like it is in Samson. The data connected for this research, however, show that, at least for high school freshmen, connections to probable future adult lives and careers has limited utility.

In history, the connections to students' futures is often through skills like evaluation of complex topics, an understanding of cause and effect, an understanding of civic life, and an understanding of human life and behavior. But this is still nebulous for a high school freshman. The lessons taught by the teacher researcher found that connecting to these skills, including drawing direct connections from these skills and their uses in student's lives, both now and in the future, did little to increase motivation and engagement among the students. A lesson that evaluates how well a president dealt with a crisis, such as Watergate or the Iran Hostage Crisis, with focus on the drama of the event and the leadership qualities of the leaders did not increase

engagement as seen in the informal observations of the teacher researcher. Lessons on social history, about Americans not so different from themselves, such as the Civil Rights Movement and the Movements of the New Left, likewise generally didn't inspire engagement based on content. In a lesson focused on why non-leaders supported civil rights leaders, students were less than motivated to read primary source documents from these organizations and individuals. All three students watched by a colleague during a jigsaw study of New Left Movements that were advocating civil rights were engaged at their average level of engagement or below. Student F was at their usual 100% engagement, but this student is an outlier among all the other students. Student B, for example, was only engaged during 44% of the colleague check ins, lower than their average of 46%. Student H also sees a dip in engagement, only engaged during 44% of the check-ins, as opposed to their average of 79%. Overall this isn't drastic, but the idea that making connections to students, trying to communicate relevance where they don't naturally see it, as being a powerful tool to raise engagement doesn't follow the observations and data collected here.

This can also be seen through my informal observations of my classes. Whenever connections are made to things like engineering or jobs with numbers students generally don't show any interest. The one exception is Student R, who in their survey responses showed that they see engineering as a relevant part of math, that "math is in everything". But generally, students seem to have a radically different idea of what they might be doing as adults than what the adults around them might hope for their students and give them relevance through. Most students don't seem to care for engineering or architecture, either as a career or as smaller do-it-yourself projects. They don't see that as relevant to them. Students either aspire for something related to social media, or they aren't thinking that far ahead. Almost all of the

students in this study are freshmen, so that may be why they aren't thinking ahead too much at this point, but this still shows that career or adult focused relevance has limited utility in getting students engaged and motivated to succeed.

Overall, it seems that students didn't connect with relevant connections made in the material to skills, jobs, and careers that could be useful to them when they are adults. Perhaps a group of seniors could see that relevance, but these freshmen generally struggled to see it. Whether that's connecting the pythagorean to building a structure or understanding how young men felt during the Vietnam draft. This then begs the question, what can promote motivation and success for students?

Hands-on and Gamified Activities

Students in the classes observed had positive reactions to lessons that included more gamification elements and involved them getting up and moving around and doing things physically. There are many examples across the teacher candidacy of the teacher researcher. In US History the most powerful example is an activity where students experienced the draft themselves. They got up and found their lottery number and had to experience the progression of draft numbers called as the Vietnam War progressed, standing up when their number was called and reacting with the class. The class interactions also created an engaging atmosphere. Students then had to write down their thoughts on the draft throughout the activity. This movement and class interaction, as well as the numbers gamification of not knowing if you'll be called were very engaging for students.

All three of the students that were being observed by my colleague had increased engagement during this lesson. Student F was engaged the entire time, but that's not abnormal for them. Student H was engaged for 8 of the 9 check-ins by my colleague, a marked

improvement over their average of 79%. Student B also saw an improvement, Up to 55%, significantly higher than their usual 46%. The informal observations and reflections of the teacher researcher also corroborate this. Students were focused on the activity and each other's place in the draft order, commenting on what each would do as their numbers got close to being called, and then called.

The Algebra One class had many opportunities to gamify instruction, and each one had success with increasing student engagement to varying degrees. The most prominent one was a murder mystery where students had to solve an equation for x to find clues to work through a logic matrix of suspects, weapons, and places. The classroom was turned into a crime scene, with caution tape, an overturned table, and the outline of a body. Every single student was engaged all the way up until the end of class. It was a master class of gamification and student engagement and success both reflected it. All but one student completed the project by the end of class, and that one student was almost done. There are a few other great examples of the success of gamification in the Algebra One class. In one, students had to solve systems of equations to uncover a spy in the Matterhorn project, the project to develop a hydrogen bomb by the US government in the early 1950s. Not only was this connecting to what students had recently learned in their US history class, about the early Cold War with the Soviet Union, but it gamified solving systems of equations. While not as successful as the murder mystery, it increased engagement significantly. Most students were engaged from beginning to end, and even the ones who were not were more engaged than they usually were.

One particular example that has the colleague observation data behind it was a scavenger hunt that had students multiplying binomials and factoring quadratic equations. As recorded by the colleague observer Student R was on task the entire class, even working on other work once

they had finished. This is odd for this student, but increased engagement was the case for the other two students as well. Student Y, whose average engagement during check-ins was 79%, was on-task in all but one during a 65 minute class period, coming to 92% engagement. Student T was likewise engaged significantly more than normal, actually also engaged for 92% of check-ins, compared to their average of 60%. The rest of class, using the informal observation of the teacher researcher, showed almost complete engagement throughout the lesson. A few students needed some redirection to get back on task, and one student lost interest after only a few minutes. But even this was an improvement from standard lessons, even ones with explicit connections to engineering and construction, for example the student who stopped engaging after only a few minutes generally is completely non-compliant.

This connection makes perfect sense as well, given the nature of the modern technology these students will have grown up with. Video games and short-form videos on social media permeate their lives, and have since these students were young. Not only will this affect their interests, possibly explaining their future aspirations, but it will also affect how they interact with educational content today. Making educational content more fun with low, but repeated, rewards as they progress towards the learning goal has been shown in the teacher researcher's informal observation and colleagues' formal observations to increase students' initial interest and sustained motivation to complete the task.

Feedback Loop Between Success and Perceived Relevance

One interesting finding was that not only did perceived relevance influence motivation, and then success, but that same success also fed back into students' perceived relevance. It seems as though if students succeed at a task or skill, they then see that skill as more important to them. This can be seen through several students who, through various motivating factors like

gamification and increased pressure from parents, worked to increase their success, through turning in assignments and increased scores on tests. Student C is a perfect example of this phenomenon. For the first three units this semester they were missing assignments and getting lower grades on tests, between 53% and 80%. Then, early in Unit 4, they really improved in terms of completing assignments and their test scores, rising to consistent 100% scores and turning in all but a couple of assignments. The quality of their work is also very impressive, writing more thoroughly and detailed than assignments require. They even did an extra credit assignment. In the ending survey after Unit 4, they communicated a much higher perceived relevance than their pre-unit survey. In the end-of-unit survey they communicated that Vietnam was very connected to events today and that they saw a heightened importance in learning the subject.

In the informal observations of the teacher researcher, it was observed that when students see success in some assignment associated with a unit, whether that's due to gamification, more concrete material, or student's own resiliency, they they see a greater relevance in the larger unit, doing better after their success on the remainder of that unit. One student did a project about the foundation of Social Security during the New Deal, and then when changes were made to it in the Great Society, they found more relevance in the information because they had done a successful project on the same topic, and was able to connect the new learning with previous knowledge, identifying with it further because they associate their own work on the topic to be a success.

Student Q shows this in the math class. They gave responses in the survey that oscillate between high relevance to some skills, like ones connected to statistics, and low relevance to algebraic skill, like solving linear equations. During the radicals unit, where the class solved

radical equations and used the Pythagorean Theorem, many students, Student Q included, struggled to get their heads around what the math was doing. Student Q obviously underestimated their own understanding, getting the highest score in a quiz halfway through the unit. After getting their almost perfect score back, Student Q was suddenly more interested in asking specific questions to further their own understanding of the material. That interest carried them through the remainder of the unit. Smaller cases of this could be seen throughout other units, such as Student U doing well at factoring quadratics and so becoming more interested in staying good at that skill.

The data clearly shows that when students see success in a skill, they build an interest in staying good at that skill, and sometimes a wider appreciation of the topic or whole subject. This might be for many reasons. Maybe students see a competition with their table for who can do the work the best or the easiest, something clearly the case with Student Q from observations by the teacher researcher, or an interest in better understanding a topic that they find they are suddenly very competent at, such seems to be the case with Student Q. Repeated forays into the same topic across time seems to build views of competence and therefore interest, such as the student studying Social Security. It almost doesn't matter what initiates the success, excluding any dishonest ways to get ahead, that success can in many ways create greater interest in the skill or topic for the students and, as has been shown above, that growth in interest will create more motivation and therefore greater success.

In summary, the data supports the argument that student motivation and academic success are strongly connected to whether students perceive classroom content as relevant, engaging, and personally meaningful. This relevance feeds into motivation to complete tasks and then into success in assignments and assessments. Connections to careers or students'

futures as adults has limited utility in motivating students through relevance. In contrast, gamification of lessons does increase motivation and then success. This is important because when students succeed in their academic tasks they actually retroactively see more relevance in the task, topic, or even whole subject matter, feeding into a positive feedback loop of success. These details will be further discussed in chapter 5.

Chapter 5
Discussions, Limitations, and Conclusion

In the course of this study, the teacher researcher used many instructional strategies found in the previous studies discussed in chapter two. The first, and most prominent throughout the research and the study, is to directly tie subject matter and skills to students' lives. This is usually done differently between math and history classes. In math, in the research and in the study, it is overwhelmingly done through practical application and use in career fields. In history, this is usually done through looking at identity, understanding people, and understanding society. This approach to instruction to enhance relevance was used throughout the study through making connections like how students can use the Pythagorean Theorem to square a wall in a small construction project, and in US history through connecting the experiences of draftees and soldiers to students' experiences in simulations and watching video.

Another instructional strategy used in both this study and previous studies examined in chapter 2, such as Van Straaten et al. (2016) and Miguel-Revilla (2022), was the use of constructionist approaches to student learning. This instructional approach focuses on the student, often through discussions among students and reflections within students. This study used both of these approaches, especially in the history class. Historical inquiry was also utilized by this study, though not to great effect as a result of the inexperience of the teacher researcher.

A specifically math-focused instructional strategy that this study utilized was Mathematical Modeling Instruction. This instructional strategy uses real world examples to ground the math students are doing. This was done through larger situations, like bicycle races for linear equations, number of chickens and sheep by comparing animal numbers to leg numbers for systems of equations, and water balloon tosses for quadratic equations. Those are some examples of how this strategy was used throughout this study.

One approach that was used extensively in history was the Student Perception Approach. This approach focuses on students' own beliefs and attitudes. Many of the articles analyzed in chapter 2 used this approach in some way, Berg (2019), Brown et al. (2008), Dessingué (2024), Grever et al. (2011), and Miguel-Revilla (2022). The way this manifested in this study was through students connecting the politics of the 1970s to their open beliefs, taking a political placement test and comparing beliefs to the 1970s left and right.

One approach this study took that differed from the research in chapter 2 was the use of gamification across both subjects. This decision was made for multiple reasons. First, this approach fits the temperament of the researcher, a long-time designer of games. Second, in a world where students grew up with video games of all kinds on all kinds of devices, including analog in the form of board and card games, gamification is more impactful than ever. Students will be comfortable with the light dopamine hit of completing a stage in a gamified lesson. One way this was implemented was in murder mystery clue hunts, where students are detectives and use math to solve for clues to find the suspect from a group of possible suspects. Another game was a spy hunt where students had to solve systems of equations to find clues about a possible leak in the Matterhorn Project, the project developing a hydrogen bomb in the early 1950s. This also connected across subjects to what the students were learning in US history, where they had just recently finished an early Cold War unit.

In US history gamification took a different appearance, simulations. The most prominent example was a Vietnam War draft activity where students got their real birthday number from the December 1969 birthday raffle. Then the student sees the numbers called by the fictitious local draft board, numbers averaged from the entire US numbers called over the last 3 years of the war. Students would then stand as their numbers were called, writing reflections at different

points of the draft. Students get a feel for how young men felt seeing their draft numbers go up and not knowing if they'll be called. Other versions of gamification for students experienced in US history was a jeopardy game and regular review games where students get into teams and answer questions for a score before a test. Students also had report card activities where they were able to grade different presidents on various aspects of their presidencies, able to act like a teacher and assess historical figures.

The instructional approaches in this study were largely aligned with the major approaches found throughout the literature reviewed in chapter two, especially in the emphasis on making learning relevant to students' present lives and future goals. Like many of the studies, the teaching approaches in this study connected mathematics to practical applications and careers through mathematical modeling activities, while history instruction focused more on identity, citizenship, empathy, and understanding society through simulations and reflective activities. However, the instructional approaches of this study differed from much of the literature through its extensive use of gamification and simulations across both math and history. While the research often emphasized relevance, inquiry, or student perception, this study uniquely incorporated game mechanics, competition, roleplay, and immersive activities such as clue hunts, review games, and draft simulations to increase engagement and emotional connection to content. These approaches reflected both the teacher researcher's personal background in game design and an awareness of modern students' familiarity with interactive media, making this implementation more experiential and entertainment oriented than many of the studies analyzed.

Limitations

The two guiding pedagogical theories that underpinned this study were social constructivism and expectancy-value theory. This study successfully applied both aspects of

expectancy-value theory, encouraging students through the focus on the value, future and present, of the content and skills being studied and through building student self-efficacy through student success. However, explicit comparisons to the usefulness of math and the connections to students in history could have been done more consistently. For social constructivism, content was consistently used to explicitly build on students previous knowledge through reflection, and to build social knowledge through discussion. However, discussions to build social understandings could have been done more. Much work was individual, with some of the cooperative learning only incidental as students worked together with neighbors and tablemates.

The implication of these pedagogical limitations is that future studies looking at how deliberate attempts to build relevance for students that use these pedagogical theories will want to see how more consistent connections to future careers and building of empathy for students increases relevance. Future studies will also want to host more consistent discussions to build a more robust social knowledge that may get relevance through to students better.

There are many methodological limitations in this study. The length of time the teacher researcher knew these students before the beginning of this student was limited to a few weeks, as a semester change had recently occurred and the teacher researcher was relatively new to the school. Another limitation is that the study itself was not as wide and as long as would be required to come to truly robust conclusions. The implications is that the length of study and the number of students involved should be taken into account when discussing the conclusions. A future study should be done with a teacher more established in their school, with more classes, and for a longer period of time. This will allow for more data from more sources with a teacher who knows the school and students more to discover more precise themes that stand up to even more scrutiny.

There were a couple practical limitations as well. First and foremost, the teacher researcher in this study was a teacher candidate. This means, in part, that the teacher researcher was learning how to teach to a significant capacity throughout the study and that other concerns, like university obligations, drew the researcher from focusing on the lessons and the data to an even greater degree. The biggest limitation caused by this, however, is that the teacher researcher didn't have their own classroom or a full slate of classes to gather data on their teaching strategies from. The implication of this is that other teachers, with full class slates, more experience teaching, and fewer educational distractions, should be able to use the instructional strategies used in this study to greater effect, or at least greater understanding of the effect of the strategies.

Conclusions

The question "Why should we learn this? When will we use this in real life?" is one heard in classrooms across subjects and across the country. This is ultimately a question about relevance. How can teachers make the content and skills relevant to students to help motivate them to push towards success? Throughout this study various pieces of data were gathered to measure students' perceived relevance, students' motivation, and student's success in two subjects, Algebra One and US history. Several things were discovered from this data. The perceived relevance of a topic by students feeds their motivation and their success. Connecting content to future careers and uses has limited utility in communicating relevance. Hands-on and gamified activities have great effects on student motivation and success. Lastly, there is a feedback loop between success and perceived relevance. From these conclusions teachers can support student motivation, the ultimate goal of relevance in the first place, through gamification and supporting the success of students to feedback into perceived relevance. Larger studies, with

longer data collection periods, more students of different ages and in different classes, and from teachers who are more experienced and have prebuilt rapport with students can build on this study and push our understanding of student relevance and further.

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