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The Benefits Of Utilizing Technology In The Physical Education Classroom

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THE BENEFITS OF UTILIZING TECHNOLOGY IN THE PHYSICAL EDUCATION CLASSROOM

By

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TABLE OF CONTENTS

CHAPTER ONE

Introduction

Overview of the Chapter

As a first year physical education teacher, I found myself struggling to communicate with and teach my Hmong and Karen students. After a few failed lessons, I realized that my students did not understand what I was asking them to do. After trying to continuously demonstrate a skill, I quickly realized that I could not keep this up for long periods of time while simultaneously helping individual students. I knew I needed to create visual aids to help these English Language Learners follow along with the class and understand what I was wanting them to do. I needed a way to provide constant visuals for my students to be successful. I realized I needed technology in my gym to reach these learners. I started using a PowerPoint and an old projector, but I continue to discover new ways to improve my physical education class for my students. The research question I am asking is: How can technology enhance learning in a physical education classroom? In what ways can it be implemented? I want to increase my technology tools past just visuals. I hope to find resources related to behavior assessments, cognitive assessments, new fun games and activities as well as ideas on ways to minimize transition times so that my lessons run as smoothly as possible.

For my capstone project, I will be creating a website. This website will be a place for my fellow physical education teachers to access technology ideas as well as examples of ways to implement them into their classes. I envision many different categories that users can click on to access technology that will provide assistance in teaching strategies, behavior management and cognitive assessment. Once the user clicks on the category,

more information will appear about the benefits of utilizing this technology in the classroom as well as examples and suggestions for resources. My goal is to create a website that provides my fellow physical education teachers with the most beneficial technological ideas located in one spot.

Throughout this chapter, the reader will learn about how I began utilizing technology in all of my lessons, how I decided on the research question stated above, as well as why I believe technology in the physical education classroom is vital and can impact other physical education professionals in this area of study.

Educational Experience

I was thrilled when I got a job teaching physical education at a low income charter school in East Saint Paul, Minnesota. The kindergarten through eighth grade school was made up of 98% Hmong students. I knew that there would be English Language Learners in my class, but that year, there was a huge influx in the Karen population as well. This was a population of people that I knew nothing about except that I would have a hard time communicating with these students.

I was a first year teacher and remember being overwhelmed by lesson planning, behavior management, and connecting with the students. After the first week of school, I spent some time reflecting on the lessons I taught and remember thinking, do the students understand what I am saying? Am I talking at them too much? Are they moving enough? What can I do differently to help them understand and be successful in my classroom? The answers to all these questions were disheartening: my students did not know what I was saying. I knew I needed to find a way to reach all of them!

During my lessons, I would always demonstrate the skill I wanted the class to practice. I started to notice that some students would start right away while many students would look around at their classmates before they began. I knew that I had to do something different for these students whose first language is not English. I started by creating a word wall to help my students visually see the words that I was saying aloud. I quickly realized this was not enough; I also needed to provide constant visuals for these students to be successful. I brainstormed ways that I could provide visuals without having to demonstrate the skill myself over and over throughout the entire class period. I asked my principal if the school had an old projector that I could use. I dug through a dark, scary closet and found one. I also found a cart to put the projector on and a long extension cord so I could make the images large enough on the wall to see it from every corner of the gymnasium. I taped a bunch of pieces of white paper on the gym wall so what I was projecting was easier to see. This helped a little, but ultimately I ended up turning off the lights and teaching my lessons in the dark. The students knew to be careful of the extension cord that was laid in the middle of the floor during the lessons and thankfully no one tripped on it. This was not an ideal set up but it was better than nothing! I began making PowerPoints of the units we were working on in class. Each PowerPoint had individual slides of specific skills I wanted the students to practice as well as teaching cues so that they could successfully perform the skill. It was a start.

This is how my love for technology in the gym began. I started to see changes in my students' confidence. They knew exactly what they were supposed to be doing and if they forgot an important cue, they knew to look at the screen. My students were suddenly in charge of their own learning. The following year, I used the same old

equipment and spent my time researching technology in physical education. I went to a school board meeting and presented some of the great things that were happening in the physical education classroom, and asked for a television so I could improve the program. The following year, our school decided to invest in Smart Boards instead. I was thrilled when my new Smart Board arrived on wheels! My visuals were so much easier to see from anywhere in the gym and I no longer had to teach in the dark or worry about the students getting hurt while they moved around the gymnasium.

With the new screen in the gym, I now had the technology to improve my lessons. I began spending my free time researching Apple Applications (apps) that I could use to improve my teaching. I figured out how to connect my iPad to the Smart Board and found a few apps that improved my visuals and teaching. I began implementing them into my classes and saw a change in how my lessons went. By providing constant Gifs on the screen, my students could look at the Smart Board and see what skill they should be practicing during the lessons. I tried a lot of different ideas I had that year. Some were beneficial and others were not, but it was neat to watch my students' confidence improve as well as their individual skills.

After five years, I left that school in the fall of 2019 and started a new adventure teaching in the school district where I currently reside. The students I teach now no longer all fall in the English Language Learner category but I still believe that implementing technology in the physical education classroom is beneficial for all students. Students who fall into the categories of English Language Learners, Special Education, and general education can all benefit from constant visuals, reminders about what skill they should be practicing, as well as important cues to correctly perform the

skill. The question I am asking is: How can technology enhance learning in a physical education classroom? In what ways can it be implemented?

Research Importance

The use of technology in physical education classes is essential to student learning. By implementing technology, students can see constant visuals and be responsible for their learning. There are so many other ways to implement technology into the classroom which include cognitively assessing students, assessing behavior, as well as improving transitions between classes.

In spring of 2020, due to the Coronavirus, our school switched learning models and I began teaching from home. I had to think outside the box and generate new ways to teach students from a computer. This was very challenging for all teachers, but especially physical education teachers. I had to create an entire new curriculum and brainstorm a list of equipment that students would have at home and could safely use. Looking back, teaching during a pandemic definitely made me a better teacher! During the 2020-2021 school year, we continued to switch models, from distance learning, to the hybrid model and, lastly, to fully in person learning. No matter the model, technology was the backbone of my teaching for eleven months. It is so critical that I continue to research new forms of technology regularly and determine how they can improve my teaching in these unprecedented times.

Professional Importance

As a physical education teacher, I have always strived to be the best teacher I can be. By implementing technology into my lessons, I believe I can do just that. There are many reasons that my physical education colleagues should do the same. For example,

there has been an increased number of English Language Learner students throughout schools across Minnesota. Teachers across the state could use these technology tools that I learned when I was teaching the English Language Learners to improve their lessons while keeping in mind that the use of technology is beneficial for general education learners as well. Our nation's youth are used to using technology in their everyday lives and, due to the pandemic, have become more familiar with a device, different websites, and apps.

Many students have devices that promote fitness in the palm of their hand or on their wrists. Apple Watches, Fitbits, Garmins, etc. are all devices that keep track of fitness levels. These can be used in physical education classrooms along with step trackers or heart rate monitors. These are some examples of technology tools that can be used to validate and engage students in more movement, and can also be used as motivation tools.

Students are exposed to technology in their other core classes, so it makes sense to apply the same tools, such as chromebooks and the Schoology website, throughout all courses. This way, students know what to expect in each class. Technology is used in all of our students' classes; physical education should be no exception.

Lastly, as an educator, it is extremely important to reach all students. This includes students with varying abilities, both developmental and gross motor, so each student is accountable for their learning. The technology and tools outlined in this capstone will elaborate on how this is possible for every student!

Summary

Chapter One examined my personal and professional journey to get to the research question: How can technology enhance learning in a physical education classroom? In what ways can it be implemented? I am educating myself on resources that can better my teaching in the physical education classroom. I want to increase my knowledge and understanding of ways to improve behavior assessments, cognitive assessments, new fun games and activities, as well as ideas on ways to minimize transition times and create a smoother learning environment for my students. Due to the Coronavirus, my school and many others had to switch between learning models many times. Technology has been vital in teaching my students from home, in the hybrid model, and full in person classes. As an educator, it is my job to ensure a learning environment that is beneficial for all students, and this capstone project will help me reach all of my students no matter their ability as well as give them the tools to be successful in the gymnasium.

Chapter Two will provide the reader with a literature review completed by professionals in the physical education field. The literature review will include the history of physical education, and how it has changed over time, specifically during the Pandemic. I will also discuss the importance of physical education class and students' daily movement, and lastly, the benefits of using technology in the physical education classroom. These studies will help me show the reader why technology is essential in physical education and how it can improve, not only the students' learning, but the whole class period so students are sitting less and moving more.

Chapter Three will detail the website I plan to create, the audience and a timeline in which the website will be published. Finally, Chapter Four is a conclusion to the capstone project, a reflection on the new connections I have made during this process as well as future research that needs to be done and how this project may benefit my fellow physical education teachers.

CHAPTER TWO

Literature Review

Introduction

The literature review will examine previously completed professional research on the history of physical education, the importance of movement, and the benefits of technology in the gym. As an educator, it is important to understand where physical education began, and the important dates in history that changed the class over time. Movement is vital for everyone, but especially our youth. As physical education teachers, it is our responsibility to instill a lifelong love for physical activity. Technology in the gym can help students keep moving, stay engaged, and is an integral tool for a successful teacher. The guiding questions for this research are: How can technology enhance learning in the physical education classroom? In what ways can it be implemented? The history of physical education will tell the reader where the concept of physical education began, the strides that have been made in improving the lessons for all learners as well as what technology can be used to enhance physical education classes. The purpose of this research is to inform fellow physical education teachers on the amazing technology that can be used to improve classroom management, assessments and transition times throughout the course of their lessons.

History of Physical Education

Knowledge of the human body is obviously an ever-growing field. To fully understand the importance of physical education and the way it continues to develop, it is important to look back at its history. Hundreds of years ago, fitness was only considered necessary in preparing for war; years later, it was discovered that a healthy body is

important for everyone. Since that finding approximately 200 years ago, physical education has been a subject taught in schools (Castalia Media Firm, 2016). The importance of physical education as a class has continually grown since. This section will provide information on how physical education became a core subject in our education requirements, as well as how the course has changed over time, especially during the COVID-19 pandemic.

The early influence of activity and fitness dates all the way back to 370 B.C. Back then, the military would train their soldiers by incorporating different exercise regimes into their daily routine to prepare for war. Hundreds of years later, Ben Franklin became the first well-known advocate for health and exercise. Not only did he create bifocals and swim fins, but Mr. Franklin also conducted research and promoted the benefits associated with daily health and fitness for individuals of all ages (Castalia Media Firm, 2016).

Medical doctors were the very first physical education teachers. With their knowledge of the human body, these doctors led studies to test muscular strength, muscular endurance, cardiovascular endurance and flexibility. "It was in the 1820's when the first schools began placing physical education as a permanent class in the curriculum...At the end of the 19th century, California was one of the states which made it mandatory for all schools to hold two sessions of physical activity per day," (The Education Trend, 2021, p. 1). This is the first record of physical education class being taught in schools in the United States.

In the mid 1800s, public parks became more accessible to citizens and an emphasis on fitness grew. Gyms and recreation centers such as the YMCA and YWCA,

also became very popular. It was during this time frame that games, activities and competitions such as basketball and volleyball were created and began being played as an additional way to exercise. This was a great way to not only get people moving but to develop sports, recreation, and physical education programs in schools (Castalia Media Firm, 2016). However, the majority of the countries around the world only offered sports as club sports, not competitions, as we did in the United States.

Inclusion in the Physical Education Classroom

It was not until after World War II that the subject of physical education became vital in the school curriculum. This was a class that was valued as a way to reach all students, with an emphasis on developing character and sportsmanship through exercise (Castalia Media Firm, 2016). In 1972, Title IX went into effect. "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance," (U.S. Department of Education, 202, p. 1). This meant that schools and universities now legally had to offer the same amount of opportunities and activities for both men and women. Title IX was a huge accomplishment for our country and gave women opportunities to participate in competitive athletics that they did not have before.

A few years later, another huge milestone was made with the passing of the U.S. Education for All Handicapped Act of 1975. This act enforced that "all handicapped children had the right to a free, appropriate public education with an emphasis in special education services" (Castalia Media Firm, 2016, 23:05). Developmental Adapted Physical Education (DAPE) began to be recognized as an important service for special

education students to receive in order to work on their gross motor skills. These services were designed to meet the students' individual needs, helping them learn at their own pace while continuing to challenge and motivate these students.

The 1980's physical education curriculum stressed an increase in fitness testing, as obesity was on the rise nationwide. "It is our nature to be physically active, our society in many ways teaches us to be inactive," (Castalia Media Firm, 2016, 32:42). Since then, physical educators have been educating our youth on healthy eating habits and the importance of daily movement, with more of a focus on skill development. Fitness is no longer the primary focus of the physical education curriculum. Students also learn body control skills, spatial awareness, eye-hand coordination skills, cooperation, sportsmanship, and strategies during game play.

For years, National Association for Sport and Physical Education (NASPE), American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), Society of Health and Physical Educators (SHAPE) America, and the President's Council on Sports, Fitness and Nutrition have been the leaders in the physical education field. These organizations have developed the national standards and guidelines for quality physical education programs around the country. These standards and guidelines focus on developing skills, understanding movement concepts, participation, respect for self and peers, as well as valuing physical activity (Thissen-Milder, 2006). It is the educators' responsibility to teach students an array of skills, knowledge and self-confidence so that they cannot only participate in physical activity in school but throughout the course of their lives. Physical education teachers had largely been providing in-person instruction in gymnasiums all over the country until March 2020, when schools, restaurants, and

businesses shut down due to the spread of COVID-19.

The Effects of COVID-19 on Schools

"Closing schools for eight weeks or more may have a greater impact on mitigating the spread of the novel coronavirus than two-to four-week closures, the US Centers for Disease Control and Prevention has said" (Clary, G., & Asmelash, L. 2020, p. 1). School districts nationwide sent teachers and students home, and in a matter of days, the education system was flipped upside down. Teachers began practicing using the websites, Google Meets, and Zoom to deliver their lessons while students received devices from their school and learning from home became "the new normal."

At this time, nearly 50 million students were learning from home. Every teacher and support staff member had to be creative about how they would effectively reach and teach their students in this new setting called distance learning. Forty percent of physical education standard-based learning is in the psychomotor domain, which includes motor-skills coordination and physical movement, so this posed an additional challenge for the physical education teacher (Hiedorn, 2020). Social media handles, #HPEatHome and #physed started trending, and physical education teachers around the world were working together to share lesson ideas, ideas about household items that could be made into equipment, as well as interactive videos on YouTube. The goal for these teachers was to continue to provide engaging lessons focused on skill development, cognitive knowledge, fitness, and self-confidence throughout distance learning. By thinking outside the box and creating engaging lessons, students were more likely to participate. Using a platform such as SeeSaw or Schoology, teachers could create activities, assessments or multiple choice questions to hold students accountable during the distance

learning model. "If our field of physical education loses sight of student learning in motor skills and movement patterns (Standard 1), and we primarily focus on physical activity and fitness (or other meaningful endeavors), in time, we may be fighting for more than just our health or against the repercussions from a serious virus," (Heidorn, 2020, p. 5).

During distance learning, however, many educators faced unforeseen issues that are normally not a problem in face-to-face learning. Students now refused to turn on their camera, microphone and some did not log on to take part in the lesson. It was especially challenging for physical education teachers to not only make sure that students were participating, but to assess skill development as well. "In fact, PE classes help individuals to learn motor skills, promote collaboration among students, or encourage social interactions through group events or competitive events. However, online PE classes may not provide these educational benefits to the students because the educator and the students are physically and spatially separated," (Yu, J., & Jee, Y., 2021, p. 2). These physical education teachers now had to once again think creatively and determine how to help their students participate in the lessons. This was problematic for many teachers, in all subject areas, all around the country.

When the Centers for Disease Control and Prevention (CDC), as well as state and local officials determined it was safe for all parties to go back to the school building, many school districts did this in stages. It began with the hybrid model, which included half of the class in person, while the other half was at home completing distance learning activities. Many teachers, students, and staff members were anxious to come back into the building to receive a more conventional way of learning, while also trying to maintain

a safe distance from their peers. With classes cut in half, teachers could spread desks and tables six feet apart in the classroom, and students could be even farther apart in the gym. Constant equipment cleaning and giving students hand sanitizer multiple times throughout the class period became the new normal. This cleaning ritual added a significant amount of time to lessons, so students now had less time to practice a skill, play a game or activity, and work together with their peers.

Officially more than a year since the first case of COVID-19 in the United States, many schools, kindergarten through twelfth grade, are now fully back in person. The list of changes and differences compared to last school year include one direction school hallways, assigned seats in the cafeteria, desks and tables spread out three to six feet away from one another, playground divisions so students from multiple classes do not mix, constant hand washing, sanitizing, and the enforcement of wearing masks all school day. It has been a challenge to adapt to all of these changes in the school building, but over the last school year, students never stopped learning.

This section discussed the history of how physical education has evolved from its beginnings as military training in 370 B.C. to the present day's more holistic approach to health. During the COVID-19 pandemic, school buildings were closed while teachers, students, and families had to figure out how to work together to navigate this uncharted territory of learning. The next section will provide information on the importance of daily student movement.

Importance of Movement

Physical education class, movement breaks within classes, and recess are all essential in improving students' ability to focus and follow along with lessons. After all,

physical activity has been proven to enhance cognitive function, academics, and behavior (Meijer, 2020). It is thus clear that students need to be able to move their bodies in order to be healthy and successful in school. This section will explain the ways in which movement benefits the body, and why physical education is thus an essential class for all students.

"Physical inactivity and childhood obesity represent pervasive, and arguably the greatest, health challenges to our children today," (Chaput, 2014, p. 12576). Adults and children alike are more sedentary than ever. A 2014 study in Canada found that sleep, physical activity, and sedentary time all have an impact on one another. There are 24 hours in a day, and researchers believe that it is important to acknowledge that obesity just does not occur from sitting too much. It was determined that participating in moderate to vigorous activity daily with less sitting around and more quality sleep patterns "has been shown to provide numerous health benefits," (Chaput, 2014, p. 12576). Obviously school districts and teachers cannot control the amount of sleep students get, so it is up to the schools to help increase student activity when they are in the building.

According to the Center for Disease Control and Prevention, it is important that students 6-17 years of age move their bodies at least 60 minutes a day (CDC, 2021). This includes a variety of enjoyable, leisurely activities as well as exercises that build muscle, strengthen bones, and increase heart rate. In a school setting, it can be challenging for students to move this much if physical education class is not offered regularly.

There are many positive outcomes of daily physical activity on the body. "Benefits include improved thinking or cognition for children 6 to 13 years of age and

reduced short-term feelings of anxiety for adults," (CDC, 2021, p. 1). Improvements in students' ability to think clearly and maintain focus is vital when learning new information. Research has shown that daily physical activity can also improve reasoning skills as well as sleep quality, and reduce the risk of anxiety and depression, (CDC, 2021). During the COVID-19 pandemic, once-a-week physical activity was not sufficient in reducing anxiety levels for many people (Meneguelli, 2020). "It is important that individuals take frequent and lengthy physical activity to diminish levels of anxiety. In particular, moderate and/or vigorous physical activity performed regularly at least 3 days a week for 40 minutes per session seems to exert anxiolytic effects during Covid-19 pandemic," (Meneguelli, 2020, p. 7).

Physical education is a crucial subject for students because it is a space where they can move their body, reduce anxiety and depression, as well as improve reasoning and sleeping skills. Attending physical education class not only improves growth and development but it gives students the opportunity to freely and safely move their bodies in a gym, cafeteria, or field. Playing games in this environment is beneficial for students' body awareness, control, eye-hand coordination, and cognitive development.

Studies have shown that physical activity is essential for everyone, but especially students. Children should receive at least 60 minutes of movement a day to reduce anxiety and depression, and improve reasoning skills and the ability to focus. All of these are necessary for a child to be successful in school. Physical education class provides students with a portion of the day to move their bodies and practice body control and object control skills. The next section will provide information on why technology is a fundamental component when teaching physical education.

Benefits of Technology in Physical Education

Technology has been making everyday tasks easier for years. GPS has replaced maps, and cell phones do more than just make phone calls. Since technology is such an integral part of life, it makes sense to use it in the physical education classroom, too. Different forms of technology in the physical education classroom will not only provide constant visuals and motivate students but will also improve the flow of the lesson and cut down on transition times. This section will explain how technology is improving lessons in the gym.

According to the website Parentology-Parenting in the Digital Age, "forty percent of kids are spending at least 30 hours a week on their cell phones-nearly two days worth of cell tech time" (Hurtado, 2021, p. 1). Children use these devices for an array of reasons, as phones do so many tasks. Playing video games, watching shows and movies, communicating with family members and friends, and social media are the top activities students do on their devices (Hurtado, 2021).

Children have begun to rely on devices just as much as adults do. Cell phones, tablets and computers have become extremely motivating for students. They enjoy getting on the internet or opening an application (app) and playing a game. Instead of sitting and playing a game, being sedentary, what if students played an interactive game, one where they had to move their own body in order to make the character move? These games exist and are changing the way video games and virtual games are being played.

Games played by user movement. Today's students only know a world that encompasses technology everywhere they look. In their home alone, many students have televisions, computers, tablets and cell phones.

> With students living in a 24/7 digital-media world, and given the fact that today's students choose to spend much of their waking time engaged in digital media and technology, it can be assumed that they find enjoyment in such activities. Physical education lessons should respond accordingly and embrace such trends. As students find value and enjoyment in physical activity, physical education teachers can appropriately scaffold instruction by incorporating more complex skills and movement patterns as well as deeper cognitive understanding, and by helping students to recognize positive interpersonal behaviors — each of which is integral to a highly effective physical education program (Bruno, 2018, p. 45).

The question for today's physical education teacher is not, “Can technology and pop culture trends foster an appreciation and value for physical activity?” but, rather, “How do I embrace pop culture trends and technology in my physical education curriculum to foster an appreciation and value for physical activity?” (Bruno, 2018, p. 46). This is the question many physical education teachers are asking themselves in order to keep their students moving and fully engaged.

Pokemon Go, NFL Play 60, and Jump Jump Froggy are apps that can easily be put on student devices. These applications are all movement-based games where the user moves their body to move the character. Teachers can have students play these games during movement breaks, indoor recess or at home as homework to encourage movement. Recent findings regarding the most popular of these games, Pokemon Go, suggest that the benefits of the game include socialization, outdoor activity, and exercise. This is exactly what our students need. It does not matter how the students are getting their daily exercise as long as they are moving. Many educators and scientists agree that the more

exercise a child gets, the better.

Fitness trackers. For the past several years, wrist-worn fitness trackers have been very popular. Big name companies like Apple, Garmin and Fitbit have created devices that will track a user's heart rate, steps taken, calories burned, and can even sync to a phone to play music and answer calls. Lower end wrist-worn trackers and pedometers have been used in the physical education classroom for years to calculate students' movement, as well as being used as a measuring tool for engagement and effort. Devices like this can motivate a student because they can constantly see the number of steps they have taken, and be aware of what their heart rate is. By keeping a daily log, students could set a goal to beat their number of steps each class period. By setting these ongoing goals, it taps into students' competitive nature. Another way to motivate students is by teachers setting a goal of a walking destination; for example, walking to the moon. Each week the physical education teacher would add up the steps taken during the lesson by all students and document it on a poster board for the school to see. Once the student population reaches their destination together, the entire school or individual classes would celebrate and create a new destination or goal.

A study was conducted in England in 2016, examining the levels of fitness of boys aged 14-16 and their levels of motivation. All of the students in the study spoke English fluently, and the majority of them came from a low-income family. The goal of this study was to "explore the impact of an intervention using biofeedback on motivation to be physically active in PE; to determine if the intervention could improve physical activity levels in PE; and to gain a better understanding of the relationship between motivation and physical activity in PE lessons," (Nation-Grainger, 2017, p. 463). The

students were assigned to either a control group or an experimental group. Both groups conducted interviews and the questions were as follows:

> "(1) Did you enjoy PE in this unit of work and why? (Competence)
>
> (2) How important is it that you exercise in PE? (Relatedness)
>
> (3) Did you feel any pressure to exercise more in PE? (Autonomy)
>
> (4) What did receiving feedback do for you?
>
> (5) Do you think your attitude this term in PE will continue to the next unit of work?" (Nation-Grainger, 2017, p. 467)

Competence, relatedness, and autonomy refer to the student's ability to reflect on the lesson, make a connection to the importance of physical activity and their body and the freedom they have to make decisions for themselves. These questions were to be answered before and after the lessons.

> The key findings of this study were an increase in identified regulation and an increase in calories burnt and distance run in the experimental group over the six-week intervention. Some evidence that physical activity levels may have increased due to the feedback received from a digital device after each PE lesson. The results seem to support the use of positive feedback to increase PA (physical activity) levels in PE," (Nation-Grainger, 2017, p. 476).

These results prove that wrist-worn devices can help motivate students to try harder and be more physically active during the physical education lesson. The research was limited as the subjects were only English-speaking boys but the results are still promising enough that they are worth trying in the wider physical education classroom.

Implementing Technology During Instruction

The use of technology is also a great way for teachers to improve their lessons and creativity in the gym. The ability to provide constant visuals for their learners is imperative for quality teachers. A Smart television (TV), Smart Board, or even a projector are necessary equipment for students to be able to follow along with the lesson. Incorporating PowerPoint or Google Slides with pictures, videos and gifs (looping short videos) is vital. The use of visuals helps with classroom procedures, expectations, and transitions, too. These are very important pieces of having a successful class, and when they are not being followed, learning and moving time are decreased.

Media like this can be projected on the Smart TV for students to view at all times. In this way, technology almost serves as another teacher; it is able to demonstrate and model skills on repeat. Utilizing this technology gives the teacher time to be able to offer individual help to students who need it, as well as spend time connecting with the students and developing positive relationships. These gifs and other tools help students become responsible for their learning. If they are unaware of what skill they should be practicing, or what it should look like, the students can look at the television, watch, and then try it themselves.

Another great way to improve a physical education class is by implementing apps during every lesson. The applications listed below will make giving assessments quick and easy. The use of these apps will also help to improve transition times so that students are not waiting around, as undesirable behaviors are likely to occur during student downtime.

A quick and easy way to cognitively assess students in the gym is to utilize the app called “Plickers.” This assessment tool collects data within seconds, without having to pass out paper and pencils. Prior to testing, the teacher must create classes on Plickers.com by typing in each student's name. Once completed, each name correlates to a number. The students will each have their own card that has a unique black shape on the front. Each side of the card has the student's number as well as the letters, A, B, C and D. The teacher will project a multiple choice or true false question onto the television or board. To answer the questions, students hold up their card with the correct answer on top. The teacher will use a phone or a tablet to scan the cards and instantly receive feedback. On the teacher's device, the students' names appear green if they answered correctly and red if they did not. On the television, students' names will appear blue when their answer has been received, and with a click of a button, students can see the class percentage as a whole and how many students chose each answer.

> With the generated results, the teacher can address the question, check for understanding, or decide to move on with the lesson. The teacher can also download the results later to use them as a form of summative assessment. The use of the Plickers program gives all students the chance to participate and engage in learning without feeling self-conscious, (Chng & Gurvitch, 2018, p. 22).

Teachers can create as many questions as necessary and can use the same questions for multiple classes. A useful feature for checking for understanding is that pictures and gifs can be inserted into the question. This opportunity for visuals is great for students of all ages when asking an array of questions about body control or skill development, (Plickers, 2021).

The application “Class Dojo” is an exceptional way to take note of student behavior and participation, as well as communicate with families. The teacher develops the classes by plugging in the students' names. During class, the teacher can give points for on-task behaviors, participation, respectfulness, or anything the teachers deems appropriate. Likewise, they can take points away for off-task behaviors. Once created, the teacher can invite the families to receive notifications. This can be a beneficial way to communicate with families daily. This app can also just be used in class. For example, the user does not need to invite families; rather, it can be projected on the television as a motivational tool when giving the entire class points. The teacher can also use it independently so students do not see who is receiving individual positive or negative points. This piece of technology and the data that comes from using the app can be utilized for a participation score on the student’s report card.

Physical education teachers often spend more time than they would care to admit putting students on teams to play a game or activity. This can take time to do, and that wait time can lead to student misbehavior. Also, students frequently forget which team they are on. “Team Shake” is an answer to this problem. “Team Shake” is a great way to quickly split students into pairs or teams and get the students moving as fast as possible. The user enters students' names into the app prior to using it. Upon hitting a button in class, the students are instantly separated into the number of necessary groups (Apple App Store, 2021). By sharing this on the television, students can find their teams independently and the teacher does not have to waste time grouping students. If students forget, they quickly look at the television and go. This is a highly useful application for all physical education teachers.

If playing a lot of games with scorekeeping is important to the class, "ScoreKeeper" is a great way to project this information onto the television for all students to see. The user can have as many teams or individual names as necessary. Points can easily be added or subtracted, and the app will automatically put teams in order numerically from highest to lowest (Apple App Store, 2021). However, the teacher should use discretion regarding this feature--it may be highly motivating to some, but could discourage others.

Intermediate aged students all the way up to adults could use the app "Round Robin." Once on teams, the application keeps track of team wins, losses and which teams still need to play each other (Apple App Store, 2021). This is very beneficial in quickly organizing games and keeping a report of how teams and individual students did.

Lastly, a QR (Quick Response) Reader can be great for recording data instantly. The applications "QR Recorder" and "QR Stopwatch" utilize a QR code for each student. The codes can be printed on paper and carried by students or can be hung as a necklace around the student's neck so that they can still participate. These apps are great for checking how fast a student can do "the cycle" in cup stacking, timing how long they can run continuously or keeping track of how many laps they run around the gym. It is a great tool to hold students accountable for their learning, as they have to hold their QR code in front of an iPad for it to record the students data (Apple App Store, 2021).

Online Physical Education. Online physical education occurred well before the pandemic. One of the first online virtual schools was founded in Florida in 1997. Florida Virtual School (FLVS) educates students grades kindergarten to twelfth grade and teaches a variety of online courses, including physical education. To teach online, teachers at

FLVS used content videos and assessments to educate their students. A lot has changed since 1997, and new technology has improved during online schooling, (Beard & Konukman, 2020).

Cyber Village Academy, located in Saint Paul, Minnesota, offers two programs for students and families to choose from: Fusion Program (Hybrid) or Online School. According to the school website, Online School is 100% online and the physical education curriculum consists of asynchronous lessons that include videos, individual activities and daily journal logs. The school's director, Nicole Rasmussen, stated, "students are only given equipment if needed and use what they have at home for physical education lessons." This is a great alternative for students who work better at home and enjoy learning on a device (Cyber Village Academy, 2021).

Due to COVID-19, many districts around the nation will continue to offer online schooling as an option for students. It is important that physical education teachers stay up to date with ways to actively reach these students over the computer. Teaching physical education online can be challenging and it is important that the teacher have lessons, activities and games that are engaging and enjoyable for all students.

This section discussed the importance of implementing technology into the physical education class. Movement-based games are not only fun but require exercise to play and can be great for movement breaks throughout the school day. Fitness trackers provide motivation for students to work harder and do their best in class. Together, the teacher and students can set a goal and work to achieve it. Incorporating technology during lessons provides the visuals that are essential for all students to learn by displaying classroom fundamentals such as form, rules, and procedures. Smart TVs, PowerPoints,

Google Slides, videos and gifs are very helpful in providing students the ability to be responsible for their learning as well as giving the teacher the opportunity to assist students that need individual help. Lastly, the use of apps provides the teacher with the ability to seamlessly transition from one task to the next and assess the class quickly while keeping students moving as much as possible.

Research Rationale

The guiding questions for this research are: How can technology enhance learning in the physical education classroom? In what ways can it be implemented? The purpose of this research is to inform fellow physical education teachers on the amazing technology that can be used to improve classroom management, assessments and transition times throughout the course of their lessons. Many physical education teachers do not implement technology into their lessons and, in turn, students' duration of physical movement is impacted. I firmly believe that incorporating forms of technology such as Smart TVs, Google Slides, PowerPoints, iPad Apps, fitness trackers, Plickers assessments, and movement-based video games can drastically improve how the physical education lesson is conducted, and how much physical activity students receive. With the use of technological tools such as these, students will come into the gymnasium ready to work, be able to take responsibility for their learning and stay engaged. The research gathered supports ways to ensure students stay focused and physically active. COVID-19 impacted in-person learning, and teachers were left largely unprepared to make their physical education lessons technology-based. Obviously, there is not yet much research published on how successful physical education classes were during distance learning. Further research in this area could help teachers adapt to online learning more quickly in

case of emergencies, or to reach students who choose to attend school online for whatever reason. The use of technology in the gym is essential to take the physical education class up a notch.

Summary

This literature review examined previously completed professional research on the history of physical education, the importance of movement and the benefits of technology in the gym. The guiding questions for this research is: How can technology enhance learning in the physical education classroom? In what ways can it be implemented? The purpose of this research is to inform fellow physical education teachers about amazing technology that can improve classroom management, assessments, and transition times throughout the course of their lessons.

Chapter Three Introduction

Chapter Three will provide the reader with a detailed description of the website I am going to create. The website will be a quality resource for physical education and developmental adapted physical education (DAPE) teachers to find ideas to implement technology in their individual lessons. These technology websites, applications (apps), and additional devices/resources will assist in classroom management, improving transitions, assessments, as well as opportunities for fun new games and activities for students of all ages.

CHAPTER THREE

Project Description

Introduction

As an elementary school physical education teacher, I teach many different grade levels within a day. I have found that implementing technology into my lessons has several advantages: improving transition times between activities, assisting in behavior management, and assessing students during each class period. Not only that, but technology can keep students moving and engaged throughout the class period. This chapter will provide the reader with a description of the setting or the school district I work for, the participants or the targeted audience for my capstone project, as well as the website I will be creating. Research framework, rationale, and timeline will also be discussed so that the reader has an understanding of the reasoning behind this capstone project. The guiding questions for this research are: How can technology enhance learning in the physical education classroom? In what ways can it be implemented? The purpose of this research is to inform fellow physical education teachers about the amazing technology that can be used in the gym to help improve student engagement and outcomes.

Setting

School Description. I teach in the fifth-largest school district in the state of Minnesota, with a student population of approximately 21,000 students in pre-kindergarten through twelfth grade. The school district has 17 elementary schools, four middle schools, three high schools, and a learning center, which is a transition program for special education students 18-21 years of age. There are currently 22

elementary physical education teachers and developmental adapted physical education (DAPE) teachers throughout the district. The elementary school physical education teachers meet monthly to discuss the upcoming new curriculum, staffing changes, and ideas for professional development. The website I am creating could and should be used during these meetings or during an individual teacher's planning time to further knowledge and improve teaching practices. Elementary physical education teachers can use this website to find the latest and greatest technology in one spot and begin implementing it into their lessons as soon as possible.

Participants. As a first year teacher, classroom management was a challenge. I began searching the internet for helpful resources to improve this but found so much more. I began implementing the technology and I discovered that my students were more engaged, transition times were cut down between activities and I was quickly able to assess my students daily. I have had such great results that I want to pass these resources on and help inform other teachers. The intended audience of my project are the other elementary physical education teachers in my school district. The viewers will use my website as a resource to improve their lessons by adding constant visuals, classroom management, transition times and assessments. The viewers will see how easy the website will be to navigate and after further review will understand the importance of utilizing technology in the gym.

This section discussed the setting of my capstone project. My elementary physical education colleagues will hear first-hand the benefits of implementing technology into their classes. The next section will provide information on the positive impacts of educational websites.

Research Framework

Websites and web logs, or "blogs," have been around since the early 2000s, when social media began to take off. Individuals created their own websites to jot down ideas, recipes, or as online journals that others could view and interact with. Nowadays, there are websites for everything and most people feel comfortable navigating the internet. "The most immediate positive outcome of [educational] blogging is that it serves as a convenient vehicle for teachers to share their knowledge and offer each other feedback," (Ciampa, K., & Gallagher, T., 2015, p. 909). This is exactly what I want my website to accomplish. My colleagues will be able to access information on the benefits of using technology in the gym with the click of a mouse. Once on the site, users will be able to look at different categories and click to learn more about, for example, Plickers or apps that can motivate their students. My hope is that the teachers in my school district will be willing to log on to the website and find at least one piece of technology that will improve their lessons and begin implementing it immediately. Providing this website for teachers will be a great resource that will offer a variety of helpful tidbits for teachers to pick and choose from to fit their classroom needs. "Teachers must feel empowered and competent with technology and this will contribute to their confidence," (Ciampa, K., & Gallagher, T., 2015. p. 910). By teaching my colleagues what I have learned and the benefits of it, I hope to encourage my fellow teachers to never be afraid to try new teaching strategies.

It is important to note what great resources blogs and websites are for learning new skills. My goal is to educate my colleagues about the benefits of using technology in the classroom and how important this research framework is. It is neat to know that I

could end up reaching physical education teachers around the nation or world! The next section will describe my website and all that it will entail.

Project Description

For my capstone project, I will be creating a website. This website will be a place for my fellow physical education teachers to access technology ideas as well as examples of ways to implement them into their classes. I envision many different categories that users can click on. For example, there will be a category for teacher tools apps, active gaming, assessments, movie creation apps and video assessment apps. Once the user clicks on the category, more information will appear about the benefits of utilizing this technology in the classroom.

Rationale

My goal is to create a website that provides my fellow physical education teachers with the most beneficial technological ideas located in one spot. I have spent countless hours searching for visual aids, online assignments and assessments to improve my lessons. Apps and other useful teaching tools provide assistance in teaching strategies, behavior management and cognitive assessment. I wish that this information would have been available when I was searching the internet as a novice teacher. This is exactly why I chose to create this website for my fellow physical education and DAPE teachers.

The previous sections explained what my website will consist of and why I believe it is vital for physical education teachers to have such a great resource at their disposal. The next section will lay out the timeline to create the website and write Chapter Four. It will also depict how I plan to introduce this resource to my colleagues next school year.

Timeline

The following table will help me monitor my project progress.

May 2021	Complete Chapters 1-3
July 2021	Write Chapter 4 & Project
August 2021	Revise/Complete Chapter 4 & Project
2021-2022 School Year	Introduce to colleagues and begin implementation

Table 1. Describes the timeline of the author's project.

During the next school year I will be introducing my website to my colleagues during an elementary physical educator meeting. I plan on sharing my website address and providing a quick professional development session on what my project consists of and the must-use pieces of technology in the gym. My fellow teachers will have the opportunity to ask questions. I will give examples of when this technology can be used and why it is beneficial during lessons. I will provide my email address and make sure that my colleagues know they can ask questions at any time. A few months later, I will check in to determine how implementation is going. My hope is that these educators take the time to learn something new, try it during their class period, and follow up with me about how it went.

Summary

Chapter Three provided information on my school district's demographics, the number of physical education teachers in the elementary setting, and how we work together to conduct a successful district-wide physical education program. Chapter Three also granted the reader with a detailed description of the website I am going to create. This website will be a quality resource for physical education teachers to determine what

area of their teaching could be improved upon. The viewers will be able to click on the category that is most beneficial for them and instantly receive ideas of what technology/apps/devices they could use to improve their lessons. Chapter Three also laid out a rationale as to why this is an important resource to create and the proposed timeline to finish writing Chapter Four and creating the website.

Chapter Four Introduction

In Chapter Four, I will produce an overview of my project, the information that I gathered, and the outcome. I will discuss what I have learned from putting my research into practice and how I can continue to implement this professional development during the rest of my teaching career.

CHAPTER FOUR

Reflection

Introduction

As a first year physical education teacher with a school population of mostly Hmong and Karen students, I found myself struggling to effectively communicate and teach motor skills to my students. After a few failed lessons, I knew I had to step outside the box. I found an old projector and began creating constant visuals for my students to follow along. If my students did not understand what I was saying, they knew to watch the looping video and perform this skill. I began to see a change in my students' confidence as well as their improvement in their overall skills. I was thrilled and began searching for new ways to improve my physical education class for my students. The research question I asked is: How can technology enhance learning in a physical education classroom? In what ways can it be implemented? By creating this website with the technology tools that I found, I will be able to inform my colleagues of the benefits of utilizing this technology in the physical education classroom.

In this chapter, I reflect on my capstone project, the research that went into writing this capstone and creating my website. I will also explain some suggestions for ongoing research in the area of incorporating technology in physical education classes and how I plan to share my website with my coworkers, fellow physical education teachers and beyond.

Reflection of the Capstone Process

This capstone project has been an enlightening, rewarding and challenging process. I chose this topic because I am passionate about teaching physical education to

students. I saw firsthand the benefits of incorporating a few pieces of technology during my lessons and began my search for more. I wanted to know that my approach was backed by research, and create a place where other teachers could benefit from my findings.

During my undergraduate work, I knew that I wanted to continue my education. I was excited for the courses but was extremely intimidated by the capstone process that would be part of a master's degree. Choosing my research topic was easy; as I stated above, I have a love for PE and incorporating technology into my lessons to meet my students' various needs.

The most trying part of the capstone was the research section. This was extremely daunting for me and I worried that I would not be able to find enough information on the benefits of technology in a space where students are supposed to move their bodies. To my delight, this was not the case. I found a plethora of sources that supported my notion of technology and physical education going hand in hand.

The most enjoyable part was researching different applications (apps) that can be used in the gym. I spent many hours on the Apple App Store website, scrolling and searching for any game or tool that could potentially be beneficial. Once I found one, I would brainstorm ways that I could use this in my gym. When I had enough apps, I began dividing these apps into different categories. These categories consisted of Teacher Tool Apps, Applications for Student Devices, Assessments Apps, Movie Creation Apps and Video Assessment Apps. I separated the list of apps into these categories and began a rough draft of what I hoped my website would look like.

I had never created a website prior to this project so I was hesitant about how it would turn out. I spent a lot of time learning about Google Sites and what it had to offer. Once I had an understanding of the process, I began creating my website. I wish I could say it was smooth sailing, but I struggled to put headings and pictures where I originally planned. The process was a lot like teaching: a teacher always needs to be prepared to change up a lesson when it does not go as planned. This is exactly what I did with my website. I am pleased with the way my website turned out. There is a lot of great information, pictures and ideas for fellow physical education teachers to utilize and begin implementing in their daily lessons.

The last two semesters have prepared me for the completion of the capstone project. During this time, I felt supported by my professors and knew that I could ask them anything. This support system was huge in helping me succeed. When you begin a graduate program, the process seems long and daunting. The professors did everything to ensure that I would be successful and I have them to thank for their help in completing my capstone project. At times, completing this course work online was demanding and challenging but felt extremely supported along the way.

Literature Review Connections

During the research process, I found a lot of valuable information about the current trends of technology and how important it is for physical education teachers to implement technology in their classrooms. Nowadays, playing video games, watching shows and movies, communicating with family members and friends, and social media are the top activities students do on their devices (Hurtado, 2021). Students do not have to just sit and be sedentary while they play video games. Rather, they could play an

interactive game, where they had to move their own body in order to make the character move. These games, referred to as exergames, change the way video games and virtual games are being played. Physical education teachers should encourage these applications to be put on student devices to inspire more movement throughout the day. Chaput (2014) states that childhood obesity is arguably the greatest health concern our children face today. By introducing our students to these movement games, students are still playing video games while being less sedentary.

Implementing the use of technology in the gym is also a great way for teachers to improve their lessons, creativity and student engagement. The use of visuals helps with classroom procedures, expectations, and transitions, too. These are very important pieces of having a successful class, and when a teacher has to spend time redirecting students, learning and moving time are decreased.

Implications

As an elementary physical education teacher, I began looking for websites that would put technology tools, tips and tricks at my disposal. I did not find it, so I created one for my colleagues and myself with all this information in one spot. This website is geared towards elementary PE teachers but would be beneficial for middle school and high school PE teachers, as well as college students pursuing an education in teaching physical education. I truly believe there is an app on the website that every teacher could find useful and could begin implementing into their daily lessons with ease.

Limitations

This website offers applications that are both free and for a small fee. If funding is a problem, the teachers could utilize the free apps. In order for most of these apps to

be beneficial in the gym, the teacher needs some form of technology to project it. This could be a projector, a Smart Television or a Smart Board. Wifi is a necessity for these apps to work, so poor connections could potentially be troublesome in the gym as well. The last limitation I envision being problematic for some teachers is the lack of student devices. Many schools do not have enough iPads so having an entire class exergaming may not be possible. With a little planning, sharing the devices the school does have would be an easy fix to help students move their bodies and have fun!

Suggestions for Ongoing Research

The beautiful thing about technology is that it is ever-changing and not going away. Because of this, teachers must learn to embrace technology and implement it in their classrooms to the best of their abilities. The applications that I included on my website will be replaced by better ones in the future. As teachers, it is our responsibility to stay up to date with the latest technology. By continuing to update my website as new technology comes out, I will be able to help bring this information to my colleagues.

As technology continues to improve, there will be a demand for professional researchers to conduct many studies on technology and students. Some of which include the effectiveness of exergaming and obesity rates and/or the use of teacher technology and retention rates. I look forward to reading these findings in the upcoming years and adjusting my teaching accordingly.

Communicating Results

I will begin by sharing my project with my fellow elementary physical education teachers in my school district. By sending the website link in an email, I will be able to inform my colleagues about why I created the website. I will also be able to encourage

my colleagues to spend some time diving in and brainstorming a list of ways that their teaching could benefit from the use of this technology. Because we all teach in the same district, we have the same devices and set up, so it will be easy to share my findings. I hope to speak at one of our PE meetings and reassure my colleagues that implementing these apps into their daily lessons will improve transition times, behavioral management and assessments while creating a fun learning environment!

Physical education has a big Twitter following across the country and the world. I follow a lot of amazing PE teachers and have learned tips and tricks from many of these incredible teachers. I hope to use my Twitter account to promote my website and encourage other PE teachers to utilize my website. I also hope to continue learning about more crucial technology tools from other professionals and adding them to my teacher toolbox and website.

Summary

My capstone project was focused on answering the question: How can technology enhance learning in a physical education classroom? In what ways can it be implemented? I chose this topic because I am passionate about teaching physical education to students and witnessing the benefits of implementing technology into my classroom. Early on in my teaching career, I searched the internet for a database of technology teaching tools but did not find one spot where they are all located. I created the website that I had wished for as a young teacher, where all my favorite applications would be in one place. Hopefully my colleagues and fellow PE teachers will find it just as useful. I will continue to update the website as new technology comes out.

In conclusion, this capstone project has been a great learning experience for me. I became more confident in researching, writing and creating a website. I look forward to continuing learning and challenging myself as an educator to be the best physical education teacher I can be for years to come.

REFERENCES

Akalın, T. C., and Gümüş, M. (2020). Investigation of secondary school students' participation in physical education lessons with distance education in the pandemic process. African

Beard, Judy, and Ferman Konukman. "Teaching Online Physical Education: The Art of Connection in the Digital Classroom." *Journal of Physical Education, Recreation & Dance*, vol. 91, no. 7, Routledge, 2020, pp. 49–51, doi:10.1080/07303084.2020.1785772.

An, R., (2020) "Projecting the Impact of the Coronavirus Disease-2019 Pandemic on Childhood Obesity in the United States: A Microsimulation Model." Journal of Sport and Health Science, vol. 9, no. 4, Elsevier B.V, pp. 302–12, doi:10.1016/j.jshs.2020.05.006.

Apple App Store. (2017). Retrieved from http://www.apps.apple.com Retrieved on 3/21/21

Best, M., MacGregor, D., (2017) "Transitioning Design and Technology Education from Physical Classrooms to Virtual Spaces: Implications for Pre-Service Teacher Education." *International Journal of Technology and Design Education*, vol. 27, no. 2, Springer, pp. 201–13, doi:10.1007/s10798-015-9350-z.

Brubaker KD, Jr. (2011) *The importance of physical education in today's schools.* [Order No. 3493078]. Ashland University.

Bruno, L. (2018) Embracing Technology and Pop Culture Trends in Physical Education: Ready, Set, (Pokémon) Go!, Journal of Physical Education, Recreation & Dance, 89:4, 45-51, DOI: 10.1080/07303084.2018.1430627

Castalia Media Firm. (2016) "History of Physical Education in the US." *Films On Demand*, fod.infobase.com/PortalPlaylists.aspx?wID=104516&xtid=116777. Accessed 26 Feb. 2021.

Center for Disease Control and Prevention. (2021) Retrieved 3/21/21. https://www.cdc.gov/physicalactivity/basics/pa-health/

Chaput, J-P., (2014)"Importance of All Movement Behaviors in a 24 Hour Period for Overall Health." *International Journal of Environmental Research and Public Health*, vol. 11, no. 12, MDPI, pp. 12575–81, doi:10.3390/ijerph111212575.

Chng, Lena, and Rachel Gurvitch. "Using Plickers as an Assessment Tool in Health and Physical Education Settings." *Journal of Physical Education, Recreation & Dance*, vol. 89, no. 2, Routledge, 2018, pp. 19–25, doi:10.1080/07303084.2017.1404510.

Clary, G., & Asmelash, L. (2020) School Closures of Eight Weeks or More May Better Mitigate Coronavirus Spread. CNN. Retrieved on 3/21/21 https://edition.cnn.com/2020/03/14/us/school-closures-cdc-long-term-trnd/index.html

Cyber Village Academy. St. Paul, Minnesota. Retrieved on 3/28/21 http://www.cybervillageacademy.org/

Does technology in physical education enhance or increase the time available to engage in physical activity?(2012) Journal of Physical Education, Recreation & Dance, 83:7, 53-56, DOI: 10.1080/07303084.2012.10598813

Eberline, A. D., & Richards, K. A. (2013). Teaching with Technology in Physical Education. *Strategies, 26*(6), 38-39. doi:10.1080/08924562.2013.839522

Filiz, B., & Konukman, F. (2020) Teaching Strategies for Physical Education during the COVID-19 Pandemic, Journal of Physical Education, Recreation & Dance, 91:9, 48-50, DOI: 10.1080/07303084.2020.1816099 To link to this article: https://doi.org/10.1080/07303084.2020.1816099

Gawrisch, D., Andrew, K., Richards, R. & Killian, C. (2020) Integrating Technology in Physical

Education Teacher Education: A Socialization Perspective, Quest, 72:3, 260-277, DOI: 10.1080/00336297.2019.1685554

Goad, Tyler, et al. "Instructional Tools for Online Physical Education: Using Mobile Technologies to Enhance Learning." *Journal of Physical Education, Recreation & Dance*, vol. 90, no. 6, Routledge, 2019, pp. 40–47, doi:10.1080/07303084.2019.1614118.

Greve, S. Thumel, M., Jastrow, F., Krieger, C., Schwedler, A., Süßenbach, J. (2020) The use of digital media in primary school PE – student perspectives on product-oriented ways of lesson staging. *Physical Education & Sport Pedagogy* 0:0, pages 1-16.

Hai, Wan-Ping, et al (2020)"The Application of Multimedia Technology in Physical Education." *International Journal of Electrical Engineering & Education*, p. 2072092093683–, doi:10.1177/0020720920936838.

Heidorn, B., (2020) "Provide and Protect the Essential Components." Journal of Physical Education, Recreation & Dance, vol. 91, no. 5, Routledge, pp. 3–5, doi:10.1080/07303084.2020.1748482.

Hurtado, K. (2021) "Surprising Facts on Cell Phone Usage Statistics." Parentology, Parenting in the Digital Age. Retrieved on 3/21/21. https://parentology.com/what-you-need-to-know-child-cell-phone-usage-statistics/

Jeong, H., Wi-Young, S., (2020) "Difficulties of Online Physical Education Classes in Middle and High School and an Efficient Operation Plan to Address Them." *International Journal of Environmental Research and Public Health*, vol. 17, no. 19, MDPI AG, p. 1–, doi:10.3390/ijerph17197279.

Kooiman, B., et al. (2017) "Moving Online Physical Education from Oxymoron to Efficacy."

Sport, Education and Society, vol. 22, no. 2, Routledge, pp. 230–46, doi:10.1080/13573322.2015.1015978.

Krach, S. Kathleen, et al. "Examining Teachers' Behavioral Management Charts: a Comparison of Class Dojo and Paper-Pencil Methods." *Contemporary School Psychology*, vol. 21, no. 3, Springer New York, 2017, pp. 267–75, doi:10.1007/s40688-016-0111-0.

Lambert, C. (2016) Technology Has a Place in Physical Education, Journal of Physical Education, Recreation & Dance, 87:9, 58-60, DOI: 10.1080/07303084.2016.122720

Lavay, B., Sakai, J., Ortiz, C. & Roth, K. (2015) Tablet Technology to Monitor Physical Education IEP Goals and Benchmarks, Journal of Physical Education, Recreation & Dance, 86:6, 16-23, DOI: 10.1080/07303084.2015.1053633

Lu, C.; Barrett, J., Lu, O. (2020) Teaching Physical Education Teacher Education (PETE) Online: Challenges and Solutions Brock Education: A Journal of Educational Research and Practice, v29 n2 p13-17 https://files.eric.ed.gov/fulltext/EJ1267187.pdf

Meira CM Jr, Meneguelli KS, Leopoldo MPG and Florindo AA (2020) Anxiety and Leisure-Domain Physical Activity Frequency, Duration, and Intensity During Covid-19 Pandemic. Front. Psychol. 11:603770. doi: 10.3389/fpsyg.2020.603770

Meijer, A., (2020) "The Effects of Physical Activity on Brain Structure and Neuropsychological Functioning in Children: A Systematic Review and Meta-Analysis." *Developmental Cognitive Neuroscience*, vol. 45, Elsevier Ltd, pp. 100828–100828, doi:10.1016/j.dcn.2020.100828.

National Standards for K-12 Physical Education Copyright 2013, SHAPE America Society of Health and Physical Educators. http://www.shapeamerica.org. Retrieved 3/21/21

Nation-Grainger, S. (2017) 'It's just PE' till 'It felt like a computer game': using technology to

improve motivation in physical education, Research Papers in Education, 32:4, 463-480, DOI: 10.1080/02671522.2017.1319590

Palao, J., Hastie, P., Cruz, P., & Ortega, E. (2015) The impact of video technology on student performance in physical education, Technology, Pedagogy and Education, 24:1, 51-63, DOI: 10.1080/1475939X.2013.813404

Pangrazi, R., Beiglhle, A. (2020) Dynamic Physical Education for Elementary School Children: Nineteenth Edition. Pearson Education, Inc. Human Kinetics.Illinois

Pyle, B., Esslinger K., (2014) "Utilizing Technology in Physical Education: Addressing the Obstacles of Integration." The Delta Kappa Gamma Bulletin, vol. 80, no. 2, Delta Kappa Gamma Society International, p. 35–.

Sanders, S., & Witherspoon, L. (2014). *Contemporary Uses of Technology in K-12 Physical Education Policy, Practice, and Advocacy*. Charlotte, NC: IAP - Information Age Publishing.

Sargent, J., Casey, A., (2018): Exploring pedagogies of digital technology in physical education through appreciative inquiry. Loughborough University. Chapter. https://hdl.handle.net/2134/33345

Stoszkowski, J., et al. (2020) "Using Flipgrid to Improve Reflection: a Collaborative Online Approach to Coach Development." *Physical Education and Sport Pedagogy*, pp. 1–12, doi:10.1080/17408989.2020.1789575.

"Title IX" U.S. Department of Education. (2020). https://sites.ed.gov/titleix/ p. 1

Thissen-Milder, M. (2006) Physical Education Lifeline: Curriculum and Instruction Resource for Physical Education Educators. Minnesota Department of Education. p . 1-59

Wyant, J. & Baek, J. (2019) Re-thinking technology adoption in physical education, Curriculum

Studies in Health and Physical Education, 10:1, 3-17, DOI: 10.1080/25742981.2018.1514983

Yu, J., & Jee, Y., (2021) Analysis of Online Classes in Physical Education During the COVID-19 Pandemic. Education Sciences. https://doi.org/10.3390/educsci11010003