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CLIMATE LITERACY: DESIGNING A SYLLABUS FOR A GRADUATE LEVEL

CLIMATE LITERACY FOUNDATIONS COURSE

by

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A capstone submitted in partial fulfillment of the requirements for the degree of Master
of Arts in Education: Natural Science and Environmental Education

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CHAPTER ONE

Introduction

Many experiences throughout my life have led to the pursuit of this capstone topic about climate literacy, specifically the question, “What elements should be included in a graduate-level climate literacy foundations course?” In this chapter I will explain the journey to my research topic and question, describe the significance and rationale for my research, and provide background information about the topic.

My Background

As a child, I developed a love and appreciation for nature through spending countless hours exploring the woods near my house, building tree forts, attending summer camp, and going on yearly canoe trips with my family. In college I worked as a student naturalist in the St. John’s Arboretum in Collegeville (now Outdoor University), and spent many summers working as a camp counselor. Although I pursued pre-medicine throughout my undergraduate college years, I realized my passions and strengths aligned more with education than medicine. An experience that had a large impact on my decision to pursue education was my time living abroad in Guatemala with a host family. Through conversations at the dinner table, traveling, visiting the market, and taking classes at the university, I acquired a deeper understanding of Spanish and history (of Guatemala, Central America, the United States, and beyond), gained a broader perspective of global relations and systems, and experienced significant personal growth.

Hearing the stories from the people in a country I grew to love catapulted me towards pursuing education, where I craved the opportunity to build connections, share stories, and continue to learn and teach. After college I taught in a formal classroom setting in Puerto Rico as a volunteer teacher. This experience felt restrictive; I felt constrained by standards and textbooks, and all I wanted to do was bring my students outside to find hands-on learning opportunities. This led me back to the world of experiential education. I landed at Wolf Ridge Environmental Learning Center and earned my Certificate of Environmental Education through the University of Minnesota, Duluth. Most importantly, I became a better naturalist and met intelligent, driven, and inspiring role models.

Since 2014 I have been a year-round, full-time program director. Over the next few years I completed my Master of Business Administration degree, where my capstone project was designing a Maple Syrup Festival. I also enrolled in the Master of Education in Natural Science and Environmental Education program at Hamline University. In late January of 2020, I met with Kristen Poppleton to ask about career advice. We ended up talking about my coursework at Hamline University, and she suggested I consider designing a Certificate of Climate Literacy Program, if I was interested of course. I was interested! Although the topic has morphed slightly, I owe Kristen a huge amount of credit and appreciation for planting this idea that caught my attention, and kept me excited, engaged, and energized. The topic of climate literacy is exciting to me because it includes the impact of climate change on natural *and* human systems, as well as an important behavioral component.

Climate Literacy

Climate literacy is short for climate science literacy, and according to the National Oceanic and Atmospheric Administration (NOAA), it is “an understanding of your influence on climate and climate’s influence on you and society” (NOAA, n.d.). NOAA outlines what makes a climate-literate person, which includes the ability to understand the seven essential principles of Earth’s climate system, assess scientific information for credibility, communicate about the climate and climate change in a meaningful way, and make informed and responsible decisions with regard to actions that may affect climate (NOAA, n.d.). Although it is important to understand the scientific components of climate change, that alone is insufficient. The political, socioeconomic, and psychological aspects are also necessary, and bridging the gap between understanding and civic engagement is critical.

Science. The science of climate change is complicated, but in order to build climate literacy, it’s important to have a basic understanding of climate change on a scientific level. Although climate and weather are often used interchangeably, they are different, and it’s important to understand their meanings. Weather refers to the more short-term conditions of the Earth’s oceans and atmosphere; it defines the temperature, cloud cover, wind, and overall what humans experience during a short time period. Climate is measured over a longer period of time and refers to the weather within this time; for example, it describes the annual mean temperature within a certain region. Finally, climate change is an “increase in average global temperature, along with all of the ways such an increase affects the characteristics of climate and weather” (Oppenheimer, 2016, p. 13). It is important to know the difference in order to avoid

misunderstandings; being able to differentiate specific weather experienced on a given day from the larger global impact is crucial (p. 13).

Understanding the greenhouse effect is important in order to understand climate change. Currently the atmosphere is mainly composed of Nitrogen (78%), Oxygen (21%), and various greenhouse gases. The major greenhouse gases are carbon dioxide, water vapor, and nitrous oxide. Greenhouse gases are responsible for keeping heat near the Earth's surface. This is because solar energy absorbed at Earth's surface is radiated back to the atmosphere as heat; as the heat is making its way through the atmosphere, greenhouse gases absorb a lot of it, and they radiate the heat back to the Earth's surface. Nitrogen and Oxygen are made only of two atoms, bound together tightly, so they cannot absorb heat. The greenhouse gases, however, are made of three or more atoms, held together loosely enough that they vibrate when they absorb heat. The vibration releases radiation, which will be absorbed by another greenhouse gas, and this is the process that keeps the heat near the Earth's surface. This is called the greenhouse effect (University Corporation for Atmospheric Research, 2020). In a balanced state, sunlight radiates to the Earth's surface, is absorbed, and then re-radiated to space as an equal amount of infrared light (heat). However, with the buildup of greenhouse gases in the atmosphere, some of this re-radiation is blocked and redirected back towards Earth's surface (Hsiang & Kopp, 2018, p. 4). Without the greenhouse effect, Earth's temperature would be below freezing, but with more greenhouse gases, more heat will stick around, and continue to warm the planet (University Corporation for Atmospheric Research, 2020).

This change to the climate is not isolated to specific areas; it is a global issue. This is because carbon dioxide has a long lifetime, and can achieve a nearly uniform

distribution in the atmosphere, meaning there are no boundaries for containing its impact (Oppenheimer, 2016, p. 14). About 25% of carbon dioxide emissions will remain airborne even a millennium from now, and so without a way to capture and bury it, the effects are damaging and potentially irreversible (p. 14). Historical climate records show that the average temperature of Earth has increased during the past century and a half by about 1.5 degrees Fahrenheit. Inland area warming has seen an increase greater than the global average, because the ocean moderates the climate of coastal areas more. Northern polar region warming has also seen an increase greater than the global average, where sea ice melt increases absorption of the sun's rays (p. 17). The global sea level has increased by 6-8 inches in the last century (p. 17). This warming has caused glaciers and ice sheets to melt, thus raising the oceans' height (p. 17). Another concern of planet warming is changes in climatic extremes; the occurrence of extremely hot days and nights has already exceeded the historical record. Increased heat leads to increased evaporation of water from the ocean surface to drive the hydrologic cycle (p. 18). This causes an increase rather than decrease in frequency and intensity of extreme precipitation. Other evidence of this impact includes migrations of species towards cooler climates, and changes in ecological cycles, such as the flowering and fruiting of plants (p. 18).

Human Impact. Climate change is anthropogenic. There is overwhelming evidence that human emissions of greenhouse gases already have and will continue to change the climate, thus making climate change anthropogenic, or human influenced (Oppenheimer, 2016, p. 12). Carbon dioxide has increased by more than 40 percent from the pre-industrial level. This increase is due to mining, burning fossil fuels, deforestation, and various industrial and agricultural practices that emit greenhouse gases (p. 13).

Humans emit 35 billion metric tons of carbon dioxide into the atmosphere per year. Without the human interference, about 20 times that amount is emitted and absorbed naturally, putting the carbon cycle close to balanced so that the amount of carbon dioxide in the atmosphere would only change slightly over thousands of years. Although humans contribute a seemingly small fraction of the total carbon emissions, this 35 billion metric tons of carbon dioxide is enough to lead to a build-up of greenhouse gases at a rate that far outpaces the rate that would be expected without human contributions. Therefore, the recent and rapid buildup of carbon dioxide in the atmosphere is easily connected to human activity (p. 18).

Politics. Since climate literacy involves understanding the impact of the climate on human systems, the topic of climate change has been a political and controversial issue throughout history. Back in 1859, physicist John Tyndall first began experiments leading to the discovery that carbon dioxide (CO₂) in the atmosphere absorbs the sun's heat (ProCon, 2020). Then, in 1938, engineer Guy S. Callendar published a study suggesting increased atmospheric CO₂ from fossil fuels was causing global warming, but many critics denied this, arguing that natural changes determine the climate as opposed to CO₂ emissions (para. 5). By 1958, climate scientist Charles Keeling confirmed atmospheric CO₂ levels were rising, instead of being absorbed by forests and oceans, and by 1977, the US National Academy of Sciences issued a report stating that burning fossil fuels was increasing atmospheric CO₂ associated with global warming (para. 6-7). In 1978, Congress passed the National Climate Program Act in order to “assist in the understanding and response to natural and man-induced climate processes and their implications” (Powledge, 2012, p. 8). Congress felt that anticipating climate changes

would help provide sound policy decisions in the public and private sectors (p.8). In 1988, NASA scientist James Hansen testified before the Senate that an increase in CO₂ was warming the planet and changing the climate, but MIT meteorologist Richard Lindzen denied this by arguing that models were unreliable and assured natural processes would balance out warming (ProCon, 2020, para. 8). In 1997 the Kyoto Protocol was signed by Bill Clinton, which was meant to reduce greenhouse gas emissions; however, in 2001, President Bush withdrew from the Kyoto Protocol with concerns that limiting greenhouse gas emissions would harm the US economy (para. 11-12). In 2011, the House of Representatives deliberated action, stating “Congress accepts the scientific findings... that climate change is occurring, is caused largely by human activities and poses significant risks for public health and welfare” (Powledge, 2012 p. 8). The proposition was voted down 240 to 184, mostly along party lines (p. 8). In 2016, the US adopted the Paris Agreement to again reduce greenhouse gas emissions, but in 2017 President Trump withdrew from the Agreement (ProCon, 2020, para. 15-16).

Spurious political claims have delayed important efforts in climate change education, policy, and mindset. The Nongovernmental International Panel on Climate Change (NIPCC) is composed of non-government scientists and scholars who do not believe in the threat of climate change; members claim that since they are not predisposed to believe climate change has a human cause, they can evaluate the evidence that the Intergovernmental Panel on Climate Change (IPCC) “ignores” (NIPCC, 2017, para. 1). The NIPCC believes that climate change is an interdisciplinary subject which requires contributions from a variety of disciplines, and that there have not been scholars with enough background in multiple areas to make worthy scientific claims. They also believe

that organizations such as the IPCC are not credible sources because they are “agenda-driven” (Idso, Carter, & Singer, 2016, p. 101). Additionally, they believe that many models used to make climate change predictions over-estimate the sensitivity of climate to CO₂ and that the twentieth century warm peak was not greater than previous peaks caused by natural forces (p. 102). Finally, they argue that people would adjust to natural changes in climate and weather events, so the government should invest in “real” problems facing people (Idso, Carter, & Singer, 2016, p. xiv).

Today, after plenty of scientific reports on climate change, supported by the Intergovernmental Panel on Climate Change (IPCC), the crisis remains unsolved. In polls, 76% of Democrats said the effects of climate change had already begun, and only 42% of Republicans agreed (Kamarck, 2019). Whether or not climate change is on the political agenda often depends on the administration in charge. Concerns for the economy seem to take precedent over preparing for climate change. However, climate change will not stop, so eventually policymakers will have to confront it (Powledge, 2012 p. 8). Climate change remains unresolved politically, both nationally and internationally, because the climate does not adhere to local (or international) boundaries (p. 9). Therefore, climate change is a global issue both in a physical (scientific) and political sense.

Socioeconomics. There are economic and social consequences to climate change that are important to understand; some impacted areas include health, agriculture, energy, labor productivity, crime, and coastal regions (Houser, 2015, p. 46).

Increased air pollution and greenhouse gases worsen respiratory concerns and conditions, impacting health and well-being. More frost-free days and warmer

temperatures lengthen growing seasons, resulting in more pollen production and increased allergies and asthma. Extreme heat events lead to more hospital admissions and death for people with a variety of underlying conditions (Kreslake, 2016, p. 2).

Climate change also impacts agriculture - an important economic and cultural component of the United States. Despite more recent strategies and technology to alleviate disruption, agricultural production and prices fluctuate in response to both gradual climate change and extreme climate events (Houser, 2015, p. 51). Over the past 15 years, there has been an increase in crop loss and negative economic impact attributed to climate events such as drought, extreme heat, and storms (p. 52). A drought that impacted almost two thirds of the country for much of 2012 resulted in widespread crop failure and other agricultural impacts estimated to cost \$30 billion. Even brief temperature fluctuations cause widespread destruction; for example, in 2008, heavy rain and flooding caused significant agricultural losses and property damage in the Midwest, which totaled more than \$16 billion (p. 53). Overall agriculture is vulnerable to a changing climate, and in turn influences the U.S. economy (p. 51).

Electricity and other energy sources are critical to the financial security of American businesses and households, as well as national security. Although the energy system has adjusted to climate changes in the past, it is not prepared for the climate changes of the future. Rising temperature, strains to water supplies, and an increase in extreme weather events will impact the cost and consistency of the U.S. energy supply (p. 96). Climate change will impact both energy supply and demand. For example, the rising average temperatures and extreme temperature fluctuations will lower the efficiency of thermoelectric generation and transmission. Heating demand will switch to cooling

demand, raising the total energy costs (p. 99). Warming temperatures result in permafrost thaw, which threatens stability of onshore infrastructure on which oil and gas production rely (p. 101). Energy production is water-intensive, and climate change has a major impact on water supply through increased evaporation rates, changes in snowpack, and changes in precipitation patterns (p. 101). Finally, extreme weather events, such as coastal storms and wildfires, damage and disrupt the energy supply (p. 102-103).

Labor fuels the economy, and even small changes in workforce productivity significantly impact overall economic output. Climate change impacts the labor force, including workers, the workplace environment, and productivity (p. 67). Rising temperatures directly affect working conditions, because people will spend more time indoors to escape the heat, and more time on breaks to cool off, especially in agriculture, construction, utilities, and manufacturing (p. 68). A changing climate may also affect the entire labor force through increased storm damage, flooding, wildfires, and other events that cause disruption to business and production (p. 67). The health-related issues mentioned previously will also inhibit work, resulting in decreased productivity and labor (p. 67).

Temperature influences both violent and nonviolent crime (p. 85). Studies have found that individuals are more likely to be violent if the temperature is higher, from horn-honking to assault, to murder. Additionally, police officers are more likely to use deadly force in training simulations when they are addressing threatening individuals in a hotter environment. Hot days have contributed to more rapid escalation of retaliatory violence (p. 86). There is a link between warmer temperatures and incidence of crime, so as climate change causes rising temperatures, crime is predicted to rise.

Finally, climate change impacts the economy through its intense impact on coastal cities. Counties touching the coast include 39% of the U.S. population (p. 105). Rising sea levels, more floods, and increased extreme weather events puts these people at higher risk and results in coastal property damage (p. 125). For example, research predicts that between 4.1 and 5.5 percent of the insurable residential and commercial property in Louisiana will likely be below the mean sea level by the year 2050; that figure will grow to 15 to 20 percent by 2100. When looked at in dollars, “between \$33 billion and \$45 billion worth of current, Louisiana property will likely be below mean sea level by 2050, growing to \$122 billion to \$164 billion by 2100” (p. 107). Higher sea levels lead to more flooding during coastal storms. Current storm damage costs about \$27 billion in average annual commercial and residential property damage, and according to projections, the losses will continue to increase by billions of dollars each year (p. 110-111).

Perhaps most important to note, the impacts of climate change are not experienced equally. Climate-related risks are disproportionately higher for the most vulnerable populations in the United States and the world. These populations include children, the elderly, low-income communities, people with preexisting health conditions, indigenous communities, and people of color (Houser, p. 84). The effects of climate change will be felt sooner and more acutely in less developed countries; many of their economies depend more on agriculture, forestry, fishing, and tourism, which are more climate-sensitive areas. In addition, these countries typically have unhealthier populations and lower access to quality public services (Tamirisa, 2008, p. 19). Extreme heat events lead to more hospital admissions and death for people with a variety of underlying conditions (Kreslake, 2016, p. 2). Communities of color are more vulnerable than white

communities; a NAACP study in 2012 stated that “communities of color breathe in 40 percent more polluted air than white communities across the US.” Additionally, although African-Americans and Latinos make up a smaller percent of the US population than white people, they are much more likely to live in places with higher concentrations of pollutants that cause both climate change and health problems. These communities of color are less likely to receive the adequate protection and response to environmental emergencies (Fernandez & Floyd, n.d, para. 10-12). Children are more vulnerable for a variety of reasons, including the risk of being separated from their guardians during natural disasters, and higher susceptibility to vector-borne disease (Levy, 2015, p 314). Indigenous people are vulnerable to climate change because their lives are closely connected to the natural environment; this impacts their food, water, and shelter sources, as well as their spiritual well-being (p. 314). What’s more is that many people belong to multiple vulnerable populations, which increases their risk for negative impacts from climate change even more (Kreslake, 2016, p. 2). Often those who experience the harshest impacts of climate change contribute very little to the cause (Mearns & Norton, 2010, p. 21). According to a recent Oxfam report, annual carbon emissions grew 60% from 1990 to 2015, and it’s estimated that the “richest 10% of the world’s population were responsible for 52% of the cumulative carbon emissions” and “the richest 1% alone were responsible for 15% of cumulative emissions” (Core, 2020, p. 2). In contrast, the “poorest 50% were responsible for just 7% of cumulative emissions” (p. 2). People in low-income populations are more likely to experience the adverse effects caused by climate change due to their higher vulnerability (Levy, 2015, p. 310). The causes and consequences of climate change are closely intertwined with global inequalities. Because

the effects of climate change exacerbate existing inequalities, it is important for policy and action responses to have equity and social justice at the core (p. 21).

Understanding the socioeconomic impact is an important component of understanding and addressing the full story of climate change; perhaps the necessary political traction will be achieved by learning of both the threat of physical damage and financial risk (Houser, p. 11). Unfortunately, it's hard to put a price on the effect of climate change. For example, when someone dies of heatstroke, a "value of statistical life" is applied, but can't really account for the real impact of the loss of a family member. There's a similar challenge when accounting for the extinction of a species. However, it's important to put a monetary price on climate change in order to demonstrate what's possible. Although it's often believed that the cost of moving away from fossil fuels is prohibitive and will destroy the economy, recent studies suggest the opposite (p. 122). In studying the direct costs from the six impacts described above (health, agriculture, energy, labor productivity, crime, and coastal regions), researchers predict a conservative cost of climate change to be 0.7 to 2.4 percent of GDP. Of course, some U.S. states would feel these effects significantly more than others, and these numbers do not include many unquantified impacts. Other predictions are even higher (p. 141).

There may be a general uneasiness for economists to participate more profoundly with the issue of climate change; many indicate that they haven't studied physical sciences since high school, if at all (Hsiang & Kopp, 2018, p. 4). Climate change suffers from being viewed as an environmental issue, but if it were reframed as a "core challenge for sustainable development with powerful economic, social, and environmental

implications,” it is more likely to be addressed by all the relevant sectors (Mearns & Norton, 2010, p. 50).

Summary

The main motivation for focusing on this topic is “society needs citizens who understand the climate system and know how to apply that knowledge in their careers and in their engagement as active members of their communities” (NOAA, n.d.). Climate change will remain an important topic of public discourse; therefore, understanding climate science and having the ability to assess news stories will allow people to better contribute as informed citizens to improve quality of life now and for future generations (NOAA, n.d.).

Despite scientific discoveries and predictions made in recent years about the threat and impact of climate change, higher education courses on climate change often miss key aspects of climate literacy (Cooper, 2019, p. 1). We need climate literate adults to interpret climate change in the local context (p. 2). Advancing climate literacy secures the collective action required to address causes of climate change and “improve natural and human community resiliency” (p. 2). This research guides the development of a graduate-level climate literacy foundations course that could be taught at Hamline University as an elective in the MAED program as well as relevant social, political, and environmental science programs.

The following capstone will dig into how to teach climate literacy in an effective way that teaches the necessary scientific, political, and socioeconomic components in a way that also inspires activism. The goal is to take what is known and design a course

that inspires a behavioral change. Chapter 2 is a literature review of what motivates learners, specifically towards pro-environmental behaviors. Chapter 3 is a description of the Hamline University syllabus design and learning outcomes. Chapter 4 is the proposed syllabus. Chapter 5 is a reflection on the connections between the purpose, research, and project as well as a look forward.

CHAPTER TWO

Literature Review

Introduction

The purpose of this literature review is to examine what is known about academic motivation in general, and furthermore, what motivates pro-environmental behavior in learners. When on a journey to become climate literate, it is important to gain a basic scientific understanding of climate change, an understanding of the politics and the socioeconomic impacts, and finally, inspiration to be involved in solutions. Responding to climate change is a huge undertaking. It requires new ways of envisioning the future and adopting new ways forward. Changes are required in companies, organizations, schools, cities, states, countries, and all levels of government worldwide as well as on a personal level. All require a commitment to action. We know what climate change is, and how to fight it, but how do we put this knowledge into pro-environmental behavior? (Beincecke, p. 1). Understanding how to move from knowledge to pro-environmental behavior will help answer the research question of identifying the elements that should be included in a graduate-level climate literacy foundation course.

General Academic Motivation

Understanding how students learn is important so instructors can utilize best practices in order to achieve desired academic outcomes. Some ways in which students

are motivated to learn include the availability of self-study options; coursework that allows students to experience competence, relatedness, and autonomy; and culturally relevant pedagogy.

Allowing for self-study, which encourages students to formulate their own questions about a topic and engage in individual self-directed investigation, is a motivational factor. Problem-based learning (PBL) is a type of learning environment that is student-led; utilizing this concept and allowing students to choose their own resources can be helpful in encouraging motivation, perceived competence, and perception of mental effort (Wijnia, 2015, p. 39). In the Wijnia study, there were 60 Dutch undergraduate students enrolled in PBL curriculum (p. 40). All students participated in an initial assessment of motivation and topic interest as well as a simulated group discussion. Next, half of the students participated in a self-study of instructor-selected resources and the other half participated in a self-study of student-selected resources. Following that, all students rated their perceived mental effort, realism, autonomous and controlled motivation, perceived competence, and learning uncertainty during the self-study (p. 45). It was found that offering students the opportunity to choose their own resources positively affects intrinsic and autonomous motivation. The students who self-selected literature also reported lower perceptions of mental effort and reported higher perceived confidence that they had met course goals (p. 52). All in all, the results suggest it is most beneficial to allow students to select their own resources from a predetermined list as opposed to instructor mandated sources (p. 55).

Feeling competent, autonomous, and a sense of relatedness may also fuel motivation in students. When these needs are met, students “engage more energetically

and learn more” (Skinner, 2017, p. 2433). In a study regarding motivation, Skinner found that active and authentic academic work as well as supportive relationships are motivating. The participants in the study were undergraduate students enrolled in science courses at an urban university in the Pacific Northwest. During the study, 1,430 students completed online surveys that captured their motivational experience in science classes. Final course grades were also evaluated. The motivational factors measured students’ view of themselves, engagement in science, technology, engineering, and mathematics (STEM) academic work, their identity as a scientist, authentic academic work, and supportive relationships with teachers and peers (p. 2437-2439). The study found that when academic work was active and authentic, it was more likely to be intrinsically motivating, interesting, and engaging. This includes work that was “hands-on, heads-on, experiential, project-based, relevant, progressive, and integrated across subject matter” (p. 2453). Additionally, the study found that the quality of the interpersonal relationships that students develop with instructors and peers was motivating. Supportive relationships with instructors and fellow classmates helped students develop positive “self-system processes, a strong academic identity, and motivational resilience” (p. 2453-2454).

The visibility of culturally relevant career goals is an important motivational factor for student learners. Research has suggested that underrepresented minority (URM) college students may lose motivation if they cannot see the cultural relevance of science careers (Jackson, 2016, p. 1). In the Jackson study, 249 freshman college students majoring in science from a large 4-year public university in California participated in a longitudinal study (p. 4). Of the students, 119 were from a URM group. The study included multiple surveys and data collection over the course of one academic semester

(p. 5). The results indicated that the opportunity for students to see that science will allow them to fulfill prosocial goals is more important for underrepresented students in science fields than students who are typically represented (p. 6). First-generation URM students held strong prosocial values for pursuing a science major, such as giving back to the community. More broadly speaking, URM students reported motivation for science careers in order to increase the status of their family, such as fulfilling aspirations for a better life (p. 1). When compared to white students, Latinos, African Americans, and American Indians value the opportunity of helping others through their work, especially around giving back to their communities (p. 2).

Providing opportunities for students to maintain their cultural integrity is academically motivating. Studies by Fordham and Ogbu in the 1980's found that many African American students who were successful in school were ostracized by their peers, and therefore often did not continue to do well in school (Ladson-Billings, 1995, p. 475-476). Because of this phenomenon, it is important to balance academic demands with cultural competence. In order to do so, one teacher in their study used lyrics from rap songs to teach elements of poetry, eventually covering conventional poetry as well. This approach supported students skilled at creating raps. Another teacher attempting to focus on peer group leadership inspired a student who was often suspended--but had also demonstrated obvious leadership abilities--to run for class president with his class helping to manage his campaign. Because these students were encouraged to be themselves and achieve in school, they did much better (p. 476). Research by Ladson-Billings supports this approach. She believes the teacher helps students make connections between their own "community, national, and global identities," as opposed to grouping

all students into one “American” identity (Ladson-Billings, 1994, p. 34). Ladson-Billings believes that not only should diverse cultural backgrounds be seen and acknowledged, but that they are central for creating relevance between a topic and individual students (p. 49).

Culturally relevant pedagogy also requires that teachers draw understanding out of their students rather than putting it into them (Ladson-Billings, 1994, p. 34). This approach requires a belief that each student arrives with various ways of knowing, experiences, and assets, and the work of the teacher is to make natural and relevant connections to the lives of each student in order to connect them to the coursework. The teacher both teaches and learns with the students. This technique causes the experiences of the students to become part of the curriculum (p. 52-53). According to Hammond (2014), teachers ought to recognize the cultural learning tools that students bring with them to the classroom, and positively respond to them when used. Common cultural learning tools engage the brain’s memory systems, and include music, repetition, metaphors, rituals, and more.

Many of the above motivational factors fit into a general approach of engaging in culturally relevant pedagogy (CRP), which is committed to make “teaching and learning relevant to the languages, literacies, and cultural practices of students in our communities” (Ladson-Billings, 1995, p. 5). In 2014, students of color became the majority in U.S. public schools; as demographics continue to shift, it is not enough to focus on valuing all communities equally, it is about valuing “skills, knowledge, and ways of being needed for success in the present and future” (p. 5).

Based on research, students experience a higher level of motivation when they have opportunities for self-study, coursework that builds competence, relatedness, and autonomy, positive relationships between teachers and peers, and an approach that is culturally relevant.

Motivations for Pro-Environmental Behaviors

A critical piece of climate literacy is pro-environmental behavior. It is relatively straightforward to teach the facts but inspiring a behavioral change that supports climate change mitigation is challenging, and often not achieved in college-level coursework (Cooper, 2019, p. 2). Nam (2011) found that simply providing extensive scientific information and connection to societal implications did not inspire a pro-environmental behavior shift (Nam, 2011, p. 240). Therefore, it is critical to understand what inspires pro-environmental behavior in order to tackle complex climate systems operating in a global arena over a long period of time.

Connection to nature predicts engagement with pro-environmental behavior. In a meta-analysis study, electronic databases were searched in order to identify previous studies that analyzed the relationship between connection to nature and pro environmental behavior (Whitburn, 2020, p. 183). The meta-analysis included 26 studies of 13,237 individuals (p. 184). The results indicated a positive connection between nature and pro-environmental behavior, and that “facilitating a stronger connection to nature may result in greater engagement in pro environmental behavior and conservation” (Whitburn, 2020, p. 180).

A specific study that supports connection to nature looked at 113 Chinese students, ages 23-30 years, from Nanjing University. Students completed a questionnaire related to their *explicit* (clear, direct) connectedness to nature and deliberate environmental behaviors, a computerized test measuring *implicit* (unexpressed, implied) connectedness to nature, and a situational simulation test measuring spontaneous environmental behaviors (Geng, 2015, p. 4). Connection to nature was measured by the individual's feelings (emotional and cognitive) of connection and belongingness to nature. Implicit connection to nature was measured through a timed-test of associating various words with nature and built environments. Deliberate environmental behaviors were measured with a questionnaire on which participants rated various statements about environmental behavior from 1 (completely disagree) to 6 (completely agree). Finally, spontaneous environmental behavior was determined by measuring their response to being offered a plastic, single-use grocery bag while distracted by another shopping task (p. 5). The study's results indicated that connections with nature are an effective predictor of pro-environmental behavior; explicit connections with nature predict deliberate environmental behavior, whereas implicit connections predict spontaneous environmental behaviors (p.6).

Connection to animals may also increase environmental behaviors (Clayton, 2014, p. 460). At the zoo, people experience direct access to animals, "natural" settings, emotional responses that often increase empathy for animals, and social interaction, all of which is believed to increase pro-environmental behavior (p. 461-462). In Clayton's study (2014), 7,182 people visiting 11 zoos and 5 aquariums were surveyed through questionnaires related to connection to nature and behavior (p 464-465). The results

indicated that connection to animals or nature in the zoo is related to behavioral response to climate change. Although it is difficult to determine whether the sense of connection preexists, some results suggest that a zoo visit facilitates the connection to nature (p. 472).

Connection with other passionate and influential people may predict pro-environmental behavior. In the Arnold (2009) study, twelve environmental youth leaders were identified because of their positive attitude toward the environment, pro-environmental behavior, environmental leadership, and multiple spheres of action. There were 10 females and 2 males, ages 16 to 19. They each participated in two in-depth interviews. The first interview was meant to determine why they believed they became involved in environmental action, and the second interview was meant to determine the effect of being an environmental leader on their life (Arnold, 2009, p. 29). Participants mentioned influential people, such as parents, role models, teachers, and friends; they also mentioned influential experiences, such as time outdoors and in youth groups, conferences, and gatherings (p. 29-30). Time spent in nature was an influence mentioned in every interview. Overall, in every case, the participant's connection to other passionate and influential people in combination with impactful experiences in nature were the key to becoming environmental leaders (p. 33).

Self-efficacy and perceived severity are strong predictors of pro-environmental behaviors (Kim, 2013, p. 180). *Self-efficacy* refers to "one's perceived capability to engage in a recommended behavior" and *perceived severity* refers to the "extent to which one perceives that a threat (e.g., global climate change) has severe negative consequences" (p. 171). The Kim (2013) study examined 189 undergraduate students

from three mass communication courses at a large university in the USA, and 144 undergraduate students from three mass communication courses at a large university in Korea (p. 174). Behavioral intentions, prevention attitudes, perceived severity, personal perceived susceptibility to danger, perceived effectiveness of engaging in recommended pro-environmental behaviors, and self-efficacy were measured for each participant through a series of questions and responses about global climate change (p. 174-176). For both Korean and American participants, the results indicated that a higher perceived severity of global climate change and a higher self-efficacy were predictors of pro-environmental behaviors (p. 180).

Participating in episodic future thinking (EFT), or projecting oneself into the future in order to pre-experience a future event such as climate change, may encourage pro-environmental behavior and a perception of climate change as more imminent (Lee, 2018, p. 60-61). In an experiment involving 93 undergraduate students at a university in Taiwan, students were divided into three groups equally. Participants from all groups read a report about the negative impacts of global warming and climate change in Taiwan. In one group, participants wrote down three risky life events that would occur in the future under climate change impacts, and then they were instructed to close their eyes and imagine the events in detail. Another group was also instructed to write down three risky life events that would occur in the future under climate change impacts, but they were not instructed to imagine this (p. 64). Both groups rated their risky life events, and the final control group provided the baseline. Finally, all participants completed a questionnaire related to climate change risk perception (p. 65). Results indicated a

correlation between how much a person can imagine the future and their future-oriented, prosocial behavior, such as pro-environmental acts (p. 62).

A social justice approach may inspire pro-environmental behaviors. Howell's (2016) survey-based research found that people actively working to reduce their carbon footprints due to a concern of climate change are doing so out of motivation by altruistic concerns about the impact of climate change (Howell, 2016, p. 814). There were 85 participants selected; they all taught and/or wrote about climate change and participated in climate change mitigation. Most participants were from the UK. The survey was conducted online and involved questions about carbon footprint reduction, climate change campaign involvement, and climate change involvement at work (p. 817). The results of the survey showed that participants were more motivated by social justice and fairness than by a feeling of responsibility to nature or connection to nature. In fact, they felt a responsibility to lessen the impact of climate change because of the perceived unfairness that poorer people suffer more from the impacts, as well as feelings of guilt at contributing to the problem (p. 814). Learning about the resulting social injustices from climate change was the catalyst for pro-environmental behaviors.

Finally, empathy may predict pro-environmental behaviors. In a study by Berenguer (2016), behaviors and attitudes regarding the environment were improved using empathetic perspective-taking for inducing empathy (p. 269). The study modeled Batson's Model of Altruism, which suggests that experiencing empathy for another person leads to motivation to better that person's well-being ("Psychology", 2016, para. 1). The study included 60 introductory psychology students at a university in Madrid. The students were divided and exposed to either a high-empathy condition or low-

empathy condition, followed by questions to evaluate attitudes toward the environment (Berenguer, 2016, p. 274). Students exposed to high-empathy conditions were more likely to express pro-environmental attitudes (p. 278).

Overall, inspiring pro-environmental behaviors may be best achieved through fostering connection to nature, animals, and other inspiring people; focusing on self-efficacy and perceived severity; utilizing episodic future thinking; addressing the topic from a social justice lens; and building empathy.

Summary

There are many factors to consider when designing a syllabus for a climate literacy foundation course. Understanding academic motivation helps build the framework and understanding motivation for pro-environmental behavior guides learning outcomes, assessments, and curriculum design. Students may experience a higher level of motivation for the course if there are opportunities for self-study, positive relationship building, and culturally relevant practices. The specific coursework may inspire pro-environmental behaviors if students are able to connect to nature and other passionate people, understand the severity of climate change, gain information that increases self-efficacy, experience futuristic thinking, understand social impacts of climate change, and build empathy.

CHAPTER THREE

Methodology

Introduction

In order to introduce new coursework into a university, it is important to understand the institutional mission, be guided by the designated learning outcomes, and utilize the required syllabus design. This chapter describes the learning outcomes at Hamline University, as well as the detailed structure of a course syllabus.

Learning Outcomes

Hamline University empowers students to “make the world better for everyone,” by taking the lead as “difference makers, innovators, and champions of justice, determined to do all the good we can” (Hamline University, n.d.). The mission is, “to create a diverse and collaborative community of learners dedicated to the development of students’ knowledge, values, and skills for successful lives of leadership, scholarship, and service” (Hamline University, n.d.). Hamline University has established learning outcomes in order to accomplish these goals. The University-wide learning outcomes are the following:

- *serve, collaborate, and lead in a community*
- *solve problems in an innovative, integrative, analytical, and ethical way*

- *work and create understanding across cultural differences locally, nationally, and internationally*
- *use information and technology competently and responsibly*
- *communicate effectively in writing and in speaking*
- *apply theories and methods of a field of expertise*
- *engage independently and reflectively in lifelong learning*

Courses at Hamline University focus on collaboration, critical inquiry/information literacy, diversity, fine arts, formal reasoning, global citizenship, humanities, liberal education as practice, natural science, quantitative reasoning, social sciences, speaking, and/or writing (Hamline University, n.d.). Faculty must articulate one or more general learning objectives, and how they will achieve these in their coursework. Climate literacy is a complex, interdisciplinary topic; therefore, the learning objectives chosen to be addressed in the climate literacy foundation course may draw areas like communication, global studies, diversity, and natural sciences. Learning outcomes with a focus on collaboration include, “articulate the potential benefits of and barriers to collaboration,” “critically evaluate how differences in individual characteristics and behavioral styles can impact collaboration and the functioning of a group,” and “make meaningful contributions on collaborative projects.” One relevant learning outcome with a focus on global citizenship is, “articulate their ethical, social, political and/or environmental responsibilities as a local and global citizen.” Three learning outcomes focus on diversity: “demonstrate understanding of diverse perspectives and experience,” and “demonstrate an awareness of systemic inequalities, power differences, and interdependencies of people in a diverse world.” Finally, a specific learning outcome with

a focus on natural science is to “evaluate the impact of scientific and technological advances on society and the environment” (Hamline University, n.d.).

Syllabus

The syllabus is often thought of as a routine and “unimaginative administrative requirement,” when in fact it can actually serve as a “map for the ‘organized and meaningful journey’ upon which professor and students embark with each course” (Soonpaa, 2018, p. 833). According to Parkes, a syllabus serves three purposes; the syllabus as a contract, as a permanent record, and as a learning tool (Parkes, 2010, p. 55). A syllabus may serve as a contract between the instructor and student, setting expectations around attendance, assignments, assessments, and various policies and procedures. Particularly with foundations courses, “there are likely to be expectations of the breadth and depth of coverage that would cause the instructor to dictate the course” (p. 55). A syllabus as a contract helps students decide whether to take the course or not, plan ahead, and evaluate their performance with the written contract. It is helpful to the instructor in settling formal and informal disagreements (p. 56). Therefore, the syllabus should include an accurate and detailed calendar, detailed information about grading, statements about academic honesty, policies related to academic freedom, appropriate disclaimers (for example, expected outcomes, sensitive content, religious topics), and the rights and responsibilities of students with disabilities (p. 56-57). A syllabus as a permanent record is useful for accountability and documentation. This record is helpful when evaluating programs and instructors during accountability and accreditation reviews. In order to be useful in this way, the syllabus should contain the title and dates of the course (with name of department, credit hours, instructor information,

prerequisites, texts and other learning materials, and experience involved in the course). It helps to document details about the course in order to aid in potential transfer credits or substitute courses. Additionally, it is advised to keep various syllabus records specific to each time the course is taught in order to account for any changes, as opposed to constantly updating without a record of changes (p. 56). Finally, a syllabus as a learning tool is helpful for the student to learn most effectively. Students will be able to plan effectively, evaluate performance, identify if they are prepared, seek support, understand how the course enriches their life and academic plan, learn additional lessons (for example, plagiarism), and perceive the course and instructor in a positive manner (p. 57-58).

Hamline University recommends instructors to design an online syllabus, which acts as the primary reference document for the course. The syllabus is intended to describe the intention of the course as well as the policies; it helps set expectations and informs students of the participation required. The first component of the syllabus is the course description, which outlines the instructional approach, course activities, projects, and how the course aligns with the major or program. The next component includes the specific learning outcomes (University and program) of the course. Assessment of how the outcomes are met, as well as information on student achievement, must be collected. Next are the course objectives or specific course learning goals, which should be observable, measurable outcomes; it's important to communicate what students will be able to do at the end of the course. The syllabus should include a list of all required texts and materials, describing how various texts will be used; this should also include a description of the course fees or additional expenses. Other requirements include the

grading scale, policy on late assignments, and attendance policy for the evaluation of the course. Finally, and typically outside of the instructor's control, is information regarding academic honesty, plagiarism, a Department of Education License Addendum (only required if the course fulfills License requirements), academic accommodations for students with disabilities (specific physical requirements or expectations are stated, if relevant), a technology disclaimer (putting the responsibility on students to have functional computers, access to printers, and information about turning in assignments), office hours, and contact information. Another consideration is to add a course philosophy to the syllabus in order to explain why the content was selected, how the course fits with disciplinary standards, and how the instructor views the learning process (Hamline University, n.d., para. 5-36). The Hamline University syllabus checklist can be found in Appendix A.

Focusing on learning outcomes while designing a syllabus is important. Michael Palmer, an associate professor and director of the Teaching Resource Center at the University of Virginia started a program called the Course Design Institute (CDI) in order to support instructors in course design. His approach is called "backward-integrated design," and includes three steps. First, identify goals. Second, figure out how to assess whether students accomplished the goals. Third, design activities to prepare students to excel at the assessments (Heath & Heath, 2017, p. 106-107). Palmer starts the course by asking professors about their aspirations for students. Over the years, Palmer has discovered that very few of the answers are content focused. Instead, aspirations focus on bigger life lessons. Once instructors have identified their goals for the course, this guides them in designing the syllabus and curriculum design for their course (p. 108-109).

Between 2008 and 2015, 295 instructors participated in the CDI, and have rated the experience 4.76 out of 5.0. All of them said they would recommend the course. This method of working backward in designing a syllabus provided motivation and direction for planning successful courses (p. 110-111).

Summary

Constructing a Climate Literacy Foundation Course syllabus will require the combination of various objectives. Identifying learning outcomes will guide the curriculum and syllabus design. Identifying important climate literacy components will frame the content for the course. Identifying relevant teaching strategies that inspire motivation, activism, and pro-environmental behavior will frame the course structure. Finally, the Hamline University syllabus checklist will provide the overall framework for combining all these critical components and communicating these goals.

CHAPTER FOUR

Project



CLIMATE LITERACY FOUNDATIONS
4 credits, Fall 2021

Course Information:

Course Name: Climate Literacy Foundations
Course Meeting: Thursday 6:00-9:00 PM

Instructor Information

Instructor:
Phone:
Email:

Course Description

The Climate Literacy Course is designed to introduce students to important components of climate literacy, which involves understanding the science, politics, and socioeconomic impacts of climate change; understanding climate change as an anthropogenic issue; and adopting pro- environmental behaviors.

Course Goals & Objectives

Students will be able to:

- Explain the seven essential principles of Earth's climate system
- Assess scientific information for credibility
- Communicate about the climate and climate change in a meaningful way
- Make informed and responsible decisions with regard to actions that may affect climate

Learning Outcomes

Hamline University specific outcomes:

- Engage independently and reflectively in lifelong learning
- Articulate their ethical, social, political, and/or environmental responsibilities as a local and global citizen
- Demonstrate an awareness of systemic inequalities power differences, and interdependencies of people in a diverse world

Instructional Methods

In this course we will engage in hands-on science activities, readings, discussions, simulations, writing, projects, and reflections. I believe strongly in experiential learning opportunities, and that instructors need to help their students learn by doing. The content and instructional methods used in the course are meant to be culturally relevant and meaningful for each student. Student choice is given when applicable, there is a focus on building strong relationships, and teaching is practiced through a social justice lens.

Textbooks & Materials

Because understanding of climate change is changing rapidly, this course will rely on current events and articles in order to engage in relevant content and discussions.

Required Textbooks and Readings:

- <https://www.climate.gov/teaching/essential-principles-climate-literacy/what-climate-science-literacy>
- <https://nca2014.globalchange.gov>
- Intergovernmental Panel on Climate Change: “Climate Change 2014 Synthesis Report: Summary for Policy Makers”

Choice Resources:

Students will be required to find and utilize a variety of their own resources for class discussions and major assignments. Below are a few resources to give you an idea.

Science:

- Climate change: How do we know? Retrieved from <https://climate.nasa.gov/evidence/>
- Gore, T. (2020). Confronting Carbon Inequality. Oxfam Media Briefing.
- Oppenheimer, A. (2016). The Science of Climate Change. *The Future of Children*, 26(1), 11-30.
- <https://scied.ucar.edu/learning-zone/how-climate-works/greenhouse-effect>
- [https://en.unesco.org/sites/default/files/1.11basic science of climate change.pdf](https://en.unesco.org/sites/default/files/1.11basic%20science%20of%20climate%20change.pdf)

Politics:

- <https://climatechange.procon.org/history-of-climate-change-debate/>
- <https://www.brookings.edu/research/the-challenging-politics-of-climate-change/>

- Powledge, F. (2012). Scientists, Policymakers, and a Climate of Uncertainty. *Bioscience*, 62(1), 8-13.

Economics:

- Houser, H. (2015). Economic risks of climate change: an American prospectus. In *Economic risks of climate change*. New York: Columbia University Press.
- Hsiang, S., & Kopp, R. (2018). An Economist's Guide to Climate Change Science. *Journal of Economic Perspectives*, 32(4), 3-32.
- Tamirisa, N. (2008). Climate Change and the Economy. *Finance & Development*, 45(1), 18-22.

Social:

- Levy, P. (2015). Climate Change, Human Rights, and Social Justice. *Annals of Global Health*, 81(3), 310–322.
- Mearns, R., & Norton, A. (2010). *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*. World Bank.

Course Schedule/Calendar

| Week | Essential Questions Addressed: | In Class | Major Assignments |
|----------|--|---|--|
| Sept. 2 | What is your relationship with the natural environment? What is climate? | One-night canoe trip on Mississippi River | Pre-Survey (due by Sept. 1) |
| Sept. 9 | How does climate change impact you and your community? What is climate <i>literacy</i> ? | Climate Literacy Exploration | Canoe Trip Reflection (due Sept. 9) |
| Sept. 16 | What is the scientific basis for how experts understand climate change? In what ways is the scientific basis uncertain? | Discussion: Science of climate change | Pre-Discussion Assignment (due Sept. 16) |
| Sept. 23 | How do human activities impact climate systems? | Discussion: Climate change as anthropomorphic issue | Pre-Discussion Assignment (due Sept. 23) Science of Climate |

| | | | |
|----------|---|--|--|
| | | | Change Lesson/Presentation Assignment and Reflection (due by Sept. 23) |
| Sept. 30 | How will climate change impact Earth's systems and human lives? ...Scientifically? | Discussion | Pre-Discussion Assignment (due Sept. 30) |
| Oct. 7 | How will climate change impact Earth's systems and human lives? ...Politically? | Discussion | Pre-Discussion Assignment (due Oct. 7) |
| Oct. 14 | How will climate change impact Earth's systems and human lives? ...Economically? | Discussion | Pre-Discussion Assignment (due Oct. 14) |
| Oct. 21 | How will climate change impact Earth's systems and human lives? ...Socially? | Discussion | Pre-Discussion Assignment (due Oct. 14) |
| Oct. 28 | How will climate change impact Earth's systems and human lives? | Presentations | Reflection Project (due Oct. 28) |
| Nov. 4 | How can people communicate about climate change in a meaningful way? | Climate Policy Simulation (COP25) Overview | Prepare for COP25 Simulation |
| Nov. 11 | What are possible green actions and initiatives that combat climate change? | Climate Policy Simulation (COP25) | Prepare for COP25 Simulation |
| Nov. 18 | | Climate Policy Simulation (COP25) | Prepare for COP25 Simulation |
| Nov. 25 | Thanksgiving | No class | |
| Dec. 2 | Now what? | "I am Greta" viewing | COP25 Reflection |

| | | | |
|--------|-----------|------------------|--|
| | | and discussion | (due Dec. 2) |
| Dec. 9 | Now what? | No class meeting | Final Project (due Dec. 9) Post-Survey (due by Dec. 11) |

Course Assignments -- See detailed assignment descriptions in Canvas

- 1. Pre-Survey** **10 points**

You will complete a brief survey about attitudes, experiences, and connection to nature to help me get a sense of where you are.
- 2. Canoe Trip** **50 points**

You will participate in a two-day/one-night canoeing/camping experience on the Mississippi River. All gear and food will be provided.
- 3. Canoe Trip Reflection** **50 points**

You will write a reflection about your time spent on the Mississippi River. You'll include responses to such questions as "What was your role?" and "What was your comfort level?"
- 4. Science of Climate Change Lesson and Reflection** **100 points**

Now that you know about the science of climate change, you will create a 30-minute lesson, presentation, demonstration, simulation, game, lecture, or similar learning experience for a group of people. You will deliver your climate change content at Hamline Elementary School, Friends School, local YMCA camp program, community event, or a setting of your choice.

You will write a short reflection about how it went, what you learned, and other takeaways.
- 5. Pre-Discussions Notes** **140 points**
(20 points/discussion)

You will prepare for in-class discussions by reading the required text and finding two additional sources that are related to the topic. You will create 10 talking points for each source.
- 6. Reflection Project (*Climate change impact*)** **50 points**

Now that we have explored the scientific, political, economic, and social impacts and implications of climate change, you will reflect on how you view climate literacy. Your reflection may be in the form of a written paper, PowerPoint, song,

or other type of expression. Your reflection will include responses to such questions as “How you feel?”, “What do you find surprising?” and “What do you want to know more about?”

7. COP25 Simulation **100 points**

You will be assigned a role as an environmental minister of government, head of national business council, or federation of civil society organizations for a specific country. You will learn about your role, and then discuss and debate with fellow classmates about the carbon reduction and environmental protection strategies in order to determine potential green actions and initiatives in Minnesota.

8. COP25 Simulation Reflection **25 points**

You will write a short reflection about your experience during the COP25 Simulation.

9. Final Project **100 points**

You will create a final project that demonstrates your mastery of the Climate Literacy Foundations course. The project of your choice will describe the seven essential principles of Earth’s climate systems; the economic, political, and social components of climate change; and a reflection on personal climate behaviors.

10. Post-Survey **10 points**

You’ll complete a brief survey about attitudes, experiences, and connection to nature.

Course Grading

Writing Quality: If I am unable to make sense of what you are communicating through writing, I will refer you to the Writing Center. Points will not be docked, but work will not be graded until revised, resubmitted, and understandable.

Participation: A large part of your grade will be determined by your level of engagement in discussions with classmates and the instructor. The quality of the engagement is more important than the quantity. Focus on contributing as a speaker and listener, using thoughtful questions and properly referencing sources that support claims.

Students are expected to be at every class session. If you are unable to attend class, do your best to notify the instructor ahead of time and make an alternate plan to engage in the content virtually or in an appropriate manner. Each absence after a first absence will result in final class percentage being reduced by 33 percent.

Late Work: Pre-Discussion Notes must be submitted on-time for full credit. Major assignments should be submitted on-time as well, but submission dates will be flexible with proper communication and effort.

Statements

Students with disabilities who think they need an accommodation in this class are encouraged to contact Disability Resources at disabilityresources@hamline.edu or 651.523.2079 as soon as possible to better ensure that such accommodations are implemented in a timely manner.

Hamline University also provides academic and other accommodations to students who have experienced sexual assault, relationship violence (physical, emotional, or other form of abuse by a dating or other intimate partner), or stalking. For more information about Hamline's policy (www.hamline.edu/svppolicy, click on University policies) and the resources available to you, consult Hamline's website (www.hamline.edu/sexualviolence) or contact our Title IX Coordinator and Dean of Students, Patti Klein, 651-523-2421, pklein01@hamline.edu or Deputy Title IX Coordinator, t. aaron hans, 651-523-2380, tahans@hamline.edu.

In keeping with Hamline's mission statement, this class strives to be an inclusive learning community, respecting those of differing backgrounds and beliefs. As a community, we aim to be respectful to all citizens in this class, regardless of race, color, national origin, ethnicity, religion, gender, gender identity or gender expression, sexual orientation, disability, marital or parental status, status with regard to public assistance, or veteran status. If you have any further questions, please contact our Title IX Coordinator and Associate Dean of Students, Patti Klein, 651-523-2421, pklein01@hamline.edu.

Class rosters are provided to the instructor with the student's legal name or designated nickname. I will gladly honor your request to address you by an alternate name; please alert me so that I may make changes to my records. Additionally, feel free to share the appropriate pronoun that you would like me to use when referring to you. Through my teaching and the content of this course, I aim to affirm people of all gender expressions and gender identities. If you have any questions or concerns, please do not hesitate to contact me.

The Writing and Communication Center (WCC) offers free one-on-one tutoring in writing, public speaking, and other forms of communication to all Hamline undergraduate and graduate students. Through discussion-based consultations with the WCC's peer tutors, students can get help with brainstorming ideas, organizing content, writing clearly and concisely, checking grammar and citations, and more. For more information and to schedule an appointment, go to hamline.edu/writingcenter or visit the WCC on the lower level of Bush Memorial Library.

The Counseling & Health Services office is a free and confidential resource available to all Hamline undergraduate students. [Graduate students may also access the office for a nominal fee.] If a personal or medical concern is adversely affecting your academic performance, you are encouraged to schedule an appointment by calling (651) 523-2204. Please be aware, however, that this office does not provide "doctor's notes." Should extenuating circumstances affect your attendance or your ability to meet deadlines, it is your responsibility to communicate with your instructor.

The Career Development Center is a co-curricular resource that helps students learn how to apply their liberal education to the world of work. The CDC helps students become successful professionals by developing self awareness, communication skills, professional connections, and professional skills.

Students receive assistance with: choice of major, assessing interests and skills, exploring career options, developing networking skills, writing resumes and cover letters, and obtaining internships. In addition, students benefit from on-campus recruiting opportunities, as well as assistance with the job search and/or application process to graduate school. Students are encouraged to participate in CDC events such as Major Decisions Fair, Practice Interview Program and career courses. Individual appointments as well as drop-in hours are available. You may call 651-523-2302 or stop by Drew Science 113 to schedule an appointment.

Every member of the Hamline University community—students, faculty, administrators, and staff—is responsible for upholding the highest standards of academic integrity at all times. The assumption that academic work is an honest reflection of one’s knowledge and skills is fundamental to the integrity of Hamline University and to the value of a Hamline diploma. If students at an institution of higher education develop a reputation for receiving grades based on honest work, GPAs and academic degrees held by all students from that institution are valued more highly. The faculty subscribe to standards of academic honesty in their research and teaching. Every person in the University is responsible for adhering to the principles of the Academic Honor Code.

CHAPTER FIVE

Conclusion

Introduction

A syllabus for a Climate Literacy Foundation course was developed in an effort to teach climate literacy by addressing scientific, political, and socioeconomic components in a way that also inspires activism. This chapter is a reflection on my major learning, connections to the literature review, implications of the project, constraints, affordances, and next steps.

Major Learning

At the end of this capstone project, I am feeling assured that I am on the right path, personally, academically, and professionally. I am feeling motivated for what is next, and a bit out of my comfort zone as well. Although I am at the end of this project, I feel that I am at the very beginning of where I can take this project, and my own journey. I have learned that I have barely skimmed the surface in terms of important and relevant literature that exists in the world about this topic; I feel that I could rewrite the whole paper again using completely different sources! Although the content is a bit overwhelming, I am excited to keep digging in deeper to a massively interdisciplinary topic. There is so much to learn and build on. Climate literacy is a focus that will keep me energized the rest of my life!

Through this work I have realized the power of using social justice as a motivating factor and lens through which to approach climate literacy. This is one area in particular that I am really excited to learn more about. I think this also ties into the importance of cultural relevance. I have been in school for a while, so I have studied topics such as cultural relevance, but the way I learned about it felt siloed. This paper helped me connect ideas, pedagogy, and topics together in a really important way.

Connecting to the Literature Review

The literature review helped me stay on track as I tried to deliver the content in a way that would motivate people to make a difference, which is an important component of climate literacy. The literature review focused on general academic motivation and motivation for pro-environmental behaviors, which provided great insight into how to frame the course content.

Beginning the course with a class canoe trip is an intentional method for building positive relationships and a connection to nature. Although short, this shared experience has the potential to bring people from various backgrounds together and create trust. The class discussions that occur throughout the course are also meant to build on these relationships and trust.

Throughout the course, students are given many opportunities to choose their own literature and resources, which is meant to give them choice and autonomy, both of which are academically motivating factors. Students also have choice and autonomy in designing their reflection project and final project.

A major goal for this coursework is for each student to connect to the content in a culturally relevant way. This is achieved through allowing students to choose their own resources and add their own perspectives to class discussions. Students are also encouraged to connect the course content to their own communities in ways that best support them, specifically through the Science of Climate Change assignment. The syllabus and course is meant to be a living document that continues to change in order to remain relevant in time.

Finally, future episodic thinking is utilized through the COP25 simulation as a way to motivate pro-environmental behavior. Students are given an assigned role in a simulated activity that represents a realistic projection of Earth's climate situation.

Implications of the Project

The Climate Literacy Foundation course is designed to equip students with a general understanding of the scientific, political, economic, and social components and implications of climate change. Upon completion of the course, students will be able to communicate about climate change in a meaningful way, and make informed and responsible decisions with regard to actions that may affect the climate. The delivery of the course content is meant to foster meaningful relationships, a connection to nature, a feeling of cultural relevance, and inspiration to behave in ways that protect the environment.

Constraints

There are various constraints that may make implementation difficult. Weather could be a constraint for the canoe trip, which likely could not be rescheduled. The cost

of the canoe trip could also become a constraint, depending on access to borrowed equipment, transportation, and food. There are many assignments that require students to find content on their own, and a constraint could be their ability to find and select material that is appropriate and relevant, including finding information to support their assigned role in the simulation. The relevance of assigned materials could be a constraint due to the rapidly changing nature of the field. The make-up of the student body could be a constraint depending on their ability to collaborate, and how similar or different their backgrounds are. Finally, there could be constraints due to students' ability to connect with their local community and connection with Hamline University.

Affordances

Although there are constraints to the implementation of this project, there are also affordances, or ways that will make implementation more successful. A major affordance is setting clear expectations for the course, so that students know the time commitment, the learning outcomes, the structure, and generally what to expect. Another critical affordance is organization. If everything is planned ahead of time, including having contingencies in place, this will help the course run smoothly. Other important affordances include an instructor who is up-to-date with current events around climate change, is constantly evaluating the course content and adjusting the layout as information and knowledge changes (required course materials, assignments, discussions, etc.) so that the course is still successfully achieving learning objectives.

Next Steps

Creating this project has been very exciting, and there are many exciting future opportunities to build on it. I would like to present the Climate Literacy Foundations Course syllabus to the Program Director of the Natural Science and Environmental Education master's program and propose that it is offered as an elective course in the program. I believe this would be a great opportunity for a trial run of the course.

Eventually I would love to design a follow-up course, or lengthen the course to a full year so that students could dig into the content a bit deeper and a more meaningful project could be accomplished. I believe that continuing to build on this foundational course could even lead to an entire certificate program or major.

Finally, I would like to research the pre and post surveys in order to understand how the impact of the course varied between those who came in with a lot of previous experience in nature, those with already pro-environmental behaviors, and those without one or either. I believe the results could provide excellent guidance for course improvements, as well as future course opportunities.

Summary

I am excited about this capstone project, and I am energized to continue building on it. I feel proud of the syllabus I have created for the Climate Literacy Foundation Course, and confident that this is only the first version of many more! I am excited to continue in the higher education world, and hope to continue on as a doctorate student in order to someday teach in higher education.

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Appendix A: Hamline University Syllabus Checklist

Hamline University**Syllabus Checklist****Course Information:**

- Course Name, Number, Section
- Semester/Term
- Meeting Time & Location

Instructor Information

- Name
- Office Location & Hours
- Telephone number
- Email Address
- Course Websites

Course Description

- Course catalog description
- How students will benefit from the course
- How the course fits into the curriculum (including any Hamline Plan components)

Course Prerequisites

- Courses, skills, experience, proficiencies

Course Goals & Objectives

- Clear statements describing the intended results of instruction
- Each objective is tied to course activities and learning outcomes

Learning Outcomes

- Clear statements regarding specific content, knowledge, skills & values students will demonstrate by the end of the course

Instructional Methods

- Describe teaching philosophy

Textbooks & Materials

- Required textbooks & readings
- Recommended readings
- Course packs, e-reserves etc.

Student Requirements & Responsibilities

- Participation
- Homework
- Quizzes & Exams

Course Resources

- Department Tutors, Learning Labs, Study Groups etc.

Course Schedule/Calendar

Blank Course Calendar Template

Policies

- Attendance
- Late Work
- Missed Quizzes and Exams
- Extra credit

Grading Methods and Scale

- Explanation of grading of each assignment
- Include number, weight, and format of quizzes and exams
- Provide descriptions of papers and projects including how student work will be graded
- What students should do to be successful in the course

Statements

- Disability Accommodations
- Hamline Honor Code/Academic Integrity
- Title IX
- Statement of Inclusivity
- Clarifying Names and Pronouns
- The Writing Center
- Counseling and Health Services
- The Career Development Center