

【原著】

The Reciprocal Relationship between Climate Change Education and the TESOL Classroom

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気候変動に関する教育と TESOL 教室の相互関係

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Abstract

As our global carbon footprint increases, knowledge and awareness about the dangers climate change poses to us and our posterity have become more urgent than ever. Yet despite this, even in Japan where people are aware of the issue, attitudes toward climate change as an individual problem rather than a global one are limited, and portions of individuals' consumption habits are trending toward increased energy expenditure, especially through increased meat consumption. At the same time, Teaching English to Speakers of Other Languages (TESOL) is experiencing a shift toward incorporating more content-based instruction through global issues coursework and content and language integrated learning. As such, education about climate change is an ideal match for these courses, as students learn a combination of language, academic skills such as research, discussions, and presentations, key climate knowledge, and methods for making individual sustainable lifestyle changes toward realizing their roles as global citizens. This paper makes the case for increased climate change education in TESOL courses borne out of the urgency of the issue and observes coursework at the author's and global colleagues' institutions for how they promote linguistic and academic skill building in addition to critical knowledge and action toward future climate sustainability.

概 要

エネルギーの消費量と国際的な二酸化炭素排出量の増加に伴い、我々や我々の子孫へと問題提起された、気候変動の危険性に対する知識や認識は、これまでになく危機迫るものとなってきた。しかしこのような状況にも関わらず、人々が問題認識をしている日本においてさえも、気候変動に対する姿勢は個人のものというよりは国際的なものに限られており、エネルギー消費、特に食肉消費の増加を通して、個人の消費習慣は増加傾向にある。それと同時に、TESOLにおいては、国際問題を取り入れたコースと内容言語統合型学習を通して、より内容重視型の教授法へ組み入れる方向へと変化してきている。したがって、気候変動についての教育は、これらのコースに理想的に合致する内容であり、学生は言語と、研究、ディスカッションやプレゼンテーションといった学術的なスキル、気候変動に関する重要な知識や、個人が行える継続可能な日常生活の変化を起こす方法を学ぶことで、国際人としての役割理解へと導くものであ

る。本論は TESOL コースにおいて、この問題がもつ緊急性に由来した気候変動についての教育が、著者と国際的に活躍する同業者の機関において、未来の気候を持続可能にするための知識や行動に加え、彼らがどのように言語的、学術的スキルを身につけさせたかについて論証するものである。

Introduction

Climate change is a transcendent issue, with the potential to impact not only the entire planet but also countless unborn generations. From sinking cities and countries to radical droughts resulting in the collapse of agriculture, from massive migration of people seeking new homes to the elimination of our ecosystem sustaining coral reefs, the effects of climate change will be felt by every individual if action is not taken. Despite these threats, and despite an awareness among students that climate change is a problem, many students know little about the specifics of climate change, including how and why it is occurring or how to help prevent it, and as a result, despite willingness to prevent it, students are likely to further exacerbate the issue due to their consumption patterns and energy footprints. Optimistically, such education is vital toward ensuring the continued sustainability of our planet; pessimistically, toward mitigating the all-but-guaranteed permanent damage humans have done and will do to the planet.

Simultaneously, TESOL has seen a push toward incorporating global issues and content-based learning into curriculum programs. By learning about the world, including global problems and potential solutions, students are empowered to act as global citizens toward solving the problems that face us. A further expansion of such coursework toward solidifying an understanding of, effects due to, and approaches for combating climate change is not only advisable for TESOL courses but mandatory due to the problems that lie ahead if we have any chance for future preservation, and in turn, climate change education offers students a myriad of opportunities to learn academic and global skills with will boost both their career opportunities and critical thinking abilities. In this paper, I will outline the urgent need for increased climate change awareness, including several methods individuals can increase their own sustainability while focusing specifically on Japan's perceptions and consumption habits. I will then make the argument for why TESOL courses are the ideal vessel for such education and provide specific examples of climate-awareness focused projects and their accompanying skills and that have been and are being conducted, drawing both from my Academic English course at Hiroshima Bunkyo Women's University and of those of my fellow educators around the globe.

Urgency of Climate Change Education

Climate Dangers

We live in a world where we may no longer take for granted that our children's and grandchildren's generations will have a sustainable future, where future generations will need to make an ethical decision about whether it is morally responsible for them to bear their own children, bringing new human beings into a world that is being further and further decimated by our own hand. While

this may sound hyperbolic, a quick look at the devastating impacts climate change is having on our planet is necessary to fully appreciate the magnitude of the approaching struggles. Since 1998, our planet has experienced the ten warmest years ever recorded, with 2014, 2015, and 2016 setting new record temperatures each year and 2017 the highest non El Niño year (Tenenbaum, 2015; Met Office, 2018), and without making changes to our lifestyles, our planet is on pace for a four degree rise in global temperatures by 2100 (Carrington, 2013) that would “likely be catastrophic, [making] life difficult, if not impossible in much of the tropics, and would guarantee the eventual melting of the Greenland ice sheet and the Antarctic ice sheet” (Sherwood, cited in Carrington, 2013). Plumer (2012) noted that this four-degree threshold would mirror the global cooling experienced in the last ice age (four to seven degrees). Elliott (2016) reported the World Economic Forum found catastrophic economic risks associated with climate change, as the collapse of agricultural systems coupled with flooding (Aisch et al., 2014) and increased extreme weather patterns (Dillingham 2018) would lead to mass involuntary migration and with it interstate conflict and war over territories and increasingly scarce resources (Steinfeld et al., 2006). Furthermore, carbon buildup threatens the planet’s coral reefs, where currently 32.8% are in danger of extinction (Carpenter et al., 2008). Due to coral reefs’ essential role in our planet’s ecosystem as the largest body of marine biodiversity, Carpenter et al. (2008) warned their collapse will have a tremendous economic impacts on food security for millions of people dependent on reef fish in addition to a large-scale loss of global biodiversity. What is worse, melting glaciers reduce white surfaces for reflecting sunlight, which further traps in solar rays and exacerbates global heating, meaning if changes are not made immediately, our planet will pass the point of no return.

Individual Sustainability

While global cooperative efforts such as the 2016 Paris Agreement have been put in place to stem this crisis, the fact remains that such efforts alone are not enough. McCloskey (2015) lamented that reckless deregulation of global economic sectors has pushed the world toward this precipice. If the world seeks to protect future generations from the past and present, it must recognize the dangers of this system and look past profits and bottom lines. In short, raised climate change awareness and action by individuals is of critical importance, even when it does not serve their or their economies’ immediate interests. Akenji and Chen (2016) noted that individual consumption habits use too much of our planet’s resources, and that if no consumption conservation is taken, we shall require two Earth’s worth of resources by 2030 and three Earth’s worth of resources by 2050 to sustain our current pace coupled with population growth. Therefore, individuals must understand the impacts of their daily consumption decisions and embrace more sustainable lifestyles (Akenji & Chen, 2016). Akenji and Chen (2016) defined sustainable lifestyles as “a cluster of habits and patterns of behavior embedded in a society and facilitated by institutions, norms and infrastructures that frame individual choice, in order to minimize the use of natural resources and generation of waste, while supporting fairness and prosperity for all.” It requires a rethinking of our social norms and our personal identity and privilege, challenging us to sacrifice aspects of our life we have taken for granted. Akenji and Chen (2016) identified five aspects of individual’s daily life for restructuring: food, housing, mobility, consumer goods, and leisure:

1. Food: Avoiding food waste (as up to 30% of global food produced is uneaten), choosing local or in-season food to reduce transportation and storage energy, and avoiding animal products such as meat and dairy that have large water intake and carbon outputs.
2. Housing: Insulating homes, more responsible water and energy usage behaviors, avoiding excessive electronic appliances, increasing average home occupancy, and shopping more responsibly by avoiding buying unnecessary products.
3. Consumer goods: Increasing recycling and repairing broken goods while avoiding single use plastic products such as bags or bottles.
4. Mobility: Walking or taking public transportation in lieu of private vehicles, and carpooling when public transport is not an option.
5. Leisure: Staying local for leisure activities and reducing vacations to areas with sensitive biodiversity, requiring unnecessary energy expenditures and potential destruction of habitats.

However, Akenji and Chen (2016) cautioned that increased awareness of sustainable consumption lifestyles does not by itself lead to necessary lifestyle changing behaviors, as a lack of access to such options begets individual agency toward them. Action lifestyle drivers include income, market prices, technology, and development. Thus, there would be many areas of the world, such as lesser-developed countries, that despite a cry from the developed world to not make the same mistakes as they did when expending immense amounts of energy, individuals may be forced into the same path no matter what education and awareness is purported. It is therefore obligatory that the developed world, where individual agency has the luxury to find accessibility, or failing that, demand it and have their voice heard, alter their own lives toward global sustainability until such access channels are more readily available for others.

Role of Livestock Industry

Among Akenji and Chen's (2016) aforementioned lifestyle changes, one area of particular importance is consumer food choices, specifically consumption of meat and dairy products. Steinfeld et al. (2006) found "livestock's contribution to environmental problems is on a massive scale and its potential contribution to their solution is equally large." Steinfeld et al.'s (2006) analysis found the livestock sector contributing 18% of all global greenhouse emissions, a rate higher than all world transportation, while estimates from other sources put it at an even higher rate, including Goodland and Ahnang's (2009) 51%. This includes both carbon emissions from food and factory production but also methane released from the mass production of cattle for human consumption. Livestock also requires an enormous land commitment, with over 80% of anthropogenic land in the world today used for the raising or feeding of livestock (Stehfest et al., 2009).

Despite these dangers, the global demand for meat and animal products has skyrocketed as the world becomes more urbanized and average incomes increase in the developed world (Steinfeld et al., 2006). Steinfeld et al. (2006) reported that global production of meat and dairy is projected to double by 2050 to 465 million and 1043 million tons, respectively. To simply hold our current

carbon emission rates, the environmental impact of this sector must likewise be cut in half. Complicating matters is that livestock production already requires immense deforestation, as more and more land needs to be cleared for both the livestock and the food needed to feed them, which leads to a decrease in the natural absorbing of CO² by the world's forests (Stehfest et al., 2009). With global urbanization and the world taking on another two billion people by 2050, these people will need to eat and will demand the same food choices as those in the developed world, but the short-term focus of our food choices and policies already requires enormous land and fuel costs such that increases are simply not feasible for sustainability (Cook, 2009).

As such, mankind's demand for meat and dairy, foods that, while carrying important nutrients such as protein, iron, and calcium, can be replaced in people's diets with healthy and greener alternatives, is a key driver toward global climate change, and the trend is rising sharply and dangerously in the wrong direction. Hedenus et al.'s (2014) study on the combined effects of greenhouse gases from increased farming productivity, technological advances, and dietary changes found that under current trends, food related emissions will be nearly double the required level to keep global warming under two degrees, and that it is unlikely that farming productivity or technology advances will be sufficient to stem this tide. Rather, it is the individual consumer who must change her or his dietary habits in order for this dangerous threshold to be kept. Stehfest et al., (2009) found that while eliminating consumption of all animal products would easily have the largest impact on greenhouse gas reductions, simply cutting back on red meat in favor of chicken could reduce cumulative emissions by 20% through 2050 and allow substantial natural vegetation to regrow on cleared land. Hedenus et al. (2014) noted that their study's conclusions are especially urgent due to other greenhouse gas emitting sectors also facing significant constraints in their drive to reduce emissions. Therefore, consumers must be the ones to change their own habits and demand change, a change that Steinfeld et al. (2006) opined will press the commercial and political sectors to greater sustainability. McMahan (2017) largely concurred with these recommendations, offering that the best options individuals can take to prevent climate change is become to vegetarian or vegan and eat organic and buy local, in addition to supporting Akenji and Chen's (2016) recommendations of expending less energy while at home and using more public transportation.

Awareness and Education Levels

Thus, we have come to a critical point where increased awareness about climate change is mandatory for future sustainability. Yet, despite the danger, there continues to be uncertainty, misconceptions, or apathy toward climate change when surveying people's attitudes and knowledge, where rather than averting global catastrophe, we hurdle yet faster toward it. Smith et al. (2017) found that compared to other environmental issues such as air or water pollution, climate change is seen as too ambiguous or abstract for people to understand causation to their individual actions. The inherent complexity between individual behaviors and global environmental consequences results in "alienation from the environmental issue because they feel it is irrelevant to them or there is little they can do about it." (Smith et al., 2017). Furthermore, Smith et al. (2017) warned that more opaque ramifications of climate change, such as extreme weather

patterns, including snowstorms or global cooling, lead to further misunderstanding of or even direct doubt as to the veracity of climate change. According to a 2010 survey conducted by the International Social Survey Program (ISSP), 26% of Americans do not believe climate change exists, and while much of the remaining 74% would categorize it as a serious problem, few consider taking action toward mitigating its effects a national priority. The Survey also found that believing the science of climate change and one's sense of urgency toward taking action was correlated to individual education achievement levels.

Japanese Perceptions

Smith et al. (2017) found Japanese people to be the most aware of climate change problems, choosing it first among environment problems at 49.2% in the ISSP survey. Smith et al. (2017) posited that because many coastlines and coastal cities are at risk for flooding, encompassing up to 10% of the population, Japanese people are more aware of the risks of climate change than people in other countries. Despite this, Kuribayashi and Aoyagi-Usui (1998) found that climate change is seen first as a global problem by Japanese people (by 19.9%), second as a national problem (by 3.9%), and last as an individual or local problem (0.9%), and only 4.1% of Japanese respondents in the 2010 ISSP survey chose the environment as the world's foremost problem. In comparison, the largest environmental concern found in Kuribayashi and Aoyagi-Usui's (1998) study was the disposal of household garbage, garnering 24.5% and 27.3% of the vote respectively as a national and local problem. Sampei and Aoyagi-Usui (2009) found somewhat more promising numbers, with 23.8% of respondents stating the environment was the biggest global issue, yet they too found only 2.5% of respondents feeling it likewise as Japan's largest issue.

Therefore, even in Japan there is a disconnect between individual actions and the ramifications of climate change. While Kuribayashi and Aoyagi-Usui (1998) also found that 94.6% of Japanese people participate in energy conservation and nearly half of all people participate in pro-environmental political advocacy and green consumer activity, Japanese knowledge and activity toward climate change is largely dependent on the number of media stories in circulation at the time (Sampei & Aoyagi-Usui, 2009). Japanese media stories on climate change in the 2000's, and people's awareness along with it, peaked directly following the 2001 G8 summit where President Bush announced his opposition to the Kyoto Protocol, the introduction of Cool Biz in 2005, and the 2007 release of "An Inconvenient Truth", with lulls in-between when media attention turned to other stories. Lorenzoni et al. (2006, cited in Sampei & Aoyagi-Usui, 2009) concurred with the surveys above and noted that Japanese media coverage of climate change, with the exception of Cool Biz, focused more on the context of international events rather than Japan's role in combating it. Peak awareness after each event lasted only one month (Sampei & Aoyagi-Usui, 2009), and Aoyagi-Usui (2006) found that while most Japanese people had heard of global warming, they could not properly explain what it was, often juxtaposing it with air pollution or ozone layer depletion. Sampei & Aoyagi-Usui (2009) found that articles beyond the front pages of newspapers were likely to be overlooked by most Japanese people, especially by those who did not perceive global warming to be a serious issue. While climate change media stories grew steadily after 2007, the 2011 Tohoku earthquake and tsunami once again severed this attention (Aoyagi, 2014).

In a study conducted by Sakurai et al. (2011) to determine if climate change's impact on cherry blossom festivals, specifically their non-traditional rescheduling due to early blooming times, would persuade festival organizers and business owners of climate change's potential local impacts, most replied they would take no special action to ensure traditions are preserved, and some questioned whether global warming was truly occurring at all. One festival's organizers (in Kakunodate, Akita) felt strongly that action needed to be taken. However, Sakurai et al. (2011) noted that due to its geographic location and associated blooming time (during Golden Week), earlier blooming times would serve the Kakunodate festival organizers and surrounding businesses with a severe economic loss, meaning that once climate change moves beyond an abstract and unseen concept and starts dealing real damage to one's personal and local finances, people begin to become motivated, but until that point is reached, one has little motivation to make individual efforts to increase one's sustainability. Furthermore, societal pressures to conform to the status quo in spite of conservation reduce the amount and perceived ability of individuals to contribute. Only once the government deemed it appropriate to wear short sleeves and no ties during summertime did offices begin reducing their energy consumption by turning off or lowering air conditioners, meaning that in Japan, cultural conventions of energy usage (and a lack of effort on the part of individuals to buck the trend for fear of being eschewed by their peers) further exacerbate sustainability efforts.

The Emissions Database for Global Atmospheric Research (2017) finds Japanese people annually expend 9.9 tons of CO² per capita, and the World Resources Institute (2013) found Japan responsible for 3% of global greenhouse gas emissions, behind only the European Union and four other countries (China, USA, India, and Russia). However, these numbers do not tell the full picture in terms of energy expended internationally as a result of Japanese consumer demands, specifically cravings toward imported meat and animal products, which as discussed previously result in large scale emissions that are counted toward other countries' contributions. Zaraska (2016) found that on average, Japanese people consume 133 grams of meat per day, up from less than a single gram per day in the pre-World War II era. The Nikkei Asian Review (2017) reported that Japan's demand for meat has increased for ten straight years, with 2016 being the fastest growth in the previous five years. Japan was until recently the world's largest importer of pork, and currently over half of all beef is imported, contributing toward a food self-sufficiency rate of 40% or lower (Gasparatos & Gadda, 2010). Galloway et al. (2007) also found that less than 10% of the land required to feed Japan its chicken and pork appetite is Japanese land, with the rest coming as imports from around the world. Gasparatos and Gadda (2010) marvelled at this sharp jump in meat consumption, which can be seen as a new cultural norm through explosions of fast food and barbecue restaurants, and subsequently warned "those responsible for importing most of the meat, Japanese diners, are not the ones facing the environmental costs associated with their dietary choices," but rather the countries raising the livestock. Therefore, Japan's shifting dietary habits directly impact the environmental sustainability of other countries and by extension the world. It is rare to find vegetarian friendly options in Japan, which is paradoxical considering the situation not 80 years prior. Meat eating has become an established cultural norm after only three generations, and awareness levels regarding vegetarianism and meat conservation are nearly

unknown. This is a clear example of individuals driving climate change through their consumption habits yet remaining unmindful of this fact and therefore unable to prevent further damage. In addition, despite its relative brevity in the Japanese diet, meat-eating culture as alluded to by Gasparatos and Gadda (2010) has become so entrenched that there are social pressures to conform regardless of any individual's awareness levels. Thus, changing this negligence toward the problem and fostering motivation to change toward smart, sustainable consumption habits must be a top priority.

The Role of TESOL in Climate Change Education

Global Competence and Citizenry

With these problems and the goal of future sustainability in mind, what role do educators play? It is clear from the literature regarding people's understanding and attitude toward climate change that key education is lacking toward drawing connections between self and the world. The most pressing need is to develop global competence and paths for global citizenry, a part that TESOL teachers have a vital role in facilitating.

Van Roekel (2010) defined global competence as "the acquisition of in-depth knowledge and understanding of international issues, an appreciation of and ability to learn and work with people from diverse linguistic and cultural backgrounds, proficiency in a foreign language, and skills to function productively in an interdependent world community." It requires competitive critical thinking skills toward enhancing creativity, understanding technology, and enabling competition in global marketplaces, proficiency in foreign languages toward promoting international understanding, appreciation of cultural diversity and cross-cultural viewpoints, and international awareness, or the knowledge of global events and systems toward solidifying the notion of how individual actions can contribute on a global scale. Van Roekel (2010) argued that global competence is not a luxury but a necessity as global challenges such as climate change grow more complex and require the brainpower and cooperation of all countries and cultures.

With English more than ever solidifying its role as the world's global language, with the perception being in many parts of the world that an ability to speak English is a prerequisite to being an educated individual (see Mydans, 2007; Cates, 1999), this education falls precipitously onto the shoulders of TESOL educators. Cates (1999) saw a global approach to English language education as one that promotes knowledge about world problems, acquisition of key skills such as communication, critical thinking, and problem solving, acquisition of global attitudes such as respect for diversity or empathy, and action toward global participation. Global issues education, where students learn about key world themes such as human rights, women's rights, or the environment, promotes a sense of world citizenship toward an identity as an "international cosmopolitan". These courses often utilize discussion forums, where students can give their opinions about world issues and their reasons for believing so, and as a result, better understand their own and their cultures' viewpoints (Harrison 1999), a skill that Higgins and Tanaka (1999) found lacking among many Japanese university students. Higgins and Tanaka (1999) felt that

Japanese students are some of the world's most privileged yet naïve, "undernourished in their vision of the world, [with] their concept of the world shallow and confined to stereotypes." In a survey of Japanese university students, Ó'Móchain and Perkins (2010) found students prefer non-critical thought discussion topics such as hobbies, movies or shopping in English classes rather than critical sociocultural topics such as racism, homophobia, or homelessness, with climate change being the sole exception. While echoing Atkinson's (1997, cited in Ó'Móchain & Perkins, 2010) warning about curricula pushing cultural imperialism by positioning Japanese students and their cultural mindset as deficient, Ó'Móchain and Perkins considered whether Japanese students' resistance to critical topics is borne out of psychoanalytical desires to avoid emotionally or cognitively conflictive information exacerbated by culturally held stereotypes or groupthink.

Higgins and Tanaka (1999) argued what is necessary for Japanese students is empowerment, the process of providing each student the ability to rationalize their own thoughts and hearts so they can connect with the world. This allows students to break free of the group ennui and recognize their individuality. Higgins and Tanaka (1999) argued that global issues can be taught by TESOL teachers to spark this empowerment, as this allows students the needed skills to think critically in addition to facilitating academic language skills (especially inferencing, predictions, and evaluation) and vocabulary. By learning what the status quo is, how it differs around the world, and how to change their interpretation of it, students see the world not as overwhelming or abstract but rather as interconnected, especially if the global issue course content contains direct collaboration with young people from other cultures (Harrison, 1999). Cates (1997, cited in Nkwetisama, 2011) was even more emphatic, stating that TESOL education cannot be labeled as a success if students are ignorant of world problems and do not develop a social conscience by using their skills toward solving international problems.

In Japan, global issues education has begun to be promoted by several educators (see Cates, 1999; Cates & Jacobs, 2006; Higgins & Tanaka, 1999; Harrison, 1999; Ó'Móchain & Perkins, 2010; Shrosbree, 2016), but undoubtedly a plethora of TESOL classrooms retain tired teaching methods such as grammar translation that provide students with no contextual and thus no motivational value toward their language learning. While one may argue optimistically that although teachers are motivated to raise awareness toward higher education issues, their students often enter the classroom already demotivated from several years of banal education that treats English as a subject worthy only for study for standardized exams and lacking any communicative competence. Higgins and Tanaka (1999), however, opined that this is to be anticipated by the language teacher, and through engaging and interactive lessons about real topics that respect learners' opinions, teachers must work to draw out student motivation. Ó'Móchain and Perkins (2010) concurred, noting that educators must actively seek to raise cultural awareness in lessons rather than focusing only on specific components of language such as grammar or pronunciation. Going further, teachers must question themselves and their teaching by understanding their critical role in not only their students' language education but also in terms of their students' willingness to both tackle global issues and have the education and awareness to make sustainable changes. Ó'Móchain and Perkins (2010) demanded teachers ask, "Am I promoting systems of silencing and

stigmatization? Do my classes help learners become aware of their potential to become agents of social transformation? Is there any acknowledgement of an ethical aspect encouraging participation in social practices outside the classroom?”

The Environment in the TESOL Classroom

Through this pedagogic lens, teaching environmental awareness and action through TESOL lessons is an excellent and mandatory way to promote global citizenry and academic skills (Küchler, 2011). The United Nations Environment Program (cited in Nkewtisama, 2011) considered environmental education to be cross-curricular because it impacts all areas of study, and as a result, Nkewtisama opines that TESOL teachers worldwide could use their profession to develop a sustainable environment for future generations. Stempleski (1993, in Kang, 1997) listed several justifications for including environmental content in TESOL courses, stating environmental education is urgent, motivates learners effectively, is a source of rich content about real issues, and provides opportunities for interaction and learning of linguistic content.

Too often, however, science education is not present or devalued in TESOL courses. Buxton (2009), in an analysis of ELL vs native English students' science education in the United States, found that traditional TESOL coursework left ELL students demotivated and unengaged toward science, as the majority of English lessons focused only on language structure and preparing for standardized exams, a problem concurrent with the Japanese education system as discussed above. This led to an “engagement gap,” with students who were provided with a content-based science program with accessible channels for action linked to their own local identities and communities were likely to see science as personal, meaningful, and impactful toward their futures, while students learning only traditional language skills regarded science as an obstacle to be studied for and forgotten (Buxton, 2009). Thus, Buxton (2009) argued civic engagement, regardless of a student's English level, is necessary for student motivation to learn meaningful content beyond the language. Therefore, more attention should be placed toward developing an engaging science content-based curriculum in the TESOL classroom, which provides a real context for the development of English language and literacy, which in turn boosts abilities toward understanding more challenging academic content (Buxton, 2009).

Nkewtisama (2011) was disappointed to find several colleagues who balked at an initiative in his teaching context to include more environmental content into lessons, stating there were not enough teacher resources in addition to not enough knowledge training. However, Nkewtisama (2011) argued that environmental education can be incorporated into any set of linguistic rules or language specifics, i.e. vocabulary, grammar, semantics, or language discourse. Fernandez Fontecha (2012) agreed, stating that content-based instruction on environmental education does not require a specialist in environmental science to teach less technical content and perspectives in order to motivate students and facilitate discussions. She stated, “only general knowledge is needed of environmental damage and its consequences for society” (Fernandez Fontecha, 2012).

Content and Language Integrated Learning

Incorporation of global issues into course curriculum requires moving beyond communicative language teaching, which focuses primarily on interactive speaking abilities and information recall at the expense of context-based discourse competence or writing skills (Dupuy 2011). In courses where learners are still developing their language skills and are not yet ready for a pure-content based immersion approach, the pending environmental crisis calls for greater incorporation of *content and language integrated learning*, or CLIL.

Dupuy (2011) stated that CLIL coursework builds “intercultural explorers” through a deeper understanding of the target language and themselves, allowing for cross-cultural awareness and critical reflection. CLIL seeks to explore academic content taught through the medium of English while developing language skills. This eliminates the artificial barrier between language and content knowledge, which allows for integration of language learning with critical thinking skills, provides opportunities for extended thinking and feedback, develops learner expertise on topics, and facilitates the learning of themed materials (Hauschild et al., 2012). For example, Dupuy’s (2011) students were not asked to simply read, understand, and discuss a text but further extrapolate sociocultural contexts from the text. She provided an example of ecolabels and a related text, where higher levels of syntax, vocabulary, style, typographical conventions, and background knowledge all merge together to not just read a text but to understand where it is coming from and the purpose it serves and images it realizes.

More simply, Hauschild et al. (2012) incorporated environmental consciousness into simple grammar activities. For example, a lesson on imperatives can focus on environmental do’s and don’ts (such as “Recycle every day.” or “Don’t waste food.”). Hauschild et al. (2012) purported that entire existing curricula do not need rewriting, but rather the content can be integrated bit by bit building upon established learning criteria and refocusing them on the environment. To this end, I have developed Common European Framework (CEFR) level delineated climate change vocabulary lists that educators can incorporate into their courses. This list can be found in the appendix.

Choosing Materials

Content-based materials can be found all around us, such as books, magazines, or online resources that deal with environmental topics (Nkewtisama, 2011). Hauschild et al. (2012) suggested reading texts can be taken from environmental sources for tasks such as skimming, scanning, fact-finding, facts vs opinions, inferences, bias, and responses. Online video channels such as YouTube are excellent sources of content and can easily be adapted toward direct language practice (such as vocabulary gap fills) or toward more advanced content such as comparing the perspectives of two news stories on the same issue or discussion of controversial video content (Shrosbree, 2016) such as factory animal farming and slaughter. Reputable news sources such as the BBC, the New York Times or NPR offer a wide variety of short online content that can help students visualize the unit theme and present visions of the world in a way text cannot. Maps are recommended at the beginning of units to set the unit context and teach relevant

geography (Higgins & Tanaka, 1999). Teachers can also introduce charts, graphs, and data sets, such as data sets on carbon emissions per country or the carbon footprint outcomes of specific daily activities, and ask students to utilize a specific set of language skills with them such as skimming, scanning, outlining, or in advanced cases, paraphrasing or even bias-evaluation.

Such content seeks to raise awareness about the key issues presented while simultaneously building needed language skills. Additionally, teachers can take the opportunity to teach students how to distinguish reputable sources from non-reputable ones such as blogs, social media postings, or news with obvious bias or leading arguments. Arya and Maul (2016) argued that underexposure to authentic and reputable discourse on climate change leaves students unable to distinguish scientific vs social media sources, leading toward blurred reasoning and difficulties making sound judgements, which results in confusion and inaction rather than channels for action.

One caution, however, is that teachers should be careful to not cause and foment cynicism and fear through focusing only on negative materials, and thus prevent action from being taken by our students rather than fostering it, but rather to focus on challenging long-held assumptions about the status-quo, considering how our mindsets and cultures prevent or distract us from changing our habits toward becoming more environmentally sustainable (Cates & Jacobs, 2006; Smith & Williams, 1999). Although the facts are vital for grabbing attention, their bleakness must not be the stopping point. Through empowering young people to reshape their own personal and cultural narrative and its relationship with nature, we can promote action toward continued sustainability.

Climate Change and Environmental Content Coursework

This section observes key elements for environmental content coursework and their applications at several institutions both in Japan and around the world.

Key Elements for Course Units

Before looking at specific coursework, I will outline several elements common to environmental-content courses:

1. **Inquiry:** The goals of each unit should be tied to questions of inquiry; that is, what knowledge does the teacher wish for students to investigate in order to raise their awareness of key environmental issues and develop channels for contribution? Inquiry questions often look to question the status quo and assumed norms of the local area, opening students' minds to question why things are the way they are. These questions can be integrated into the reading and videos, discussed orally, or submitted as written assignments, either in paragraph form or as the foundation for more extensive projects.
2. **Academic Skills:** Although discussed prior due to its integral connection to content-based learning, units can be matched to specific academic skills, such as research, presentations, argument justification, critical reading, or vocabulary and language

development. Teachers often select a variety of presentations and text types they wish students to become familiar with over the duration of the course, each with their own specific skillset.

3. **Academic Projects:** Cates and Jacobs (2006) found project based work provides students with the autonomy to plan their assignments and carry out their research without direct instruction from the teacher. They also allow students to explore knowledge for themselves, delving deep into critical topics, and often involve tasks where other people are helped or educated as a result, furthering their role as global citizens. Hauschild et al. (2012) proposed academic research papers, posters or brochures, news articles, debates about environmental topics, or persuasive presentations as examples of projects that can be connected to the environment. They also suggested role plays to link the classroom to personal responsibility, where students can visualize how they will or ought to approach others who are not acting responsibly toward the environment.
4. **Building Local Connections:** Another common refrain is coursework that connects global issues to students' local communities (Cates & Jacobs, 2006; Kang, 1999; Buxton, 2009). This reinforces the learning context even more, as students can understand how environmental issues have a direct impact on their surroundings and greater empathy for others dealing with similar issues in other countries.
5. **Fieldwork:** Field trips can be facilitated to promote hands-on learning (Buxton, 2009; Cates & Jacobs, 2006). In addition to being exciting and motivating, going to places allows students further their local science connections, speak to people directly involved in environmental efforts, and provide opportunities for academic projects. It also helps students come to understand they need additional social studies knowledge like policy and economics to further holistic understanding of the environment.
6. **Reflection:** Students are asked to reflect critically on their learning process, skills acquired, knowledge gained, and newfound awareness toward the unit's issue and the individual roles they can play toward it. Reflections also provide a channel for direct feedback to the teacher about the unit, giving them an empowered role in future curriculum development and modifications. Students can also provide peer feedback on each other's ideas and presentations.

Climate Coursework at the Author's Institution

In the climate change unit of Academic English at Hiroshima Bunkyo Women's University, a global content-based academic skills and project course, students are elucidated to the global climate threat and undertake a survey research project to discern what knowledge gaps exist in our community in order to best understand and promote the next steps to take in making our community more globally and future-oriented. Inquiry questions include: What does climate change mean for our and our children's future, what level of responsibility do we hold in tackling this problem, and what level of awareness exists among us and our peers, and consequently, what action needs to be taken?

Students begin the unit by describing their visions of the future, with common evocations being technological and medical advances or concern about Japan's shrinking population, followed by an opportunity to discuss their understanding of climate change, including what they know but especially what they do not. Through examining a New York Times article (Gillis, 2016) on frequently asked climate change questions, a CNN article (Mackintosh & Formanek, 2017) on the impacts of melting glaciers, and watching and discussing Before the Flood (Stevens et al., 2016), a documentary about a trip around the world to study how climate change is already reshaping our planet, students decide if it is necessary to reevaluate their positions on the urgency of the problem facing them, including critical reflection of their consumption habits such as meat and dairy, energy expenditures while at home, products they have purchased which go toward supporting fossil fuel industries and/or industries that disrupt natural environments in remote locations, and transportation choices, and consider why they and their peers have received relatively little pertinent education on the matter.

Toward furthering this enquiry, students investigate their community's attitudes and levels of knowledge regarding climate change, and to what extent others are willing to change their lifestyle toward combating climate change and how they would prioritize these changes. This involves teaching the academic research process, including:

- **Literature Review:** Students conduct background research on the causes, current impacts, and future scenarios of climate change, citing the articles and documentary covered in class along with their own researched online sources. Students must also compose a references list, following traditional APA conventions.
- **Methodology:** Students are given a tutorial of common survey question types, such as Likert-scale questions, open-ended questions, and multiple-response questions. Students must then best decide how to link their survey questions with the research questions (their community's knowledge, awareness, and attitudes toward climate change) to gain enough knowledge to prepare an appropriate answer. Students also must consider which variables to introduce into their research, such as composition of respondent audience (such as younger or older, Japanese or foreign, teacher or student) and format of survey (oral, paper, or email) and be prepared to justify their choices.
- **Data:** Students must compile their survey responses into logical categories, including responses to open-ended questions. They must also consider how to best represent their data visually in a presentation by designing appropriate charts or graphs and how to most logically describe their results.
- **Discussion and recommendations:** Students must consider how to answer the research questions through interpreting their survey data. Based on their determination of the urgency of climate change action as presented in their literature review and the community's perception of the issue, students issue recommendations on what knowledge should be shared in order to motivate more people to action and the best channels for sharing it.

Finally, students reflect on their learning and presentation process both orally at the end of their presentation and in writing. In addition to the academic skills and experience, students feel empowered as climate experts aware of how to alter their individual consumption habits to promote future sustainability as well as an awareness about the surrounding level of education with an eye on sharing their knowledge with their peers.

Climate Coursework in Other Institutions

Many educators around the world have facilitated climate based projects and coursework.

Kang (1997)

Kang approached her global warming unit through key discussion questions, such as its causes and effects, how to reduce it, and how to conserve energy. Activities are facilitated through information gaps, including one-sided exchanges (where students must find another student with the necessary information) two-sided exchanges (where two students must exchange information) or cooperative group exchanges (where an entire group requires information from another to complete an activity). Kang utilized CLIL focus on form activities, where grammar exercises focus on environmental contexts. For projects, she uses local field trips to areas with air or land pollution for students to investigate firsthand how pollution is impacting their community. Students present their research to the class.

Yabuno (cited in Cates & Jacobs, 2006)

Yabuno's students formed groups and completed 20-hour service learning volunteer projects at a local environmental protection organization, with the main coursework being a scrapbook and presentation of their experience. Groups were allowed the freedom to choose their project focus and organization, such as endangered species protection, and groups that disagreed about the best way to tackle their project were free to split into subgroups each with a specific organization and focus. Feedback and communication were core skills in this project. Groups provided written feedback on their peers' scrapbook drafts, and each group presented to each other, with the listening group responsible for giving oral feedback, which builds their sense of responsibility for their peers' academic success in addition to increasing student speaking time. Yabuno's goal with the project was promoting "informed, involved, self-motivated citizenship, rather than to foster action on behalf of the teacher's or majority of classmates' views" (Cates & Jacobs, 2006).

Mappe & Nurnia (cited in Cates & Jacobs, 2006)

In order to encourage students to make their consumption habits more sustainable, including a reduction of their animal consumption, students in Mappe and Nurnia's class learned about local fishing practices, including unsustainable ones like dynamite fishing, in addition to nutrition and plant-based alternatives to eating sea life. They then traveled to talk to fishers, food marketers, and nutritionists to acquire information about the entire fishing industry cycle. The information they learned was presented through discussions, skits and articles, and each student was responsible for educating others on what she or he has learned, to take a turn being the teacher rather than listening to a teacher. The unit also promoted the impact of food and food choices on

the environment and gave students a chance to use L2 in a real communicative way, as they needed to have planned and prepared and then presented in English even though their interviews were in Japanese, allowing students to practice 'code-switching' between languages, an important linguistic and cross-cultural skill.

Lee et al. (cited in Lambert & Ariza, 2008)

Lee and a team of educators facilitated the CLIL *Living Planet* curriculum with elementary school ELL students. Students learned about planetary life cycles from different angles. For example, students learned the photosynthetic carbon relationship between animals and plants, then later connected this relationship toward climate change processes. After having taught the necessary vocabulary and sharing the class materials, the lessons centered on science inquiry questions, where students reflected on the questions, planned and conducted research, and reported back to the class on it. Academic strategies included graphic organizers, visual aids in presenting content, simple science vocab lists, and simple language for unfamiliar terms while avoiding overly complex structures. Students learned beyond simple communication but rather observing, predicting, analyzing, summarizing, and presenting information in a variety of formats: orally, in writing, and graphically. Lambert and Ariza (2008) commented that this style allows for application of language forms immediately to the science context rather than learned in isolation devoid of context, giving the language learning a specific purpose, "a linguistic lens through which to focus and clarify their ideas, inferences, and conclusions." Major projects included creating "eco-announcements" after watching public service announcements, developing an imaginary sustainable island on Earth through cooperative class dialogue, and writing paragraphs and reports on their research. Afterward, 92% of students remarked their science knowledge improved due to this curriculum, and 75% said they would change their daily habits to reduce their carbon footprint.

Buxton (2009)

Buxton's EFL learner class spent two weeks at the urban nature center and created a series of posters connecting the meanings of scientific topics such as water quality and global warming to the local community. Students developed public service announcements on topics such as reducing carbon footprints and the consequences of sea level rise on different neighborhoods in their city. Buxton noticed this project raised student engagement and motivation for success in English, as students needed extra effort to ensure the language on their poster was appropriate for display at the nature center.

Dupuy (2011)

Dupuy taught a CLIL unit on scientists' vs the public's opinion on climate change. Students were presented with information about greenhouse gases, then asked to discuss a series of extreme weather images to uncover if they could connect the images to climate change. They then surveyed their peers to collect attitudes and beliefs toward climate change, followed by viewing and reading a scientist's congressional testimony to scan for learned climate vocabulary and phrases. Once completed, students developed a climate concept map of the testimony, transformed

the testimony into an interviewer/interviewee format, and investigated the testimony's discourse structure. Students considered the linguistic devices in the text and the effects they created on the reader. The unit capped with students rewriting their interview as a formal news magazine article.

Oldani et al. (2015)

Oldani et al. designed the Carbon Footprint Project for future elementary school teachers. Students were given basic carbon emission education, which revealed that most students did not fully understand how carbon is emitted through combustion, and that many students misunderstood climate change as ozone layer depletion, corroborating Aoyagi-Usui's (2006) similar findings. Students then calculated their carbon footprints by looking at energy labels, miles driven, and bills, upon which they chose one area to reduce their carbon footprint. Their carbon footprint data and reduction was used as the basis for a climate research paper. Students also made a physical footprint with paper for a wall mural so that the combined impact of their carbon output and reduction was public knowledge. After the project, 89% of students found that investigating their own eco-labels was more meaningful than being presented with online climate facts and figures, 80% could correctly answer factual questions regarding climate change, and 82% felt like the lessons were empowering them to make real life energy use changes, impressed by the methods in which individuals exacerbate or are able to reduce their carbon footprints. Oldani et al. (2015) noted "students expressed their beliefs that this sense of personal empowerment could lead to even bigger impacts, especially through their future teaching," and Oldani et al. themselves were moved enough by their own newfound climate knowledge, carbon footprints, and subsequent reduction that they felt a personal responsibility as educators to teach as many people as possible about climate change and how to stem it.

Liu (2017)

Operating under the mantra that "food education is the single most impactful way to better the world," Liu (2017) designed Food Heroes, a gamification program in Chinese elementary schools that taught children to make smart food choices for their personal health and planet sustainability. Created as a response to a dearth of food education in Chinese schools and the combined carbon output of Chinese consumers' poor food choices, including overconsumption, food waste, and increased meat and dairy demand, the Food Heroes program allowed children to interact with food and grow their English vocabulary through songs, games, and vocabulary activities, while in turn making health and sustainability concepts simple and understandable.

Further Climate Coursework

Additional climate coursework can focus on academic skills not highlighted in the above examples. For example, climate change's causes, impacts, and mitigation methods can form the basis of a research paper. From here, the teacher chooses which skill set to highlight, such as distinguishing and practicing paraphrasing vs plagiarism, essay formatting, inserting appropriate in-text citations, and compiling a references list. Another skill building climate unit would be comparing news articles about the same topic from two different sources for lexis, voice, and bias. Climate change

lends itself well to this activity due to the multitude of conflicting information and misinformation on the Internet, and teachers can further extend this activity toward distinguishing reputable vs. non-reputable sources. A final choice of activity to cap student learning is presenting their knowledge and perspectives at local community centers or other schools or online through forums or Skype channels. This allows students channels to fully realize their roles as global citizens and inspire others to pass along critically needed knowledge.

Conclusion

If action is to be taken against climate change, it will require constant education and awareness. In general, once people grow accustomed to their own lifestyles and privilege, and once cultures set certain ideals for the way people should live their lives, it becomes very difficult to change people's mindsets toward a more sustainable path. Thus, education about climate change should come from all sectors, as early as possible, to promote individuals' understanding of their own personal responsibility, foster a demand for sustainable alternatives to everyday goods, and contribute dialogue and action toward sustainability both in one's local community and in the developing world, where sustainability and survival struggles are often intertwined. Combined with its responsibility toward fostering global communication, TESOL has a vital role to play in this environmental education, and teachers should embrace this opportunity to step up on a world stage rather than running from it. Correspondingly, the academic skills, projects, linguistic development, and community service that an environmental approach to TESOL facilitates provide extensive and exciting opportunities for students to develop their research, presentation, opinion-sharing, and critical thinking skills. These skills and experiences support our students' ambitions and employment opportunities and by extension their potential for success, which, if educated toward greater awareness, responsibility, and sustainability, also determine our own and our children's own long-term future.

References

- Aisch, G., Leonhardt, D., & Quealy, K. (2014). Flooding risk from climate change, country by country. *The New York Times*. Retrieved from: <https://www.nytimes.com/2014/09/24/upshot/flooding-risk-from-climate-change-country-by-country.html>.
- Akenji, L., & Chen, H. (2016). A framework for shaping sustainable lifestyles. United Nations Environment Programme: Nairobi, Kenya.
- Aoyagi, M. (2014). Mass media coverage on climate change issues and public opinion in Japan. *Development and Society*, 43(2), 207–217.
- Arya, D., & Maul, A. (2016). The building of knowledge, language, and decision-making about climate change science: a cross-national program for secondary students. *International Journal of Science Education*, 38(6), 885–904.
- Buxton, C. (2009). Science inquiry, academic language, and civic engagement. *Democracy in Education*, 18(3), 17–22.
- Carpenter, K. E., Abrar, M., Aeby, G., Aronson, R. B., Banks, S., Bruckner, A., ...Wood, E. (2008). One-third of reef-building corals face elevated extinction risk from climate change and local impacts. *Science*, 321(5888), 560–563.

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- Carrington, D. (2013). Planet likely to warm by 4C by 2100, scientists warn. *The Guardian*. Retrieved from: <https://www.theguardian.com/environment/2013/dec/31/planet-will-warm-4c-2100-climate>.
- Cates, K. A. (1999). Teaching English for world citizenship: Key content areas. *The Language Teacher*, 23(2), 11–14.
- Cates, K., & Jacobs, G. M. (2006). Global issues projects in the English language classroom. In G. H. Beckett & P. C. Miller. (Eds.) *Project-based second and foreign language education: Past, present, and future*. 167–180. Greenwich, CN: Information Age Publishing.
- Cook, G. (2010). Sweet talking: Food, language, and democracy. *Language Teaching*, 43(2), 168–181.
- Dillingham, T. (2018). It is not fear-mongering to appreciate the existential impact of climate change. *Philly.com The Inquirer Daily News*. Retrieved from: <http://www.philly.com/philly/opinion/commentary/bomb-cyclone-grayson-jersey-shore-climate-change-global-warming-20180105.html>.
- Dupuy, B. (2011). CLIL: Achieving its goals through a multiliteracies framework. *Latin American Journal of Content & Language Integrated Learning*, 4(2), 21–32.
- Elliot, L. (2016). Climate change disaster is biggest threat to global economy in 2016, say experts. *The Guardian*. Retrieved from: <https://www.theguardian.com/business/2016/jan/14/climate-change-disaster-is-biggest-threat-to-global-economy-in-2016-say-experts>.
- Emissions Database for Global Atmospheric Research. (2017). CO2 time series 1990-2015 per capita for world countries. *European Commission*. Retrieved from: http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts_pc1990-2015.
- Fernández Fontecha, A. (2012). CLIL in the foreign language classroom: Proposal of a framework for ICT materials design in language-oriented versions of content and language integrated learning. *Alicante Journal of English Studies*, 25(2012), 317–334.
- Galloway, J. N., Burke, M., Bradford, G. E., Naylor, R., Falcon, W., Chapagain, A. K., ...Smil, V. (2007). International trade in meat: The tip of the pork chop. *AMBIO: A Journal of the Human Environment*, 36(8), 622–629.
- Gasparatos, A., & Gadda, T. (2011). Tokyo drifts from seafood to meat eating. *United Nations University*. Retrieved from: <https://unu.edu/publications/articles/tokyo-drifts-from-seafood-to-meat-eating.html>.
- Gillis, J. (2016). Short answers to hard questions about climate change. *The New York Times*. Retrieved from: <https://www.nytimes.com/interactive/2015/11/28/science/what-is-climate-change.html>.
- Goodland, R., & Anhang, J. (2009). Livestock and climate change: What if the key actors in climate change are... cows, pigs, and chickens? *World Watch*, November/December 2009, 10–19.
- Harrison, D. (1999). Communicating classrooms: English language teaching and world citizenship. *The Language Teacher*, 23(2), 29–31.
- Hauschild, S., Poltavtchenko, E., & Stoller, F. L. (2012). Going green: Merging environmental education and language instruction. *English Teaching Forum*, 50(2), 2–13.
- Hedenus, F., Wirsenius, S., & Johansson, D. J. (2014). The importance of reduced meat and dairy consumption for meeting stringent climate change targets. *Climatic change*, 124(1–2), 79–91.
- Higgins, M., & Tanaka, B. M. (1999). Empowering ESL students for world citizenship. *The Language Teacher*, 23(2), 15–19.
- Kang, M-Y. (1997). The environmental issues and the EFL classroom. *English Teaching (영어교과)*, 52(2), 197–214.
- Küchler, U. (2011). “Am I getting through to anyone?”: Foreign language education and the environment. In A. Brock, U. Küchler, & A. Schröder. (Eds.) *Explorations and Extrapolations: Applying English and American Studies*. Lit Verlag: Münster. 105–115.
- Kuribayashi, A., & Aoyagi-Usui, M. (1998). Pro-environmental attitudes and behavior: a comparison of Thailand and Japan. *Nippon Life Insurance Research*, 122, 34–46.
- Lambert, J., & Ariza, E. N. W. (2008). Improving achievement for linguistically and culturally diverse learners through an inquiry-based earth systems curriculum. *Journal of Elementary Science Education*, 20(4), 61–79.
- Liu, P. Food Heroes Project. *JUCCCE*. Retrieved from: <https://www.jucce.org/foodheroes>.
- Mackintosh, E., & Formanek, I. (2017). Global warming: Greenland’s melting glaciers may someday flood your city. *CNN*. Retrieved from: <http://edition.cnn.com/interactive/2017/11/world/greenland-global-warning>.

- McCloskey, S. (2015). From MDGs to SDGs: We need a critical awakening to succeed. In S. McCloskey. (Ed.) *Policy & Practice: A Development Education Review*, 186–194. Center for Global Education.
- McMahon, J. (2017). Nine things you can do about climate change. *Forbes*. Retrieved from: <https://www.forbes.com/sites/jeffmcmahon/2017/01/23/nine-things-you-can-do-about-climate-change/#6c7602c7680c>.
- Met Office Hadley Center and Climatic Research Institute (2018). 2016: One of the warmest two years on record. Retrieved from: <https://www.metoffice.gov.uk/news/releases/2017/2016-record-breaking-year-for-global-temperature>.
- Mydans, S. (2007). Across cultures, English is the word. *The New York Times*. Retrieved from <http://www.nytimes.com/2007/04/09/world/asia/09iht-englede.1.5198685.html>.
- Nikkei Asian Review (2017). Japan's appetite for meat keeps growing. Retrieved from: <https://asia.nikkei.com/Markets/Commodities/Japan-s-appetite-for-meat-keeps-growing>.
- Nkwetisama, C. M. (2011). EFL/ESL and environmental education: Towards an eco-applied linguistic awareness in Cameroon. *World Journal of Education*, 1(1), 110.
- Oldani, E., Marano, M., & Borgeson, M. (2015). Energy and me: Actual calculations of individual carbon footprints can change individual actions. *Electronic Journal of Literacy Through Science*, 6, 25–40.
- Ó'Móchain, R., & Perkins, R. (2010). Critical issues: A survey of topic popularity among university students. *The Language Teacher*, 34(2), 5–11.
- Plumer, B. (2012). We're on pace for 4°C of global warming. Here's why that terrifies the World Bank. *The Washington Post*. Retrieved from: https://www.washingtonpost.com/news/wonk/wp/2012/11/19/were-on-pace-for-4c-of-global-warming-heres-why-the-world-bank-is-terrified/?utm_term=.80f1709d654f.
- Sakurai, R., Jacobson, S. K., Kobori, H., Primack, R., Oka, K., Komatsu, N., & Machida, R. (2011). Culture and climate change: Japanese cherry blossom festivals and stakeholders' knowledge and attitudes about global climate change. *Biological Conservation*, 144(1), 654–658.
- Sampei, Y., & Aoyagi-Usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, 19(2), 203–212.
- Shrobbree, M. (2016). Global issues through YouTube video clips. *Global Issues in Language Education Newsletter*, 101, 12–15.
- Smith, G. A., & Williams, D. R. (Eds.) (1999). *Ecological education in action: On weaving education, culture, and the environment*. SUNY Press: Albany.
- Smith, T. W., Kim, J., & Son, J. (2017). Public attitudes toward climate change and other environmental issues across countries. *International Journal of Sociology*, 47(1), 62–80.
- Stehfest, E., Bouwman, L., Van Vuuren, D. P., Den Elzen, M. G., Eickhout, B., & Kabat, P. (2009). Climate benefits of changing diet. *Climatic change*, 95(1–2), 83–102.
- Steinfeld, H., Gerber, P., Wassenaar, T. D., Castel, V., & de Haan, C. (2006). *Livestock's long shadow: Environmental issues and options*. Food & Agriculture Organization of the United Nations.
- Stevens, F., DiCaprio, L., Davisson Killoran, J., Packer, J., Ratner, B., & Davidoski, T. (2016). *Before the Flood*. United States: National Geographic Studios.
- Tenenbaum, L. F. (2015). The 10 warmest years: Not exactly forever ago. *NASA*. Retrieved from: <https://climate.nasa.gov/blog/2224>.
- Van Roekel, N. P. D. (2010). Global competence is a 21st century imperative. *NEA Education Policy and Practice Department, Center for Great Public Schools*.
- World Resources Institute. (2013). CAIT climate data explorer. Retrieved from: <http://cait2.wri.org>.
- Zaraska, M. (2016). How Japan went from being an almost entirely vegetarian country to a huge consumer of meat. *Business Insider*. Retrieved from: <http://www.businessinsider.com/how-japan-became-hooked-on-meat-2016-3>.

Appendix

CEFR Level Delineated Climate Change Vocabulary

This appendix has made use of the English Vocabulary Profile. This resource is based on extensive research using the Cambridge Learner Corpus and is part of the English Profile programme, which aims to provide evidence about language use that helps to produce better language teaching materials.

Several vocabulary terms in this list have multiple possible CEFR levels depending on the desired definition. In this list, the CEFR level sub-list it belongs to determines the desired definition for that term. To see these definitions and for more information about the English Vocabulary Profile, visit <http://www.englishprofile.org>.

CEFR A1 Level Climate Change Vocabulary

animal (n)	change (v)	choose (v)	country (n)	die (v)
difficult (adj)	food (n)	fruit (n)	grass (n)	milk (n)
plant (n)	problem (n)	tree (n)	use (v)	vegetable (n)
warm (adj)	water (n)	weather (n)	wind (n)	

CEFR A2 Level Climate Change Vocabulary

air (n)	area (n)	carefully (adv)	dead (adj)	degree (n)
desert (n)	electricity (n)	forest (n)	future (n)	gas (n)
happen (v)	heat (n)	history (n)	ice (n)	information (n)
international (adj)	island (n)	national (adj)	ocean (n)	reason (n)
sea (n)	storm (n)	temperature (n)	war (n)	

CEFR B1 Level Climate Change Vocabulary

act (n)	action (n)	attention (n)	average (n)	beef (n)
burn (v)	challenge (n)	choice (n)	climate (n)	communicate (v)
condition (n)	control (v)	cool (adj)	corn (n)	cover (v)
creature (n)	damage (n)	decrease (n)	decrease (v)	destroy (v)
develop (v)	discover (v)	Earth (n)	economics (n)	effect (n)
efficient (adj)	energy (n)	environment (n)	event (n)	fight (v)
flood (n)	frozen (adj)	fuel (n)	generation (n)	habit (n)
hole (n)	human (n)	increase (v)	individual (adj)	intelligent (adj)
land (n)	leisure (n)	local (adj)	location (n)	method (n)
natural (adj)	oil (n)	period (n)	permanent (adj)	planet (n)
politics (n)	pollution (n)	population (n)	pork (n)	power (n)
predict (v)	prevent (v)	protect (v)	rainforest (n)	record (n)
recycle (v)	region (n)	remove (v)	research (n)	result (n)
season (n)	shore (n)	sink (v)	situation (n)	society (n)
solution (n)	stop (v)	toward (adv)	transportation (n)	trend (n)
use (n)	vegetarian (n)	vegetarian (adj)	waste (v)	wildlife (n)

CEFR B2 Level Climate Change Vocabulary

absorb (v)	acid (n)	activity (n)	affect (v)	agreement (n)
agriculture (n)	alter (v)	atmosphere (n)	aware (adj)	awareness (n)
background (n)	balance (n)	capacity (n)	carbon (n)	carbon footprint (n)
cause (n)	cause (v)	citizen (n)	climate change (n)	CO2 (n)
community (n)	complex (adj)	conflict (n)	construction (n)	consumer (n)
cooling (n)	cooperation (n)	cycle (n)	dairy (adj)	damage (v)
decline (n)	decline (v)	destruction (n)	developed (adj)	developing (adj)
die out (v)	difference (n)	disappear (v)	disaster (n)	economy (n)
extreme (adj)	factor (n)	footprint (n)	global (adj)	global warming (n)
goods (n)	green (adj)	harm (v)	harmful (adj)	identify (v)
immigrant (n)	impact (n)	increase (n)	industrial (adj)	industry (n)
influence (v)	investigate (v)	level (n)	lifestyle (n)	link (n)
link (v)	long-term (adj)	loss (n)	manufacturing (n)	massive (adj)
measure (v)	measurement (n)	media (n)	melt (v)	negative (adj)
nuclear (adj)	occur (v)	organic (adj)	oxygen (n)	participate (v)
pattern (n)	poison (n)	pollute (v)	positive (adj)	prediction (n)
preserve (v)	pressure (n)	priority (n)	process (n)	produce (v)
public (n)	question (n)	question (v)	record (v)	relationship (n)
research (v)	resource (n)	responsibility (n)	responsible (adj)	result (v)
rise (v)	risk (v)	short-term (adj)	soil (n)	solar (adj)
source (n)	species (n)	step (n)	strategy (n)	surface (n)
survey (n)	tackle (v)	threat (n)	toxic (adj)	trapped (adj)
tropical (adj)	use up (v)	warming (n)	waste (n)	will (n)

CEFR C1 Level Climate Change Vocabulary

coal (n)	conservation (n)	consume (v)	consumption (n)	ecology (n)
emission (n)	exhaust (v)	extinct (adj)	housing (n)	mass (adj)
migration (n)	motivate (v)	motivation (n)	ozone (n)	preservation (n)
radiation (n)	rate (n)	renewable (adj)	risk (n)	status (n)
survey (v)	sustainable (adj)	worsen (v)		

CEFR C2 Level Climate Change Vocabulary

catastrophe (n)	combat (v)	coral reef (n)	demand (v)	drought (n)
emit (v)	famine (n)	fluctuate (v)	grains (n)	perception (n)
produce (n)	unsustainable (adj)			

Additional Climate Change Vocabulary (Off CEFR List)

altitude (n)	Arctic (n)	biodegradable (adj)	biodiversity (n)	biofuel (n)
CFC (n)	conserve (v)	currents (n)	deforestation (n)	desertification (n)
eco-friendly (adj)	ecosystem (n)	fossil fuel (n)	geothermal (adj)	give off (v)
glacier (n)	grassroots (adj)	greenhouse (adj)	ground up (adj)	hurricane (n)
hydroelectric (adj)	ice age (n)	ice cap (n)	infrared (adj)	intake (n)
inundation (n)	Kyoto Protocol (n)	latitude (n)	livestock (n)	marine (adj)
methane (n)	microclimate (n)	mitigate (v)	nonrenewable (adj)	Paris Agreement (n)
polar (adj)	poultry (n)	responsibly (adv)	reuse (v)	snowstorm (n)
temperate (adj)	top-down (adj)	tundra (n)	ultraviolet (adj)	unstoppable (adj)
urbanization (n)	vegan (n)	vegan (adj)		