

Western Oregon University

Digital Commons@WOU

Master's of Arts in Teaching (MAT) Action
Research

Division of Education and Leadership

6-11-2021

The Integration and Application of Experiential Learning, While Focusing on Culturally Relevant Pedagogy.

Anthony Whipple
awhipple20@mail.wou.edu

Follow this and additional works at: <https://digitalcommons.wou.edu/matactionresearch>



Part of the [Education Commons](#)

Recommended Citation

Whipple, Anthony, "The Integration and Application of Experiential Learning, While Focusing on Culturally Relevant Pedagogy." (2021). *Master's of Arts in Teaching (MAT) Action Research*. 37.
<https://digitalcommons.wou.edu/matactionresearch/37>

This Action Research is brought to you for free and open access by the Division of Education and Leadership at Digital Commons@WOU. It has been accepted for inclusion in Master's of Arts in Teaching (MAT) Action Research by an authorized administrator of Digital Commons@WOU. For more information, please contact digitalcommons@wou.edu, kundas@mail.wou.edu, bakersc@mail.wou.edu.

**The Integration and Application of Experiential Learning, While Focusing on
Culturally Relevant Pedagogy.**

By Anthony Whipple

An Action Research Project submitted to Western Oregon University

In partial fulfillment of the requirements for the degree of:

Masters of Arts, in Teaching

June 2021



**WE, THE UNDERSIGNED MEMBERS OF THE GRADUATE FACULTY OF
WESTERN OREGON UNIVERSITY HAVE EXAMINED THE ENCLOSED**

Action Research Project Title:

Graduate Student: _____

Candidate for the degree of : Master of Arts in Teaching: Initial Licensure

*and hereby certify that in our opinion it is worthy of acceptance as partial fulfillment
of the requirements of this master's degree.*

Committee Chair:

Name: _____ Signature: _____
Date: _____

Committee Member:

Name: _____ Signature: _____
Date: _____

Dean of Graduate Studies and Research:

Name: _____ Signature: _____
Date: _____

Abstract

The Integration and Application of Experiential Learning, While Focusing on Culturally Relevant Pedagogy.

By Anthony Whipple

Over the last year of my graduate studies, I have identified three research questions to use to improve my teaching. These are: How am I developing tools to teach inquiry-based learning? How am I incorporating student culture to build a safe and respectful learning environment? How is my use of technology integration facilitating experiential-based learning?

To examine my growth I have collected and analyzed artifacts that are reflections of my teaching in these areas. This process is guided by the principles of action research and my analysis used a 6 step data-analysis procedure as described by Braun & Clarke, "Using thematic analysis in psychology. Qualitative research in psychology".

This project determined areas where I have identified significant growth and areas I can still improve. This project is based around self reflection and as such is a delve into my own practices.

Table of Contents

Chapter 1 **INTRODUCTION**

To understand where my teaching philosophy comes from I need to start by analyzing my educational past and the experiences that come from it. I grew up in a heavily agricultural town where education was seen as a means to an end. Where people went because they had to. This was just a hurdle slowing them down from joining their family farms full time or to seek employment supporting such farms. It was not unusual then to hear answers to the question “What do you want to be when you grow up?” include professions like farmer or welder instead of the “usual” doctor or astronaut. There were

definitely families that pushed their students. These students worked diligently to pursue avenues that would lead to success and careers, however when the electives mostly consisted of agricultural business, forestry, and advanced auto body it tells you something about the overarching view of the school.

My family was one of the few that pushed towards “A better future”, at least at first. From a young age I was seen as “exceptional”. I was reading above the standards, and understood math easier than my classmates. This early success led to high praise from my family. I remember some members of my family giving me college sweatshirts from prestigious universities for Christmas gifts. I was routinely “shown off” as the smart one of the family and expected to be the smart, mature one at all times. This high praise hurt me. I just wanted to ride dirt bikes, and swim and enjoy being a kid like my sister did, instead of having these expectations put on me. I always felt like if I did not act the way they wanted, then I was letting them and myself down.

For the first years of my schooling this was fine. I loved school and especially reading. I went all the way through 5th grade never having to try. I learned everything easily and completed my homework in a timely manner. Once I started middle school was when I fell off the pedestal. I needed help and did not know how to ask for it. When you go through your schooling never struggling, knowing everything asked, how do you do it? I decided that instead of turning in work that was not 100% correct I'd rather just not turn it in at all. I had been conditioned that only perfection would lead to success. I would literally finish my homework, and throw it away on my way to class. The stress of not

being perfect made me a failure. I never learned how to ask for help, something I still struggle with today. If I know I am going to turn something in late, I just don't do it. I know that people love to help and fundamentally if I am trying it should be fine, but the conditioning I received from my family and prior educators make it difficult for me to do.

Now how does my background affect my answers to questions about my teaching philosophy? I will try to connect my experiences to the answers I give, some through anecdotal views and some with references to outside sources. I know everyone has different experiences, so any personal opinions are derived from my own experiences.

Who are you as a teacher: what is your mission statement?

My mission as a teacher is to provide high quality instruction congruent with prominent and researched educational philosophies. To provide this instruction in a culturally relevant manner, where differences are respected, in a classroom where students have a community and are respected. Teaching is not just the transmission of knowledge. It's an art form that balances so many positions in one title.

My philosophy is driven entirely by my experiences as a student. I feel like I was a student who slipped through the cracks. I had the ability to be successful but not the knowledge. I want to ensure that my classroom is a place that reaches every student. I want to give every student the skills and knowledge to be successful. I want to be able

to see my students as people and know that they have their own differences. I want to celebrate these differences and ensure that they feel comfortable in my classes. I never want to alienate any of my students.

Where do you stand on the various influences, issues and ideologies that shape our educational system?

I feel like answering this question means I need to identify what influences our system, the issues that arise with this and how as a nation we look at education. I want to start with influences on the system. Economic pressure, general public opinion, politics, and corporate lobbying can all affect how the system of education is created and changed. (National Research Council 2002). We tend to look to our economic competitors to compare our educational success. This begs the question however of how we measure success. Looking at the National Center for Educational Statistics, we see that they use a tool called the NAEP, The National Assessment of Educational Progress. In other words, a standardized test. Inherently standardized tests are not bad. They can produce excellent data when used in specific ways. W. James Popham describes how standardized testing works wonderfully when utilized correctly. He continues to describe that when designing tests, the use of the data should be at the forefront while it is being built. (Popham 2016). I agree that standardized testing can be useful, but it can also create situations that poorly reflect student ability. When these scores are used as the only measure to decide a student's fate, there is a problem. When these schools allocate funding based off of scores, I see this as a problem. Standardized scores have been put above all else, due to their quick and easy comparative nature. Society puts too much stock into this system and ignores other evidence. My opinion is that students'

ability be examined as a whole. Whether this is a portfolio of work, better communication between teachers, or a new system entirely I do not know. I know there are challenges regardless of what is decided but they cannot be as problematic as using one test to decide a student's path.

The next influence and issue is what the general public input is on education and how it affects education. I want to start by talking about science denialism and how it makes its way into the classroom. Currently there are numerous points which can fall under this category, anti-vaxers, flat earth movement, pandemic deniers, climate change, and as always evolution. Evolution denial is the easiest to look at. Challenges on teaching evolution in school have been around since the introduction of the topic. In the article "An evolving controversy: the struggle to teach science in science classes" the authors describe that "Federal courts have consistently held that states and school boards cannot ban the teaching of evolution or introduce creationism, creation-science, or intelligent design into the public school curriculum. But significant segments of the public do not care. Many do not accept the science, do not want it taught, or prefer approaches that courts have repeatedly rejected as unconstitutional." They continue on to talk about how a not insignificant number of teachers try to balance teaching evolution with some addition of creationism.

How do I fit into this? Well I truly believe that people should have freedoms to practice their religion in however way they see fit. However these freedoms do not enable their practices to guide public teaching. Pushing the narrative of one specific religion goes against others' freedom of religion. This is an infringement of their rights, and is unacceptable. This has been defended in federal court time and time again. As far as

content goes, basic scientific literacy is an important skill in today's society. One that I feel is lacking. Through the argument that evolution is "Just a theory" we can see how this term is used to try to discredit science fundamentals by misconstruing what a theory actually means. I feel that as a science teacher I should strive to teach the skills that allow students to develop critical thinking which will allow them to have conversations to discuss ideas and movements in correct terminology. To better our planet, public health, society, and other complex public issues, the conversations need to be rooted in scientific fundamentals. Without this common ground to start with, there will be more misunderstandings, whether intentional or not.

How do these connect to my experiences? Looking back at my education, especially high school, I can see the connections science made with the local economy.

Agriculture is an increasingly complex industry that needs the most updated technology and information to produce supplies at its maximum capability. The people around me knew this, but had disconnects between other science related topics. I could not and still cannot see how individuals can be so dependent on science, yet reject parts of it, developed under the same guiding principles.

Where do you stand in relation to the various prominent philosophies of education?

My view is that education, especially science education, draws heavily on experiential learning as discussed by Piaget, Steiner, and Dewey. This hands-on approach to student driven learning is how students build skills necessary to critical thinking and content competency.

My K-12 environment was heavily based on “traditional” learning where teachers lecture and students regurgitate information on written exams. This lends itself well to making students ready for standardized testing but not much else. My issues with standardized testing are mentioned above. From my experience after high school I learned much more efficiently with what I called “Hands on learning”. I have now learned that this can be understood as experiential learning. This was a method that allowed me to explore a topic with guidance and learn it better than I have before. I am fully behind this philosophy of teaching, especially in a scientific content area.

Where do you stand in regard to teaching with social justice—creating an environment that challenges all students at all times, regardless of their ethnicity, socio-economic status, legal status, etc.....?

I firmly believe that all students are entitled to an education that not only teaches them the subject but also prepares them to enter a world with a perspective that everyone is equal, valued, and respected. This starts in the classroom. Through the perspective of culturally relevant pedagogy, I will include other cultures' values and languages to not only teach students in a method that resonates with them, but to also teach other students about these cultures to foster respect and understanding. I feel that it is my duty as an educator to ensure that students are challenged in a fair method so that they can grow and learn in an environment that celebrates differences. This is something

that I wish my small town had done. I did not receive exposure to many cultures and I feel that this is a part of my education that I could have used more of.

What kind of a classroom environment do you feel is conducive to learning?

I feel that a classroom that is conducive to learning is a place where students feel safe. This does not just mean physical security, but a place where students can fail and feel like that is a normal part of the learning process. A place where they feel that their differences are valued and respected. I think that students should feel like their academic successes are the successes of everyone in the class and that learning is a team effort. A classroom should not be a place where students dread going.

Chapter 2

LITERATURE REVIEW

Purposes and Objectives for the Literature Review

My purpose in this review of the research was to examine who I wanted to be as a teacher and look for the research others had done in these areas. I searched for research on inquiry based learning because my teaching philosophy is in the field of experiential learning. Inquiry based, and specifically the 5E model of instruction are heavily influenced by this philosophy and I want to incorporate these teaching styles into

my classroom. I also searched for studies on culturally relevant pedagogy because I feel that curriculum based around students and their cultures fosters a classroom of acceptance and respect. Additionally, because I would be studying my own practice and focusing on my readiness to use inquiry based learning, I looked for studies that indicated the kinds of instruction that are effective for integrating inquiry based learning over distance learning and to see if there was any research on this interaction.

Procedures for the Literature Review

For my literature review I wanted to explore the use of inquiry based learning. Specifically my research was focused on three sub-themes. These sub-themes are: 1) How inquiry based learning is beneficial (or not) 2) The integration of culturally relevant pedagogy into science education, and 3) how technology is integrated into science education, specifically experiential learning. For these sub-sections, I initially searched the EBSCO database and google scholar for articles that met the keyword criteria listed above. I was fairly abstract with my searches at first to try to form a well rounded approach to finding more specifics. After finding these articles, I read each article to determine how it fits within these broad thematic categories. My intent was to start with a broad treatment of each theme and then to systematically reduce broad understandings down to specific understanding of how these themes are present in research about inquiry based learning.

Inquiry based learning is effective for many students.

Through my research into these topics I have found that inquiry based learning is an effective method for teaching students science. In a 2015 article based on a study of 275 science teachers, it was found that “More than 90 percent of the teachers surveyed agreed that inquiry was an (1) effective teaching tool, (2) important instructional strategy to use in the classroom, and (3) effective method for developing problem solving skills among students.” (DiBiase 2015) This study also found that “Many of the teachers (75%) feel that inquiry is a good method of reaching all students in their classroom. They believe that inquiry is a good tool to use to reach both high ability and minority students.” (DiBiase 2015) While this is less than the 90% who believe that inquiry is a good method, it is still significant. These teachers did have some reservations however with the biggest concern about inquiry based learning being that “84 percent of the teachers questioned whether inquiry was an effective teaching method in preparing students for the end-of-course testing. Only 40 percent of the teachers surveyed believe that their students are prepared for the content knowledge assessed through the end-of-course tests if they implement inquiry regularly in their classroom.” (DiBiase 2015)

The next study I looked at measured the effectiveness of inquiry-based learning in scientific achievement in a qualitative manner. This study took data from the Program for International Student Assessment that was captured in 2015 and indexed it through a hierarchical linear model. They found that “Some inquiry practices demonstrated a significant, linear, positive relationship to science achievement (particularly items

involving contextualizing science learning)". (Cairns 2019) This is followed however by their findings of "Another group of activities in this analysis generally demonstrated a negative relationship with science achievement. These included the following: students are allowed to design their own experiments, there is a class debate about investigations, and students are asked to do an investigation to test ideas. The relationship with science achievement for these strategies was significant and negative at all levels of reported exposure". (Cairns 2019) These findings were also consistent with a study conducted in 2006 which found that "For science achievement, Level 2 inquiry had the highest score with respect to the US data. In all the 56 participating countries, this result was held in 22 countries. In addition, Level 2 inquiry had the second highest score in 18 countries. More specifically, Level 2 inquiry had a higher score than Level 0 in 37 countries, higher than Level 1 in 39 countries, higher than Level 3 inquiry in 41 countries, and higher than Level 4 inquiry in 47 countries. As for Level 4 inquiry, it had the lowest science achievement score in the US data. This result appears in other 26 countries. In addition, Level 4 inquiry had the second lowest science achievement in 14 countries".(Jiang 2015) The table below describes what each of the four levels are based on.

Table 1. Levels of openness in inquiry teaching

	Conducting activities	Drawing conclusions	Designing investigations	Asking questions
Level 0	T	T	T	T
Level 1	S	T	T	T
Level 2	S	S	T	T
Level 3	S	S	S	T
Level 4	S	S	S	S

Note: S, given/conducted by student and T, given/conducted by teacher.

Table 1

Table from Jiang 2015

The findings from the last two papers are important because they describe a beneficial environment for students when using inquiry-based learning. They also describe a drop in student achievement above level two. This is an extremely important note because too much student driven learning can lead to worse learning than no student driven learning at all.

From here I have seen how inquiry-based learning has been shown to help general students but I wanted to examine if this teaching style can help students with learning disabilities. One study that I examined showed that inquiry-based learning did not benefit students with a learning disability. This study showed that out of the six participants, only one was able to identify the main idea from the unit. This study

described their findings as “Results indicated that most of the students with LD had difficulty acquiring science process knowledge and that students relied on peer supports to facilitate their learning”. (McGrath 2018) This study showed that inquiry-based learning was ineffective for students with a learning disability. It did however suggest that vocabulary was a major sticking point. “Students reported being confused about vocabulary words, having difficulty even pronouncing words, and being unable to remember key words at all.” (McGrath 2018)

Culturally Relevant Science Education

To discuss the intricacies of bringing culturally relevant teaching into science we need to look at why it is beneficial for students across education as a whole. I believe that the best method of doing this is examining the article that first describes the rationale and reasoning behind it. If we look into the relationships between students, their culture and their home life, the term “culturally responsive”, is used to describe the complex interactions of these three aspects. “Not only must teachers encourage academic success and cultural competence, they must help students to recognize, understand, and critique current social inequities” (Ladson-Billings 1995) With this in mind I wanted to explore how I could include culturally relevant education into my own classroom. I can see many possibilities when examining other subjects and I can see opportunities in science to a lesser degree. What I will look for in my literature review for this question is where others have identified opportunities and what benefits have been found.

The second piece I examined fit the categories that I looked for. This was a direct, planned inclusion of culturally relevant information that was intended to create a

response from students. The study introduced a short story to drive a conversation based around immigration in the form of science fiction. This lesson plan wanted to bring in real world problems and frame them in an analogous way to allow student ideas and thoughts to drive the conversation. According to the author “In analyzing the data, we identified several patterns as the students wrestled with the implications in their own lives of a situation like that presented in *The Space Traders*. In organizing these patterns according to Ladson-Billings’s tenets of CRP, we found several indications that Adams’s lesson embodied culturally relevant science teaching.” (Laughter 2012) This was also supported further by inclusion of the questions that students asked. This connection between the material and students’ lives was crucial to building the ideas that they did.

The third piece I found described the use of culturally relevant pedagogy in a one week summer camp setting. The article described its purpose as “The purpose of this study was to provide culturally relevant experiential education by exposing underrepresented children to science in natural environments.” (Djonko-Moore 2018) The activities chosen were designed to bring in examples of the students’ culture as a way to bridge experiences and knowledge. An example of this was given by describing the rationale of an activity that included growing and observing Lima Beans. “This study had direct implications to our focus on plants and growing lima beans, which are easily accessible and a staple in the African American community.” (Djonko-Moore 2018) This study specifically looked at the question “How did culturally relevant experiential learning influence student participants’ science content knowledge?” and found “The results of

this study suggest that it had a positive impact on children’s learning, engagement, and interest in science.” (Djonko-Moore 2018)

The fourth piece of literature I looked at specifically examined preservice teachers in Australia. This study specifically examined teacher readiness in being able to meet two new standards introduced by the Australian government. “The Australian Curriculum seeks to prioritise Aboriginal and Torres Strait Islander content through two curricular strategies: (1) a focus on Aboriginal cultures and identities embedded in each of eight learning areas and (2) a cross-curriculum priority that requires students to “engage in reconciliation, respect and recognition of the world’s oldest continuous living cultures”. (O’Keeffe 2019) This study used self-scored readiness to track teachers' growth in using culturally relevant pedagogy to meet these standards. Over the study it was found that teachers increased their self scoring. This was reflected by an increase as experience was gained. The study concludes that “The two key themes which emerge from this data are (1) acknowledging that PSTs need more teaching experience, particularly in culturally diverse contexts, and (2) PSTs in this study are tentative around culturally responsive pedagogies because they are fearful/ nervous of inadvertently causing offence.” (O’Keeffe 2019)

Technology and Its Use In The Classroom

In this year of the pandemic we have had the opportunity to work with new tools and simulations to augment student learning. This has allowed educators to integrate technology into daily life and view how these tools can be used in normal teaching. One of these technologies that can enhance learning is simulations. Lab simulations allow teachers to incorporate more examples of real world situations while not using chemicals, equipment or classroom materials. This is especially important in 2021 where lab time is not possible. The first piece of literature I examined looked into the use of lab simulations. This study focused on teaching 7th grade students about linear motion. This study examined growth by using pretests and posttests before and after the simulation. This found that “ it was concluded that the use of multimedia computer in linear motion concept for junior high school students is able to increase science process skills with moderate normalized gain score in each sub-concept learnt.” (Siahaan 2017)

This was also shown in my second piece of literature chosen. This study used a lab simulation to prepare students for an in person lab. This used a program designed specifically for lab preparation. They found that “The results indicate that students had significantly increased confidence when conducting laboratory experiments and felt significantly more comfortable operating the apparatuses in the Labster-using courses compared to other non-Labster-using courses. This suggests that although the students did not feel better prepared overall, they felt more confident and, thus, were in fact better prepared for the practical parts of the laboratory work in course 1 or 2 using the Labster programme than without the programme.” One interesting takeaway from this was that students did not feel more prepared, but did feel more confident.

For my third piece of literature I found an article that describes the criteria that should be looked at when including simulations into a lesson. These criteria were “It should be appropriate (age, culture, language, etc.) for the students for the target audience. It should cover the targets, contents, and experiments of the subject to be applied. It should also be in compliance with the physical conditions of the environment in which the education shall be provided. The design and the usability characteristics (symbol, button, color, form, etc.) should be appropriate for the education program and the students. It should contain samples and courses (tutorials) that are appropriate for the education program and the students. It should include the mathematical formulas and analyses. Thus, the student could form their own model visually and could come to the same conclusion, but also could analyze the model by seeing the mathematical results. This situation could be useful in correcting conceptual mistakes of the students and for the teachers to assess their students.” (Mirçik 2018) Looking at this list it appears to follow some of the ideas that inquiry based learning leans on.

One of the most promising areas of technology integration is the inclusion of previously inaccessible materials to students. The ability to easily take students on virtual field trips to incorporate other cultures in classes supports my second research question as well. In my fourth piece of literature I examined a study that created virtual field trips for students in elementary grades. While this was younger than the students I work with the principles are the same. The study found that “School-based VFTs enable learners to experience distant places and schools without leaving the classroom. VFTs such as these can take learning to a new level as students create them for meaningful

purposes.” (Delacruz 2019) This could be used to emphasize locations within lessons, or show students new viewpoints in science.

Summary

The articles and studies I have chosen reflect areas in which I wish to improve my skills as an educator. These provide knowledge and guidance to focus upon places that have been identified by others within the field I was looking into. From these pieces of literature I have identified that my research questions have merit and are based on concrete topics that can be improved upon. Experiential learning being the guiding principle to my study has been identified as both a positive and a negative. The biggest drawback to this style of teaching has been identified as letting students drive too much of the learning. With this in mind I can see how balancing this can be the most important aspect of this methodology. Including culturally relevant pedagogy increases student engagement and knowledge retention. Integration of technology into the classroom allows for unique opportunities for students to learn.

Given the findings of this literature review, the next chapter will explain the methods and procedures that I used to study my ability to teach in an experiential based manner while ensuring student culture and independence is preserved.

CHAPTER 3

RESEARCH METHODS

The methods of inquiry for this study focused on the principles and practices of action research, using self-study aligned with professional teaching standards, teacher artifacts, coordinated observations and self-reflection journaling as a means of data collection. I will begin with a review of action research principles to establish the foundation for this study's method of inquiry. Second, I will review the choices and purposes of data collection that helped to highlight my instruction and means for searching for improvement. Third, I will detail my context for the study, methods of data collection protocols, maintaining credibility and trustworthiness of the data, and acknowledge my limitations as a researcher. Finally, I will present the procedures used for studying my practice, while providing a plan for data collection that speaks to adaptations and adjustments made to my instruction as I implemented this study.

Research Questions

My focus for this research was to examine my growth and effectiveness in implementing experiential learning into a safe and respectful classroom. Specifically, I examined my growth and development in integrating student-driven learning using inquiry-based methodology. I did this in conjunction with implementing culturally responsive pedagogy in order to build a classroom community focused on respect and acknowledging student cultural differences. These focuses aligned with the following

INTASC Standards for teacher professional development; Instructional Strategies, Learning Environments, and Planning for Instruction. The research question (s) for this study were:

1. How am I developing tools to teach inquiry-based learning?

With this question I wanted to examine how I am including student-driven, experiential learning into my lessons through the framing of inquiry-based lessons. I am a firm believer in experiential learning and inquiry-based lessons fit both my philosophy and the research examined in chapter two. I wanted to specifically look into my skills and experience in this area and examine my efforts and implementation. Through this, I wanted to monitor my growth over time.

2. How am I incorporating student culture to build a safe and respectful learning environment?

With this question, I wanted to evaluate my readiness and ability to use culturally relevant pedagogy to build a community in the classroom that facilitated learning. I want to design my classroom to be a community based on respect and appreciation. For me to achieve this I need to be able to reach students with backgrounds and experiences different than my own.

3. How is my use of technology integration facilitating experiential-based learning?

With this question I wanted to look at many different technologies and determine how my lesson plans bridge technology and the traditional classroom.

INTASC Standards

The INTASC (Interstate Teacher Assessment and Support Consortium) standards are an outline of what teachers should know and be able to do to prepare students for college and careers. They are set by The Council of Chief State School Officers (CCSSO). These standards are designed to model what ideal learning and teaching would be. Teachers use these standards to evaluate themselves and grow because they are based on four identified key areas. These areas are: The learner and Learning, Content, Instructional Practice, and Professional Responsibility. These four areas are then split into the individual standards that break down exactly what an educator must do to meet the standards. These standards have descriptions to self-evaluate where an individual is on the standard and what steps to take to reach the next progression. This allows individuals to continuously reevaluate to improve or maintain their skills and knowledge.

I will use these standards as a basis and guide to focus my study on. My growth will follow the progressions and give me areas to evaluate myself. Specifically, I will use them to conduct a pre-evaluation and post-evaluation based upon these standards.

The INTASC standards I have chosen to focus on are # 8 Instructional Strategies, #3 Learning Environments, and #7 Planning for instruction. I chose Instructional strategies

standard to guide my exploration in using a variety of methods and ideas to reach my students. This also includes the adjustment of instruction in response to student needs.

The learning environment strategy was chosen to reflect the importance that a positive environment has on student success.

Finally, the planning for instruction strategy was chosen because proper planning and preparation can lead to long term successes.

Methodology and Research Design.

Action research is the study of one's own methodology or practices through the lens of conducting research. This style of research allows individuals to use themselves as the topic of research to improve or examine a chosen area. These tools are useful for self-reflection and growth not only through this project but for long term improvement. Action research is essentially a more formal framework of what many teachers already do. This collection of experiences and making decisions and changes is a common trait in educators. Action research gives educators a system to share their data and findings with others. This allows others to use the findings.

Because my purpose was to describe my own teaching practice as well as how I use data to improve my own practice in line with the INTASC professional standards, it was important to choose a method that could account for both what the standards are for teachers and how I was able to take data and apply it to my own practice.

Table 2

Contains the details of my collection and analysis strategies

Research Question	Data Sources	Procedures	Purpose	Timeline
1.How am I developing tools to teach inquiry-based learning?	Lesson plans, observations	Maintain a record of my lesson plans from the beginning of the program to the end. Ask my observers to watch for specific instances of experiential learning.	To record changes over time in my planning. To self reflect and create data to use in my analysis at the end of the project.	Lesson plans from August 2020 to May 2021 Observations from January 2021 to May 2021
2.How am I incorporating student culture to build a safe and	Lesson plans, journal entries	Maintain a record of my lesson plans from the beginning of	To record changes over time in my planning.To self reflect	Lesson plans from August 2020 to May 2021

respectful learning environment?		the program to the end. Reflect weekly on opportunities, successes and misses in the classroom.	and create data to use in my analysis at the end of the project.	Journal and self reflection from January 2021 to May 2021
3.How Is my use of technology integration facilitating experiential-based learning?	Lesson Plans, self reflection questions	Reflect weekly on opportunities, successes and misses in the classroom.	To self reflect and create data to use in my analysis at the end of the project.	Journal and self reflection from January 2021 to May 2021

Data sources

My plan for this project is to use three main sources of data to examine. The first is lesson plan artifacts. With these I have a record of my planning from summer of 2020 to the end of data collection. Within my lesson plans I will be looking for the inclusion of experiential learning lessons. I will count the opportunities I presented students with the chance to drive learning. I will also examine my lesson plans for planned opportunities

for cultural inclusion. The last piece I will look for in my lesson plans will be if I used any technology based learning tools. The reflection portion of these plans will also be examined for instances of the mentioned pieces.

The second piece of data I will use will be teacher observations. I will utilize others' observations by looking through the observations taken and examining places where inquiry is mentioned and looking for growth opportunities. My observers take notes that I will include in my research. These observations will occur throughout the winter and spring semesters.

The third piece of data I will use is a self reflection journal. I will prompt myself with five questions to answer. 1. Did I integrate student culture in my lessons this week? 2. Did I see opportunities to bring student experiences into my lessons? 3. Were there opportunities I missed or did not capitalize on that I noticed? 4. How did I use technology in the classroom this week? 5. Were there opportunities I feel like I could have used more technology this week? I will answer these questions every Friday during my prep period and keep these in a collection.

Data Analysis

I will analyze the data from this study using a 6 step data-analysis procedure as described in table 3, (Brawn & Clark, 2006).

Table 3

Data Analysis Steps

Phase 1 Familiarize myself with data	Organize my lesson plans in ascending order based on the date of creation. Move my journal entries into digital formatting for ease of searching later on. Ensure my observers have sent all the information I have asked for.
Phase 2 Generate initial codes	Organize data into meaningful groups with research questions in mind Manually code with notes in transcribed text Begin digital code book, collating data within groups

	<p>Code for all potential themes</p> <p>Begin MAXQDA software coding of data</p> <p>Note tensions & inconsistencies of codes in digital diary</p>
<p>Phase 3</p> <p>Search for themes</p>	<p>Organize codes into potential themes using digital table</p> <p>Note thoughts on relationships between the emerging themes in digital diary</p> <p>Note any potential sub-themes in digital diary</p> <p>Add a miscellaneous section in digital code diary for any seemingly unrelated code</p>
<p>Phase 4</p> <p>Review themes</p>	<p>Revise table of potential themes, considering internal homogeneity and external heterogeneity</p> <p>Read collated data extracts for each theme, checking for coherent pattern</p> <p>For extracts with no coherent pattern, re-examine theme and related coded data for sub-theme or renaming of theme</p>

	<p>For themes where coherent pattern exists, examine for individual theme validity in relation to entire data.</p> <p>Examine transcripts for any missed data extracts needing coded for theme</p> <p>Re-read entire data sources for any new themes that may have been missed</p> <p>Stop when no more substantial and relevant themes emerge</p> <p>Examine how themes fit together in relation to research questions and note thoughts and considerations in digital journal</p> <p>Create thematic map</p>
<p>Phase 5 Define & name themes</p>	<p>Adjust digital table of them to organize collated data extracts within each theme for consistency</p> <p>Identify relative narrative for each theme in the digital diary</p>

	<p>Write a detailed analysis for each theme, to include individual relevance and how that relates to overall analysis and answers the questions of this research</p> <p>Examine written analysis for any excessive overlapping of themes</p> <p>Examine each theme for any sub-themes needing to be identified and explained</p> <p>For each theme, describe scope and content in no more than two sentences, adding potential names to each theme</p>
<p>Phase 6</p> <p>Write the thematic report</p>	<p>Write an analysis within and across themes</p> <p>Assure there is written evidence within each theme with related data extracts</p> <p>Choose vivid and relevant extract examples for each point of evidence in answering research questions</p> <p>Create analytic narrative that incorporates evidential answers to each research question</p>

Limitations, Delimitations, and Bias/Assumptions

Action research is limited in scope by the very data it collects. Through the lens of research I am examining my own practices and procedures. This inherently is subjective and is driven by my own desires to improve my teaching abilities. The data gathered is used to reflect on such practices and due to this should not be generalized. The action research cycle of data collection and reflection should occur over many cycles before any conclusions can be made. This was not able to happen due to the compressed timeline of the academic program.

I have chosen to collect the bulk of my data during the spring 2021 term. This term was chosen because students have started returning to the classroom. The significance of this is that this allows a normalized classroom to be the setting of the action research project. With students in the classroom there are more opportunities for interaction and teaching.

My biases in this project are directly related to my inexperience in the field. Through observing my experiences I am attempting to be critical of my own experiences. This can lead to either more critical observations, or less. These biases might affect my data collection and should be noted when examining the conclusions in the following chapters.

Credibility

Validity and reliability are important aspects of social research and can be accounted for in a variety of ways (Torrance, 2012). Both validity, the quality of being logically sound, and reliability, the degree to which accuracy can be considered dependable, are components of credibility, the quality of being trusted or believed in. Eisner (1991) believes that credibility of qualitative research is grown through a “confluence of evidence” that includes multiple types of data (p. 110). Validity of research is one component of providing credibility and can be done through triangulation of data (Lather, 1991). Carter, Bryant-Lukosius, DiCesno, Blythe, and Neville (2014) explain that one method of triangulation is method triangulation which includes using multiple methods of data collection. This is similar to Eisner’s method of structural corroboration (1991). Eisner (1991) also believes that getting input and opinions from others in the same field serves as a means of consensual validation. This helps to further demonstrate credibility.

In my research, I used multiple methods of data collection. These different methods served as method triangulation based on the explanation from Carter et al. (2014). The methods of data collection were through direct observations from peers, self reflection journaling, and reflection of lesson plan artefacts. This allowed me to analyze the data through differing means to ensure that I was correctly interpreting the data, as well resulting in “a broader understanding of the phenomenon” (Carter et al., 2014, p. 546). In addition, to further strengthen my credibility, I also used member

checks to provide a form of consensual validation. These member checks were conducted with the assistance of Geoff Thoma, as well as Riley Lamont.

Chapter 4.

DATA ANALYSIS

Introduction

Throughout this chapter I will examine the data I have collected and discuss how this relates to my goals and research questions. The research questions I explored were;

1. How am I developing tools to teach inquiry-based learning?
2. How am I incorporating student culture to build a safe and respectful learning environment?
3. How is my use of technology integration facilitating experiential-based learning?

These goals were identified as areas of interest to me that could also improve my teaching methodology and increase student learning. Due to the research limitations given to me based on time available and the inherent nature of action research being self reflective my data collection came from three main sources. These are lesson plans, observations, and journal entries. My lesson plans are original creations that I believe will show my growth over time and contain a record of information from the summer of 2020 to spring of 2021. Over this collection period I have taken several

classes which I believe will influence the methods I teach with. The observations I used came from my university supervisor and two different mentor teachers. These observations took place in winter and spring of 2021. The last piece of data I will look at is my personal journal entries from February 2021 to May 2021. All of these data sources will be examined using methods explained in chapter three.

Analysis of Question 1: How am I developing tools to teach inquiry-based learning?

This research question is aimed to discover my growth in implementing inquiry based learning through my lessons. As such I used my lesson plans and observations as the sources of my data. Inquiry based learning is centered around John Dewey's experiential learning and uses student driven inquiry to teach new material and cement knowledge. The reason I chose to use my lesson plans and observations for my data is that they represent the planning and action side of my teaching. Through my lesson plans I have records of my planning from the very first plan I wrote (June 2020) to my most current (May 2021). This planning reflects my ideals and how I would like my classes to work. My observations were chosen because they reflect what actually happened. This is important because it was completed by others watching my classes and I was given their impartial observations. Through observation of what actually happened I can see how my flexibility and planning enables inquiry based learning to actually occur.

Lesson Plans

My analysis of my lesson plans started by ensuring I collected and organized them into chronological order. This allowed me to examine my planning in order of occurrence.

My plan was to look for what I call primary and secondary opportunities. Primary opportunities were areas where student driven learning could take the main role of the lesson. Secondary opportunities were times where I presented information in ways that students could add to and drive the learning but not be the initial goal. I call these opportunities because they are in the planning stage being lesson plans.

While examining my plans I started by highlighting any activities that were planned. These were colored as primary opportunities. Within these activities I looked for specific terms that connected them to being either student driven or teacher driven. I assigned points to these terms that scored student driven as a 3, teacher driven as a 1, and in between as a 2. These scores allowed me to graph the scores and quantify the amount of primary opportunities in each lesson.

Once every lesson plan had been searched for activities I looked for demonstrations and activity set up lessons. I colored these as secondary opportunities. I assigned scores with the same point structure as primary opportunities.

Observations

To analyze my application of inquiry based learning, I utilized the observations of my teaching from my university supervisor and my mentor teachers. With these observations I looked for evidence of experiential learning and recognition of these practices. I was lucky to have three observers to watch me teach and share their knowledge through the notes that they have left me. While these observations can be subjective, they are useful due to the outside nature of observation. The observers used their own experience to determine my effectiveness as an educator. The themes I examined in these observations were similar to my lesson plans in that they looked for these experiences and inquiry that were student driven. They differ though in that these examine what actually happened. Where my lesson plans focus on the ideal, these show the reality. This data gave me information to see if there is a disconnect between the planning and implementation steps. Within this one of the themes I looked for was scaffolding the inquiry. I found many examples of the secondary opportunities described in the lesson plan portion of this research question. Included below are two small portions from my observers notes which describe their finding of the scaffolding I intended.

Analysis of Question 2: How am I incorporating student culture to build a safe and respectful learning environment?

Through this program I have learned a great deal about how students learn and how a classroom environment is a reflection not only of the teacher but also the students that make up the class. I have seen how classroom management techniques can succeed and fail depending on the relationship between all parties involved. Through my classes and research into the topic I have seen the importance of involving student culture and ensuring students have a learning environment where they are welcomed. This is why I chose this area to focus on for my second research question. I wanted to examine my effectiveness in creating this environment. To do this I inspected two aspects of the process. My planning and my thoughts. To examine my planning I looked at my lesson plans. This showed me where I created opportunities to integrate student culture into my lessons specifically. I wanted to see where I made a conscious effort to bring in culture and experiences. To determine places where I saw opportunities in class I used my journal entries as a record of my interactions with students. I also used these entries to see how my feelings about cultural topics changed over time.

Lesson Plans

My examination of lesson plans started similarly to how I used them to explore inquiry based learning. I organized them chronologically and electronically to ensure ease of searching. With my lesson plans I look for frequency codes. I want to explore the places where I planned on specific instances. The process of this was the same as before and produced a similar graph.

Reflection Journal Entries

With my journal entries I had 15 weeks worth of entries and answers to my questions. With these entries I kept them in one notebook and left them in analog format to be able to use a highlighter while analyzing the data. With these entries the first 3 of 5 questions were related to integrating student culture. I chose questions I believed would allow me to remain objective as much as possible, however I acknowledge that this is difficult.

The questions I used for this section were;

1. Did I integrate student culture in my lessons this week?
2. Did I see opportunities to bring student experiences into my lessons?
3. Were there opportunities I missed or did not capitalize on that I noticed?

These three questions allowed me to look back on my experiences in the class and pick out codes to demonstrate growth and development. The themes I looked for started broad and narrowed to break down specific instances of cultural integration.

Analysis of Question 3: How Is my use of technology integration facilitating experiential-based learning?

For my third research question I looked at how technology can improve my ability to create lessons that provided experiential based learning. I not only wanted to look at the physical technology brought into my room but what tools were helpful or not in my lessons. How did they bring in better opportunities for student engagement? How did they make my lessons better? With this year being a mix of online only, hybrid, and in person lessons, I had the opportunity to look at this implementation from three different viewpoints. I have chosen two artifacts to dive deeper into and use for my data. The first is my lesson plans to examine planning as discussed earlier. The second is my reflection questions. I answered these questions after my lessons and used them to reflect on how my technology use was either effective or not, and if I saw opportunities to improve.

Lesson Plans

Again my lesson plans followed the same process as before with my other two research questions. I specifically wanted to examine the frequency of my purposeful inclusion of technology usage. I wanted to investigate my growth and I believe frequency can display this pattern numerically.

Reflection Journal Entries

As before, using my journal entries allowed me to look at 15 weeks worth of data. I maintained the information in my notebooks to be able to manually look through the information to look for coloration patterns. With these entries I looked for usage and thoughts on how technology improved the lesson. I specifically investigated the use of technology to enhance lessons and the methods in which I used it.

Table 4

A description of codes examined within my data sources.

Code Name	Description	Examples
Primary Opportunities	Primary opportunities were areas where I designed specific activities to meet a specific goal.	From Lesson Plans from the week of May 3rd- May 7th 2021 “Students will design a parachute to increase air resistance....” “Students will take their experimental data and use it to explain energy change in phase changes.”
Secondary Opportunities	Secondary opportunities were times where I presented information in ways that supported an identified main goal which	From Lesson Plans from the week of May 3rd- May 7th 2021 “I will describe the equation used to determine force with the example of our basketball team” “I will ask students what forces apply to the egg to

	encouraged student participation.	encourage critical thinking”
Modeling	Modeling is where I provided a source of scaffolding examples for students. This could be written or a demonstration.	Observation from 4-14-21 “Used guiding questions, modeled first example “H” with class gradual release” Observation from 3-12-21 “Modeling -example Boron”
Support	Support was shown in encouraging students to bring in their own interests and opinions.	From journal reflection dated May 21,2021 “I had a student this week thank me for using their identified pronouns. They told me that there were students in the school who refused to, and I made them feel comfortable in my class.”
Conscious Effort	These were reflections on places I made intentional occurrences of a topic.	From Lesson Plan dated May 2nd, 2021 “I will present a powerpoint about Marie Curie's research into radioactivity to tie into our lessons about beta emissions.”
Discussions	These were places where I led student discussions or used student topics to talk about an issue.	From journal reflection dated APR 24, 2021 “Students were discussing the holocaust due to an earlier class. One student in particular wanted to share their experiences with visiting the holocaust

		museum in Rhode Island. This led to a discussion that took the place of our warm up.”
Improvement	I used improvement codes to determine where I enhanced a topic or situation using technology.	From Reflection dated Feb 12th 2021 “ Students liked being able to manipulate the waves themselves. This wouldn't have been possible in the classroom. Can I use simulations in conjunction with the labs?”

Conclusions

In this conclusion I will describe what findings I discovered from the analysis of my data sources as discussed in the above sections.

Inquiry based learning

This research question was chosen to determine my ability and growth in creating and implementing inquiry based lessons in the framing of experiential learning. The question itself was “How am I developing tools to teach inquiry-based learning?” To analyze this I used two data sources to look at my planning and results. These were my lesson plans and observation notes.

With my lesson plans my sources came from plans submitted in the earliest classes of my program, August 2020, to my latest submitted plans in May 2021. What I had expected to find was a gradual increase of inquiry based lessons from very little

opportunities to almost every lesson containing some sort of student driven learning. I thought this would be the case due to not learning about what inquiry education was until the fall of 2020. My findings however were very interesting. I discovered that the number of what I call “Primary opportunities” did not increase very much over time. Primary opportunities Even looking at my earliest lesson plans I had instances of these primary opportunities in most lessons. What did increase dramatically were the instances of what I call “Secondary Opportunities”.

Primary opportunities were areas where student driven learning could take the main role of the lesson. Secondary opportunities were times where I presented information in ways that students could add to and drive the learning but not be the initial goal.

Looking at these findings I believe that due to my experiences in my own education I had preconceptions about what type of teacher I wanted to be, even before starting the program. I believe that my interest in learning new skills through doing them drove my earliest plans to include these experiential based tasks. What I am the most surprised about was the inclusion of secondary opportunities. These were added through my lessons with a dramatic increase around the end of fall term. Looking at the time period that this increase occurred I can attribute this to my mock EdTPA submission. This submission was driven by new skills learned in my pedagogy classes.

Through the observation notes I examined, one of the most common themes that I found was modelling. I noted this word on 5 of the 6 observations. To me this is

indicative to the inclusion of the secondary opportunities. This shows that students are not necessarily driving the learning through this demonstration but have the opportunity to ask questions and push the learning into a different direction.

Integrating Student Culture

This question is where I identified the most potential for growth. I remember thinking about how to bring in student culture and being scared by the idea. I thought that if I did not know everything about what I was talking about that it would be seen as disrespectful. From my data sources I can see where I have and have not improved in this area. I will start with the negatives first. While looking at my planning for including student culture I found that my planned lessons had very few primary opportunities. I found that only 10% of my lessons had planned instruction with culture. This is unacceptable and is an identified area where I can still heavily improve. Secondary opportunities were a little better but not much. These opportunities were weak and non-directed with most plans based around a free discussion period.

The positives though were very numerous. I found that my reaction to the inclusion of student culture was much better. While looking at my journal entries I identified three major opportunities that show my improvement in this area. The first was the very first time I reacted to a student discussing race in a negative manner. The student referred to Covid-19 in a way that emphasised race. This was right after a major national news event where people were injured due to their race. I took control of the situation and used it as a learning opportunity for the students. In my entries for the week I used words like "Nerve wracking, sweaty, unsure." This showed my inexperience in both this

topic and dealing with a situation like that. The second major reaction was an interaction with a student who identifies as non-binary and uses a name different than their given name. This student came up to me and thanked me for respecting their choice and using their name. They told me that this was not always the case for them and that by me being respectful it made them feel welcome in my class. In my entries I noted this interaction as “surprising, positive, easy, felt normal.” I include this to describe that I felt that I was not trying to make a specific change other than to just do the right thing and that this student was so moved by it that they told me so. The third major reaction was when students came into my class and talked about the college application process. A white student was complaining that they felt that using race to describe challenges overcome in college application essays was unfair. There are several students of color in this class and they were not happy with the students' comments. I quieted the class and used this opportunity to discuss how people of color have all of the same challenges as any other student academically but also have challenges that someone who is white do not have. I described this interaction as “difficult, opportunity, supportive.” Looking at the progress from how I described the first interaction to the last shows me that the conversations are not getting easier, but how I react to them does. I still am uneasy, but no longer scared. This shows that I am trying to make a respectful classroom environment and am improving myself through my reactions to difficult situations.

Technology Integration

This was the most difficult research question to evaluate. With Covid-19 making education occur only online for the majority of the year it made instruction without technology impossible. This limited my research opportunities to places where I purposefully and consciously decided to use technology to enhance in person lessons. With this framing in mind I looked for instances where I used technology in place of other options. I found in my later lesson plans that there were few times where this was the case. I also found that secondary opportunities were not present. Looking at this data I believe that the decrease in technology usage through my plans were caused by a return to the classroom and a decision to try to use as many hands on and physical lessons as possible. This skewed my data and I feel like it is an area I can continue to look into in the future. The reasoning for lost secondary opportunities is also attributed to a return to the classroom but for different reasons. Trying to use technology whether in the form of supplemental videos, simulations, assessments, or any other type is near impossible without some sort of planning happening first. This limits the chances to use it.

Looking into my reflections I also have a hard time deciphering the data. I can see where I made decisions on when to use certain types of technology when we were online and hybrid, but these also disappeared when we returned to the classroom. Overall this is a good thing. Looking through what I do have I would say that I am extremely comfortable with technology and can reasonably plan for its use and integration in the future when we have a normalized schedule again.

Chapter 5

CONCLUSIONS AND SIGNIFICANCE

Introduction

As the 2021 school year comes to a close I can safely say that this was the most unique experience in education that I have ever had. Seeing it through both an educator's lens and a student's point of view has given me opportunities to discuss the education system that few others will have. What it has done is allow me to see how much flexibility is needed to be a successful educator. I have been able to gain skills quickly, use technology supports and master them in ways that take some teachers years. I know that I was also limited in my experiences in the classroom and look forward to being able to build my skills here while maintaining the positives that came out of such a different year.

This project gave me an opportunity to evaluate myself in three very distinct areas. I was able to use my own data to determine how skilled I am in these areas and where I

still need to develop. I am thankful that I had this opportunity during this time because it set me up to be able to perform my own reflections in the future using these processes. My goal has always been to improve as an educator and I feel that I had the ability to do so using this project and will have the opportunity to use these formats moving forward.

This project is a reflection of my process in using action research to evaluate my skills. It started in chapter one with a review of my educational history and thoughts on where I want to be as an educator. Chapter two displayed the literature I used to determine where to focus my research. Chapter three described my process and what I will use to analyze my data. Chapter four was the culmination of the project and described what I found in my data and what I have found. This chapter closes the book on this action research project by wrapping up my research and discussing the implications of what I have found. I will also discuss the limitations I faced and give a final conclusion.

Implications of this research

Through this research I have identified areas of strength, and areas where I can improve. I knew from my background and experiences that I would purposefully design strong experiential learning even before I knew of the theory. This is a byproduct of my own needs and desires as a student. I also knew that I would be weakest in the integration of student culture. This is also due to my background. What this project has taught me is the importance of being able to identify these and objectively show them in data generated through experience. I can point to specific instances and say that I have

grown in this area. I can see where my attempts to improve have succeeded and failed. I am able to reflect on this and identify where I still need work. Overall I feel that I have not made some breakthrough that will shake the educational field, but I have made progress on my own shortcomings as an educator. The implications of this is that I can see that I will always have room to improve. Even where I am confident there is always something to tweak and change to get better results. I believe that this is the true purpose of the project. The implications are small in that they only affect my practice, but they are a massive step forward into being the best educator I can be.

Limitations

The limitations of this project during this year were immense. This was the year of uncertainty for all of us and due to covid restrictions no student in the MAT program knew what our experiences would look like. Even here at the end, none of us have had what could be called “traditional.” I myself had limitations in the form of being the last person to get a placement for student teaching. I started in December of 2020 and my action research project started well before that. I tried to design research questions that I thought would be encompassing an experience that I couldn't predict. This in turn led to many rewrites and new directions throughout the year. In addition to being a late placement I also moved placements in the last week of winter semester. I was fortunate to be hired on an emergency license for a high school to finish the rest of the year with them. This meant I had to learn a new system, meet all of the students, design a

curriculum and complete all of my MAT requirements, all at the same time. Add in the constant flux of changing between hybrid learning, all online, and in person learning with new requirements all the time, I am not sure how I was able to complete my project. The nature of a one year accelerated program with all of this stacked on top has been one of the most difficult experiences of my life.

Reflections and conclusion

Through this action research I have been able to view my own practices from a perspective as objective as I think is possible when looking at myself. This was extremely difficult for me as my background is in the sciences. When I think of research I think of hard data and controlled experiments. It has been an extremely hard transition for me to think of this as “research.” I still do not in the traditional sense, but I can see the value of reflection and looking at artifacts with a methodology that tries to produce actionable information.

My data and conclusions produced information that I would hope to see through a teacher preparation program. I saw the growth of teaching skill through experience. These skills took the form of interactions between myself and students, through the planning and integration of technology, and the utilization of theory and practicality when designing experiential learning opportunities. I can see my growth through this data and am glad to be able to look at where I came from and compare it to the teacher I am now.

References

- Asunda, P. A. (2018). Infusing computer science in engineering and technology education: An integrated STEM perspective. *Journal of Technology Studies*, 44(2), 2–12. <https://doi-org.ezproxy.wou.edu/10.21061/jots.v44i1.a.1>
- Berkman, M., & Plutzer, E. (2012). An evolving controversy: The struggle to teach science in science classes. *American Educator*, 36(2), 12.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Cairns, D. (2019). Investigating the relationship between instructional practices and science achievement in an inquiry-based learning environment. *International Journal of Science Education*, 41(15), 2113–2135. <https://ezproxy.wou.edu:4285/10.1080/09500693.2019.1660927>
- Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum*, 41(5), 545-547. doi:10.1188/14.ONF.545-547
- Delacruz, S. (2019). Building digital literacy bridges: connecting cultures and promoting global citizenship in elementary classrooms through school-based virtual field trips. *TechTrends: Linking Research & Practice to Improve Learning*, 63(4), 428–439. <https://doi-org.ezproxy.wou.edu/10.1007/s11528-018-0350-1>
- Develaki, M. (2019). Methodology and epistemology of computer simulations and implications for science education. *Journal of Science Education & Technology*, 28(4), 353–370. <https://doi-org.ezproxy.wou.edu/10.1007/s10956-019-09772-0>
- Dewey, J. (1916). *Democracy and education*. Macmillan.

- DiBiase, W., & McDonald, J. R. (2015). Science teacher attitudes toward inquiry-based teaching and learning. *Clearing House*, 88(2), 29–38. <https://ezproxy.wou.edu:4285/10.1080/00098655.2014.987717>
- Djonko-Moore, C. M., Leonard, J., Holifield, Q., Bailey, E. B., & Almughyrah, S. M. (2018). Using culturally relevant experiential education to enhance urban children's knowledge and engagement in science. *Journal of Experiential Education*, 41(2), 137–153. <https://doi-org.ezproxy.wou.edu/10.1177/1053825917742164>
- Dyrberg, N. R., Treusch, A. H., & Wiegand, C. (2017). Virtual laboratories in science education: students' motivation and experiences in two tertiary biology courses. *Journal of Biological Education (Routledge)*, 51(4), 358–374. <https://doi-org.ezproxy.wou.edu/10.1080/00219266.2016.1257498>
- Eisner, E.W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. New York, NY: Macmillan.
- Jiang, F., & McComas, W. F. (2015). The effects of inquiry teaching on student science achievement and attitudes: Evidence from propensity score analysis of PISA data. *International Journal of Science Education*, 37(3), 554–576. <https://ezproxy.wou.edu:4285/10.1080/09500693.2014.1000426>
- Ladson-Billings, Gloria. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal - AMER EDUC RES J.* 32. 465-491. 10.3102/00028312032003465.
- Lather, P. (1991). *Getting smart: Feminist research and pedagogy with/in the postmodern*. New York, NY: Routledge.
- Laughter JC, Adams AD.(2012) Culturally relevant science teaching in middle school. *Urban Education.* ;47(6):1106-1134. doi:10.1177/0042085912454443
- Maras, N., Soldo, R., & Đuranovi, M. (2021). Students' self-efficacy in the virtual mathematics classroom. *Journal of Educational Sciences & Psychology*, 11(1), 66–78. <https://doi-org.ezproxy.wou.edu/10.51865/JESP.2021.1.07>
- McGrath, A. L., & Hughes, M. T. (2018). Students with learning disabilities in inquiry-based science classrooms: A cross-case analysis. *Learning Disability Quarterly*, 41(3), 131–143. <https://ezproxy.wou.edu:4285/10.1177/0731948717736007>

- McKinney de Royston, M., Madkins, T. C., Givens, J. R., & Nasir, N. I. S. (2020). "I'm a teacher, i'm gonna always protect you": Understanding Black educators' protection of Black children. *American Educational Research Journal*, 0002831220921119.
- Mirçik, Ö. K., & Saka, A. Z. (2018). Virtual laboratory applications in physics teaching. *Canadian Journal of Physics*, 96(7), 745–750. <https://doi-org.ezproxy.wou.edu/10.1139/cjp-2017-0748>
- National Center for Education Statistics (NCES) U.S. Department of Education. <https://nces.ed.gov/>
- National Research Council. (2002). *Investigating the Influence of Standards: A Framework for Research in Mathematics, Science, and Technology Education*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/10023>.
- O'Keeffe, L., Paige, K., & Osborne, S. (2019). Getting started: Exploring pre-service teachers' confidence and knowledge of culturally responsive pedagogy in teaching mathematics and science. *Asia-Pacific Journal of Teacher Education*, 47(2), 152–175. <https://doi-org.ezproxy.wou.edu/10.1080/1359866X.2018.1531386>
- Popham, W. J. (2016). Standardized tests: Purpose is the point. *Educational Leadership*, 73(7), 44–49.
- Siahaan, Parsaoran & Suryani, Ajeng & Kaniawati, Ida & Suhendi, Endi & Samsudin, Achmad. (2017). Improving students' science process skills through simple computer simulations on linear motion conceptions. *Journal of Physics Conference Series*. 812. 012017. 10.1088/1742-6596/812/1/012017.
- Torrance, H. (2012). Triangulation, respondent validation, and democratic participation in mixed methods research. *Journal of Mixed Methods Research*, 6(2). 111-123.
- Wellington, A., Easton, G., Davis, J., & Yeh, A. (2020). BEAT AND RHYTHM: Teaching science via integrated STEAM and digital technologies. *Teaching Science: The Journal of the Australian Science Teachers Association*, 66(2), 20–25.