Addressing climate change from an Ignatian-inspired perspective
An interdisciplinary innovation at Marquette University

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Abstract

Marquette University currently requires all undergraduate students to complete a Methods of Inquiry course in which three disciplines address a topic from their varied perspectives. In response to a 2019 call to faculty to develop these courses, a physicist, theologian, and sociologist collaborated in proposing energy use and human-induced climate change as their focus for offering during the Spring 2020 semester. This topic warranted a deviation from the two prescribed multi-disciplinary formats to an interdisciplinary approach aimed at yielding an integrated outcome. The three disciplines contributed to this outcome following the SEE--REFLECT/JUDGE–ACT method demonstrated in Catholic Social Teaching and Society of Jesus documents. Eighty-seven students joined three professors in two introductory sessions that set the stage for successive units within which the data, methods, and scopes of Physics, Theology, and Sociology were explored. Teams of students were established to research a variety of topics and recommend how Marquette can minimize its reliance on fossil fuels. Though the outbreak of COVID 19 forced moving from teams on campus to individual student research on their residences, the students demonstrated in their final submissions their ability to integrate the three disciplines.

Introduction

Prompted by the establishment of a new core curriculum at Marquette University (2019) that required all undergraduate students to complete a Methods of Inquiry (MOI) course in which three disciplines addressed a shared topic, we—a physicist (Tim Tharp), a systematic theologian and ethicist (Jame Schaefer), and a sociologist (David Nowacek)—discussed the possibility of collaborating to create an interdisciplinary course that focused on energy use and human-induced climate change to discern why and how Marquette could be responsive to the problem. We realized, however, that we could not approach our topic in either of the two ways stipulated in the official MOI format, one of which required professors to teach the same material to three groups of 29 students by rotating to them and the other that required each professor's lecturing to 250 students for a third of the semester and relying on graduate students to hold break-out sessions. We knew that our topic required a sequential approach beginning with the scientific data, reflecting theologically on why a response to these data is warranted, and deciding how to act.

This sequence corresponded well with the SEE–REFLECT/JUDGE–ACT approach to societal issues that has been demonstrated in Catholic Social Teaching (USCCB, 2005; Francis, 2015) and Ignatian documents (e.g., Task Force, 2011; IJEP, 2015). Taking this approach required bringing 87 students into one classroom three times a week and engaging them in addressing our topic from the diverse perspectives of Physics, Theology, and Sociology to yield an integrated outcome. We wanted our students to recognize how each of our disciplines with their different data, methods, and scopes contributed to addressing energy use and human-induced climate change and provided a more comprehensive understanding than any one discipline is capable. We also decided that we wanted to serve as assistants to one another in the classroom to model our disciplines for our students, firm our collaborative presence, and underscore our shared outcome.

Our resolve to proceed as we deemed essential led us to inform the coordinator of Marquette's core curriculum about our desire to deviate from the two MOI formats and to ask the Registrar to find a room in which we could assemble all students and break them into small

groups for experiments and deliberations. We were delighted when the coordinator did not object to our plan and when, months later, we were offered a choice of three rooms for our interdisciplinary experiment. During the ten months we spent preparing our course syllabus and mini-syllabi for our nine-session units, we added a fourth component to our SEE–REFLECT/JUDGE–ACT method: CELEBRATE. We also decided to meet after the third session each week to evaluate our progress.

Because our disciplines required different ways of evaluating student efforts, we agreed that each professor would be responsible for computing 20 percent of a student's final grade. We also agreed that we would collaborate in evaluating the final team project that constituted 35 percent of the final grade, 5 percent for participation in class, and up to 6 percent extra credit for participating in options we identified (touring the power company that provides electricity to Marquette, attending the invited lecture of the eminent philosopher Dr. Andrew Light, Professor of Philosophy, Public Policy, and Atmospheric Sciences at George Mason University, and presenting one team's project during the upcoming 50th Anniversary Earth Day celebration). All grades were entered on D2L, Marquette's online learning management platform, and computed synchronously for students to follow.

In this article, we share how we conducted our MOI course from the beginning of the Spring 2020 semester to its alteration by COVID 19. We begin with our two introductory sessions that set the stage for descriptions of the Physics, Theology, and Sociology units with emphasis on their varied contributions to understanding and responding to human-induced climate change. We proceed with our plan to develop teams of students for researching and recommending actions aimed at minimizing Marquette's reliance on fossil fuels, the disruption of this plan by COVID 19 at mid-semester, and the substitution of individual student research. We conclude with the outcomes of our course, a brief evaluation of our efforts, and our intention to implement all aspects of our original MOI plan during Fall 2021.

Launching Our Course

We spent the first two sessions (50 minutes each) introducing our 87 students to our plan for the

semester with emphasis on the SEE-REFLECT/JUDGE-ACT-CELEBRATE method and outcomes anticipated within each: (1) Learn the fundamental scientific principles governing climate change and energy use—the SEE segment of our method on which the physicist would be focusing; (2) consider the theologically grounded ethical imperatives that require altering Marquette's energy strategies—the REFLECT/JUDGE segment of our method on which the systematic theologian and ethicist would be focusing; (3) explore the features of human cognition and organization that are relevant to Marquette's situation and broader efforts to mobilize action for addressing climate change—the ACT segment of our method on which the sociologist would be focusing; and (4) experience the value of addressing the problem of human-induced climate change from an interdisciplinary perspective when integrating the three disciplines. We took turns identifying with the segment on which each would be focusing, briefly explaining the data, methods, scope, and limitations of our individual disciplines that would be elaborated within our units, and underscoring our shared intention to facilitate our students' integration of the three disciplines to yield a more comprehensive and meaningful approach to ways in which Marquette can minimize its reliance on fossil fuels. We explained that their integration of the three disciplines would be demonstrated through team research on multiple possibilities and preparation of a video by each team on its research project during the ACT segment directed by the sociologist.

Turning to these possibilities for team research, we whetted our students' interest with some options that included more efficient use of energy, implementation of renewable sources including solar, wind, and geothermal on campus, and surveys of students, faculty, and staff on their perspectives. Some of these options resulted from consultations with Marquette's Chief Engineer who was eager to help and to know the students' recommendations based on their research and reflection. We encouraged them to think about and share their interests with us individually and to anticipate opportunities at times specified in our syllabus when they would prioritize their research interests from a list, circulate among themselves on the topics that most interested them, sign up for a topic team, and work in teams one session a week during the ACT-Sociology section. We announced that one of the teams would be chosen to present its recommendation for implementing at Marquette during the all-University commemoration of

the 50th Earth Day on April 22.

The second introductory session ended with the physicist's brief overview of the SEE component to be covered within ten sessions outlined in the Physics mini-syllabus. Students were assigned the first of several texts to read and an online reading quiz to complete before entering the classroom for the first Physics session.

SEE: Physics Unit

By design, the Physics section of our course came first to provide a knowledge base and skill set for understanding climate change that would inform theological and sociological deliberations. The learning goals of this section focused on three parallel aspects: (1) Content; (2) skills; and (3) Physics' method of inquiry. These three aspects were integrated throughout the unit.

As a prerequisite for understanding climate change, students needed to have at their disposal some basic background material. One might assume that students have been exposed to some of the basic material through personal interactions or the media, but covering this material systematically is crucial due to abounding misconceptions about climate change. Thus, we drew explicitly on the factual connections between human energy production and carbon-dioxide emissions and between atmospheric carbon-dioxide concentrations and global warming. We discussed the physics of blackbody radiation, the effects of albedo, and the greenhouse effect. We culminated the unit by discussing factual observations of the effects of climate change, including global warming, ocean acidification, sea level rise, and impacts on ecosystems and human societies.

A major focus of our course was for students to identify ways in which they can take specific action to reduce local carbon dioxide emissions. To help them identify effective courses of action, they needed to develop the mathematical skills to calculate the carbon emissions of various scenarios. These mathematical skills included converting units, distinguishing between energy, power and power density, and using simplifying assumptions to calculate the total emissions of a given product or process. A second skill that we fostered throughout the unit is the ability to read and interpret technical scientific literature. To develop this skill, we explored

the Intergovernmental Panel on Climate Change (IPCC, 2020) website through a series of guided reading activities and eventually removed instructional scaffolding with an open-ended reading assignment of the IPCC's Fifth Assessment Report (2014).

The third focus of this SEE segment of our course was to expose students to the academic culture of Physics. As we examined the topic of climate change from the perspective of Physics, we discussed the role and limitations of Physics as a discipline and the distinction physicists draw between models, measurements, and observations. We investigated the nuance of technical language, including the cognitive dissonance that arises when we discuss human energy production and consumption, while simultaneously acknowledging the fundamental physics principle of energy conservation. We built a mathematical model (using the physics of blackbody radiation and the geometric properties of spherical coordinates) for the equilibrium temperature of a planet without an atmosphere, and students compared the predictions of this model with publicly available NASA observations. We performed an experiment in class to measure the impact that carbon dioxide can have on radiative absorption. Eventually we understood the Earth's climate as a complex system capable of exhibiting chaos and discussed the fundamental limitations that this implies about climate model predictions. Thus, after taking this course, students should be able to recognize many aspects of the culture and methods of Physics, including model building, experimental methods, comparisons with observation, and the integration of core concepts into a broader ontology.

The methods and sources we used relied heavily on existing educational resources. Each class period consisted of approximately 20 minutes of lecture followed by 30 minutes of group work. This was logistically facilitated by a flexible classroom space in which 87 students (and three faculty) occupied a room with lightweight, mobile tables and chairs. Following the Physics lecture, students pushed their tables together to form groups ranging in size from 2 to 6. Students were given a worksheet packet that contained instructions for a self-directed activity. All three faculty circulated the room to facilitate struggling groups. Typically, a few industrious groups could finish the activity in class, though most students completed the activity at home and submitted their worksheet before the next session commenced.

Half the activities (5 of 10) were based on PhET simulations (2006), one activity utilized resources from NASA (Williams, 2019), one used a resource from the Fraser Institute (Fretwell and Scarborough, 2009), and one was a homemade calculation activity that did not utilize specific external resources. One activity was a lab, and the final activity involved a critical reading of the IPCC reports (2014). The activities are summarized in the following table:

Activity	Topic	Resource
Pendulum Lab	Models and approximations	PhET
Energy Skate Park	Energy conservation	PhET
Energy Forms and Changes	Energy conversion	PhET
Power vs. Energy	Energy production	Homemade activity
Blackbody Spectrum	Blackbody radiation	PhET
Planetary Temperatures	Equilibrium planetary temperatures	NASA
Lab	CO2 absorption of radiation	See text
The Greenhouse Effect	Mechanism of atmospheric warming	PhET
Carbon Stocks and Flows	Carbon cycle	Fraser Inst.
Climate Change Impacts	Human and ecological impacts	IPCC reports

The lab activity involved using an incandescent light to warm the air trapped inside a two-liter soda bottle. The bottles were partially filled with water, and some Alka-Seltzer tablets were added to one of the bottles that caused the air in the bottle to be replaced by (mostly) carbon-dioxide. The temperatures of the bottles were monitored throughout the 50-minute period, and most groups saw significantly more heating in the bottle with carbon-dioxide. There is much discussion in the literature about this type of classroom experiment (e.g., Keating, 2007; Wagoner et al., 2010) that was summarized to the class in a lecture during the experiment (involving a lot of waiting). Though the current consensus of this classroom experiment is that it *does* appear to be an accurate illustration of an important global warming mechanism (that is, the observed warming *is* primarily due to the infrared radiation absorption of CO2 and *is not* an artifact of some other physical effect), the riveting discussion provided an example of a peer-reviewed scientific debate that is accessible to students.

The final activity involved students' critically reading a self-determined selection from the IPCC's *AR5: Impacts, Adaptation, and Vulnerability* (2014) and writing a reflection on one or more of the impacts that global climate change has on people and ecosystems. Because the IPCC reports are dense and enormous (well over 10,000 pages), students were gradually introduced to these documents through short reading assignments and quizzes throughout the Physics unit.

At the end of the unit, we expected students to have gained a conceptual understanding of the physics of global climate change, the skills to calculate the energy use and associated carbon emissions of a variety of human activities, and an introduction to the academic culture and methods that characterize the field of Physics. As students learned about the impacts of climate change, we encouraged them to recognize that the discussion was moving from the realm of Physics into an ethical arena that falls within another discipline. We underscored that the knowledge gained during the Physics unit would critically inform their upcoming discussions in the Theology and Sociology units, and that the skills they have developed in Physics will necessarily be leveraged to identify and evaluate opportunities for reducing carbon emissions at the local level.

REFLECT/JUDGE: Theology Unit

Informed by evidence of human-induced climate change discovered during the Physics unit, the theologian/ethicist began leading students in reflecting on pertinent data within the Christian tradition, identifying faith-based rationales that motivate addressing climate change, and gauging their efficacy for persuading Marquette to minimize the university's reliance on fossil fuels. These tasks required critical thinking skills of analysis to understand the deep meaning of some theological texts that were written during earlier times and vastly different worldviews, reflection on these deep meanings informed by the current scientific view of the world, and discernment of the most motivating rationales for advocating action at Marquette today.

Foundational for all data examined in this unit was the "doctrine of creation." This expression of Christian faith emerges from two different biblical depictions of God's creating the world that are found in chapters 1 and 2 of the Book of Genesis. Though these two stories vary

considerably due to the time periods and circumstances within which they were told orally and eventually recorded in ancient Hebrew by inspired writers,[1] understanding their deep meaning required careful analysis of each, comparison of the two stories, and determination of their shared meaning: *Faith in God who is the creator and active sustainer of the world upon whom its totality of creatures is utterly dependent for its existence, with whom human creatures have a special relationship, and to whom we are accountable for how we function within the world.* This biblically based meaning undergirds all assigned readings in the Theology unit. When our students reflected on a rendering of the 13.5 billion year history of the universe in 30 book volumes, each of which has 450 pages with modern humans emerging in the last paragraph of page 450 of the 30th volume (Haught, 2013, 2), some expressed a deep sense of humility and responsibility for functioning cooperatively with other species and systems for the common good of the Earth community—its flourishing in the present and future.

Texts assigned for discerning the most motivational theological rationales for persuading action at Marquette fell into three categories: (1) Statements by bishops and popes, the teaching authority (magisterium) of the Catholic Church; (2) the first *encyclical*[2] addressing the ecological crisis with its societal ramifications; and (3) documents issued by the Society of Jesus. Focus questions on each were geared toward identifying theological rationales in the documents that individual students considered most motivational for addressing climate change. They entered their answers in D2L prior to class, brought them to class for discussion with 5-6 other students in groups, reached consensus on key questions within an allotted period of time that they wrote on a form, shared their group answers in class, answered clarifying questions posed by other students and the Theology professor, edited and signed the form, and submitted it before leaving the classroom. The Theology professor responded online to each student's answers to the focus questions on D2L to assure that he/she understood the reading and the motivation the student found appealing in the assigned text.

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[1] Genesis 1 in the 6th Century B.C.E. and Genesis 2 in the 10th Century B.C.E.

[2] A highly important papal document focusing on an issue that requires consideration by all Catholics. Pope Francis appealed in *Laudato si'* to all people, regardless of their faith, with hope they would also consider his encyclical.

During the first week of the unit, students read and analyzed Pope Saint John Paul's Message on the 1990 World Day of Peace (1989), Pope Emeritus Benedict XVI's 2010 Message on the 2010 World Day of Peace (2009), and the U.S. Conference of Catholic Bishops' *Global Climate Change: A Plea for Dialogue, Prudence, and the Common Good* (2001). The second week focused on Pope Francis's *Laudato si', On Care of our Common Home* (2015) with special attention to the encyclical's second chapter, "The Gospel of Creation," and assigned parts of chapters 3-6 to groups that deliberated and reported on the chapter's significance for our course. Each group also identified a repetitive theme in the encyclical that could serve as its "chorus" if *Laudato si'* were a song.[3]

Society of Jesus documents took center stage during the third and final week of the unit. The first session focused on the "Principle and Foundation" and "Contemplation to Attain Love" in the *Spiritual Exercises*, the four-week retreat manual that St. Ignatius of Loyola (1991, 130-131, 176-177) wrote for his followers in the 16th Century. "Contemplation" provided an opportunity for students to reflect quietly on the blessings of creation that each person has received, God's dwelling in all creatures, God's working and laboring in all creatures for each person, and God's giving all these blessings and gifts of creation to each person. During the next two sessions, students examined *Healing a Broken World* by Society's Task Force on Ecology (2011/2), the International Jesuit Ecology Project's online environmental science textbook *Healing Earth* (2015) that the Theology professor helped draft, and the Universal Apostolic Preferences (2019) to which Jesuits worldwide committed to prioritizing in their ministries through 2029.

To culminate the Theology unit, each student wrote a 500-600 word essay in which he/she chose at least two assigned texts that had the most meaningful descriptions of God's activity in relation to Earth and how humans should respond and identified the most promising theological rationale in one of the texts for persuading Marquette to implement the forthcoming team recommendations. Their choices varied with 36 choosing pertinent content from Pope Francis' *Laudato si'* (2015),[4] 23 from the Jesuit Task Force on Ecology's *Healing a*

[3] Some groups opted to sing the "chorus" that brought levity to this serious session.

[4] Among the most motivational theological rationales that students cited were the pope's underscoring

Broken World (2011),[5] 15 from Pope John Paul II's *Peace with God the Creator, Peace with all Creation* (1989),[6] and eight from the USCCB's *Global Climate Change* (2001).[7] Our students anticipated sharing their individual preferences with other members of their research project team[8] and together deciding on the most effective theological rationale to use for persuading Marquette to implement their team's recommendation for minimizing reliance on fossil fuels. When evaluating the students' essays, the Theology professor wrote comments to each student aimed at assuring a clear understanding of the theological rationale selected.

Unfortunately, our students were unable to collaborate in research projects they expected to launch upon their return to campus from Spring Break. COVID 19 interrupted our plans and left us scrambling for an alternative to teams and adjustments to the Sociology-ACT unit within which the teams' research and deliberations would occur.

ACT: Sociology Unit

Though the global scope of climate change can be addressed from nearly all branches of Sociology (e.g., demography, economic sociology, social psychology, sociology of law, political sociology, and sociology of organizations), we decided to concretize our treatment of human-

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the human interconnection with all creatures, valuing them and ecological systems intrinsically, making an ecological conversion, respecting the world as God's gift and the inheritance of all, protecting God's creation for future generations, and exercising the human gift of intelligence to use technology wisely.

[5] The Task Force's call for *metanoia* (that some students related to popes John Paul II and Francis's call for "ecological conversion"), reconciliation with God's creation, and restorative justice were among the theological rationales preferred by students who were orienting their thinking toward the anticipated team recommendations for persuading Marquette to minimize its reliance on fossil fuels the Ignatian way—in deeds more than words.

[6] Students who chose Pope John Paul II's 1990 World Day of Peace Message considered his emphasis on moral responsibility for addressing the ecological crisis, the solidarity of all people in the present and future, and the dire consequences if Marquette does not act to respect God's creation.

[7] Especially impressive to students who selected the U.S. Catholic bishops' statement was their call for exercising the virtue of prudence to achieve the common good, solidarity with vulnerable people whose lives should be respected, and the imperative to respect God's gift of creation.

[8] At that point in the semester, research teams had already been firmed after an iterative process of soliciting individual student interest in many research topics, prioritizing topics from a list, moving from one research topic to another within the classroom to discuss interest, and submitting first, second and third preferences.

induced climate change by focusing on what Marquette University could do to reduce its climate footprint.

This scale of action had two faces—one inward-facing and one outward-looking. The inward-facing aspect of this ACT segment of our course required crafting action projects for student teams to undertake that the university would consider implementing. This inward-facing action orientation implied that the most relevant domain of Sociology would be the *theory of organizations*. The outward-facing aspect recognized that although Marquette is a sizable organization, it exists in a legal and organizational context that both enables and constrains what the university can do. Each of these aspects—the inward-facing and outward-looking—provided the means for selecting the most relevant materials within Sociology's broad domain. The inward-facing aspect made relevant the sociology of organizations, while the outward-facing aspect made relevant legal and market contexts in which Marquette's acts.

Once we decided to focus our course on climate change generally and to concretize it for our university, we needed to identify the relevant players, efforts to reduce the use of fossil fuels that had been considered or implemented, and promising avenues for future projects that students might research and support. Getting to know the relevant players meant developing relationships, mainly with the building and maintenance departments of the university. Knowing the relevant players also meant understanding the energy infrastructure of Marquette and the commercial relationships it has for energy supply and maintenance of its infrastructure. Marquette uses plenty of electricity and also a lot of steam to heat campus buildings during the cold Wisconsin winters. We learned that some of the chief challenges facing the university include understanding and maintaining this steam system—a byzantine array of pipes, valves, and steam traps. When the steam moves through the campus, it condenses into water as the heat it carries is transferred to university buildings. The traps that capture this condensate need to open automatically to release the condensate and close again to contain the steam. Yet these mechanical devices often fail, remaining open and releasing not only the condensate but also the valued steam. These traps number in the thousands, and the university maintenance staff did not even know where all were located and typically did not have the staff to maintain them

adequately. These lessons learned during preparations for our course put us in touch with the functioning of our own institution and presented options for student engagement.

The inward-looking portion was also an opportunity for students to explore organizational theory. The pre-COVID plan had been to engage students in some relevant aspects of organizational theory that promised to inform their projects: (1) Organizational structure; (2) bounded rationality and satisficing; and (3) the absorption of uncertainty (March and Simon, 1966). Both inward-looking components— the student projects and the organization theory meant to support them— were put to the side in favor of another approach forced upon us when the pandemic hit and forced the closure of campus (discussed in the next section).

The outward-facing aspect of the last segment of our SEE–REFLECT/JUDGE–ACT method attempted to help students comprehend the agencies, policies, and organizations that make up the institutional space in which Marquette uses energy and would have to negotiate any transition towards greater carbon neutrality. For example, one of the anticipated student projects aimed to assess the feasibility of the university's investment in solar or wind sources of electricity. Opting for a solar or wind investment would shift Marquette's institutional role from merely an energy consumer to also a producer. That shift would require articulating with the surrounding institutional energy infrastructure in unaccustomed ways as a seller in wholesale energy markets.

Two exercises were designed to help students discover and explore this external legal and organizational context: (1) Reading a utility bill sociologically; and (2) an extensive reading on public utility regulation in the U.S. and its role in decarbonizing the electricity sector (Boyd, 2014). Both were maintained after the COVID shutdown because the students were still able to articulate with the course.

The sociological reading of a utility bill was modeled in lecture by our sociologist using Marquette University's electric bill. Reading a utility bill sounds like a remarkably mundane activity, but a very close read of a utility bill allows students to use some information they learned in Physics and Theology as they began to appreciate the organizational complexities of energy use. This demonstration prepared students to investigate the utilities bills for their own

residences that became the post-COVID shutdown focus for the remainder of our MOI course.

The public utility reading was accompanied by a student writing assignment in which each explored in detail a specific type of action necessary for decarbonization. This reading and other preliminary readings were accompanied by quizzes intended to assess student participation in the readings.

FROM TEAMS to INDIVIDUALS

As we entered Spring Break, the Physics and Theology units of our course had concluded and was planned to continue with an initial week devoted to team projects and a guest speaker after which the Sociology ACT segment would begin. None of us foresaw that we would not return to the classroom or even to campus for the remainder of the semester. When the campus was closed and classes moved online, the ACT segment was thrown into disarray. We had spent months fashioning campus-centered projects for students to undertake, and students had only recently completed the process of sorting themselves into project groups. Yet these projects were inextricably tied to being on campus. We had conceived the class to culminate in these action-oriented projects in which students could use the knowledge and skills they had learned during the Physics and Theology units and to undertake these actions within a local organizational context that would allow them to also apply sociological methods. We wondered how we could bring the SEE–REFLECT/JUDGE–ACT sequence to conclusion after having been deprived of the campus setting in which the culminating ACT stage had been conceived.

This dilemma was especially pressing for the sociologist on our team who was in charge. After learning we would not be returning to campus and sleep-deprived, our sociologist wondered what to do and whether the ACT segment could be transferred from campus closer to home where students were now marooned. While trying to move his own home off fossil fuels, he had become aware of online tools that allowed homeowners to use satellite imagery to assess rooftop solar feasibility and price out a solar system. "Ah hah!" he exclaimed to himself; if they no longer can study the Marquette campus, they *can* study their own residences. This would mean losing the focus on Marquette but keeping the ACT segment of the course intact. Taking

this individualized approach also seemed promising for students to complete the online solar system estimate, enter information about past energy consumption, investigate their own utility bills, and begin a conversation with their parents or owners of their residences about energy use and alternatives to fossil fuels. Thus, the ACT segment was refocused from campus-centric to home-centric. Because students were no longer working in teams *per se* (though they were encouraged to meet with members of their team to help one another with their home projects), a standardized data collection template was constructed that walked students step-by-step through collecting data about home energy consumption and using that data to complete the online home solar assessment.

This revised ACT segment of the course also attempted to maintain the outward-facing feature of the original plan by requiring students not only to learn about their own home energy use. They also had to learn about the electrical grid into which the residence is hooked. Thus, the data-collection template also included questions about their particular grids and policies that influence options for energy use and investments in renewable energy. Students were asked to visit the website for their grids and observe wholesale electricity prices at different times of the day. Their observations provided a feel for the dynamism of many electricity markets resulting from significant deregulation over the last several decades. Students were also required to figure out the policies of their local utilities that influenced the adoption of renewable energy.

For a final grade and completion of the integrating ACT segment of our course, each student submitted to D2L a Citizen of the Grid computation (15 per cent) that the physicist and sociologist evaluated and a letter integrating Physics, Theology, and Sociology (20 percent) that the three professors evaluated. Students addressed their letters to the owners of the residences examined for energy use explaining in three paragraphs: (1) Energy use findings, an action for minimizing reliance on fossil fuels, and why that action should be taken from a theological perspective; (2) how methods of Physics and Sociology were used in the Citizen of the Grid project; and (3) why this action should be taken from the theological perspective of a Marquette student attending a Jesuit university. We were pleased overall with these final submissions because they demonstrated student ability to integrate three different disciplines to yield a more

comprehensive and meaningful response to human-induced climate change.

CONCLUSIONS

Team-teaching CORE 1929 Energy Use and Human-induced Climate Change during a tumultuous semester that forced moving 87 students from learning in the classroom to their residences was indeed challenging—especially for our sociologist who had to significantly alter the ACT segment of our SEE-REFLECT/JUDGE-ACT method. Our experience was also gratifying because our students were open to learning the differences of our disciplines and demonstrating that they could be integrated for meaningful outcomes. We look forward to teaching our course in Fall 2021 as initially planned when we hope to experience the CELEBRATE segment of our method.

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