Are We Failing to Prepare Our Students for Life in a World Altered by Climate Change?

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> *[W]e must face up to the truth… catastrophic climate change is now virtually certain.* (Hamilton, 2010, pXIV)

> *Sustainability is about the terms and conditions of* human survival*, and yet we still educate at all levels as if no such crisis existed. The content of our curriculum and the process of education… is unchanged* (Orr, 1992, p83, emphasis added).

> *The situation is hopeless; we must now take the next step.* (Pablo Casals, attr.)

1. Introduction

This paper discusses the question of whether, in the light of what is becoming overwhelming evidence, Japanese university students are being adequately prepared for a future in which their lives may be deeply affected by the consequences of climate change. Using research conducted by survey at two Japanese universities, it will show how the current attitudes and understanding of climate change among university students ill-serves them for a future in which they could experience greater health risks, higher levels of social instability, and greater competition for resources leading to a likely reduction in the quality of their lives. From the research results, the paper will argue that, at present, Japanese universities may be failing to prepare students for making future decisions that will affect themselves, their families and their communities.

The conclusion will argue that, as tertiary educators, we could and should be doing more to prepare students for a world that is likely to change in unpredictable and barely comprehensible ways. Regardless of subject area, educators need to be raising awareness of sustainable lifestyles, initiating discussions on the ways communities can adapt to climate change, and investigating ways of how to make governance more effective when access to resources becomes more difficult and unpredictable. In addition, it will argue that almost any academic discipline can 'mainstream' such issues into its curriculum, and that both teachers and students should be able to work together in exploring these themes.

2. How Will Climate Change Affect Us?

It is likely that most people who struggled through the long Japanese summer of 2010 would, if asked, describe it as one of the most severe they have ever experienced. They would not be wrong. According to the Japan Meteorological Agency, the average temperature for the months of June to August was the highest since records were first made back in 1898 with an average increase of +1.64°C compared to the period 1971-2000 (JMA, 2010). The previous hottest summer in Japan was in 1994. Statistics show a similar pattern world-wide. The National Oceanic and Atmospheric Administration announced that for the first eight months of 2010 the world as a whole was as hot as the previous record year of 1998 with an average temperature of 14.7°C. The month of August was the third hottest on record (behind 2009 and 1998), and the months from June to August were the second hottest world-wide ever (NOAA, 2010).

Citing instances of global record temperatures may not, by themselves, convince anyone that fundamental changes to our climate are underway. However, evidence from a variety of other sources including melting icecaps and glaciers, greater frequency and duration of extreme weather events, and never-before- seen changes in thousands of local ecosystems across the world, makes such a conclusion harder to refute (UNFCCC, 2010). It seems difficult to deny that climate change has become a reality. So, what future effects will climate change bring about and what will this mean for the lives of people affected?

Although global climate change – the aggregate of countless local weather patterns – has the potential to exert much more serious and far-reaching (if less obvious) effects on the lives of people, it is, of course, at the *local* level where we experience the effects of climate change, for instance, by responding to the typhoon that passes over us by putting up the shutters or boarding up the windows. But the effects of climate change in local terms will mean that any given location may experience a much wider variety of weather patterns. Within the range of locally-experienced conditions, previously common weather patterns may become less or more frequent, be of shorter or longer duration or of greater extremity (Smithers and Smit, 2009; Moench, 2009). In addition, a particular area may experience never-before-witnessed weather patterns which may include extreme weather events like flooding and drought leading to disasters like mudslides, bursting river banks and so on. In short, climate change may present communities with an alarmingly wide range of unpredictable challenges. In the UK, for instance, an unprecedented 45 flood warnings were issued around the country in November 2009 (The Guardian, 19 December, 2009) while in the county of Cornwall, Southern England, severe flooding in 2010 caused millions of

pounds worth of damage to houses and businesses (Ibid, 18 November, 2010). Such events as these appear to validate the comments of former Prime Minister, Gordon Brown, who warned that the country faces a "catastrophe" of floods, droughts and heat waves as a result of climate change (Ibid, 19 October, 2009).

However, a changing climate will not only have environmental effects. The example above illustrates that climate change will also bring about disturbances to "economic, technological, institutional, political and social conditions" (Smithers and Smit, 2009, p.23) and, as also seen above, will have repercussions in both developed as well as developing countries. These will include disruptions to livelihoods, health systems, transport, communications, patterns of land use and the distribution of decreasing resources (Handmer and Dovers, 2009). A more disturbing vision of the future is envisaged by Greg Craven in his book, "What's The Worst That Could Happen?" (2009) who wrote:

> I've glimpsed an unlikely but feasible future where I end up holding people off at gunpoint to protect my grandkids' clean drinking water, due to a breakdown of modern civilization triggered by sudden and irreversible climate destabilization (p. 15).

This may indeed be unlikely, but what are the chances that climate change will cause serious disturbances to people's lives throughout the world?

It has been said that avoiding serious climate disruption depends on how much we can reduce the emissions of the greenhouse gases that cause climate change. According to the Intergovernmental Panel on Climate Change

> Current greenhouse gas emissions at or above the current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century (IPCC, 2007).

The European Union meanwhile argues that 2.0°C above the pre-industrial era represent the upper limits of risk and that the closer we get to 2.0°C, the more likely we will be exposed to what the Union calls "dangerous" risks. It also states that even below this level we are likely to see "significant impacts" (European Commission, 2010).

3. A Future Already Determined by the Present

Unfortunately, there is strong evidence that indicates we are not going to be able to keep within these limits. Clive Hamilton, a former executive director of an Australian think tank and current professor at the Center for Applied Philosophy and Public Ethics at the Australian National University, argues that it is now too late to prevent serious climate disruption. His argument is based on the analysis of social, political and scientific factors from which he concludes that significant climate change is inevitable. Moreover, he argues that the chances of stopping warming at even 2.0°C are "virtually zero" (Hamilton, 2010, p.12). This conclusion has also been reached by an organization named Climate Analytics based at the Potsdam Institute in Germany. It echoed Hamilton's words almost exactly when it announced that there is "virtually no chance" of holding temperatures to plus 2.0°C. Rather, it believes that temperatures are more likely to rise by 3.5°C by the end of the century (The Guardian, 15 July 2010). As predictions about global warming consistently err on the conservative side, we might expect such warming to arrive sooner, certainly within the lifetimes of young people and their descendants. Can there be any justification for such pessimistic seemingly-defeatist conclusions?

Hamilton begins his argument by reminding us that the release of greenhouse gases into the atmosphere serves to trap heat and raises the temperature of the earth. Rising temperatures cause increasing agitation and disruption in weather systems and thus results in more unusual and severe weather events. The great majority of greenhouse gases are released in three ways: first, through the burning of fossil fuels; second, through the clearing of forests (both of which are responsible for carbon dioxide emissions); and third, through agricultural practice which releases two other greenhouse gases, namely methane and nitrous dioxide. The way to prevent the earth from suffering climate disruption would thus hinge upon reducing emissions in these three areas.

Unfortunately, as Hamilton goes on to show, this is not going to be possible. Emissions from agriculture are likely to increase as agriculture is currently expanding as well as moving more towards the production of meat – which is emission-intensive. In any case, reductions can only be achieved in ways that will not reduce our food supply, which therefore limits the potential for cuts. In the area of fossil fuel burning, the percentage increase of CO2 emissions since 2000, has now reached record levels of 3% per annum, after running at 1% during the 1990s (Hamilton, 2010). With the continuing rapid development and energy needs of majority-world countries, particularly the so-called BRIC countries (Brazil, Russia, India and China), global emissions are unlikely to drop below these levels. Even optimistic predictions for the halting of deforestation do

not envisage significant decline in forest destruction until 2040.

It is Hamilton's conclusion that we need to strip away our misplaced optimism about mitigating climate change. Mitigation – the policies and actions designed to reduce emissions in order to stabilize the amount of greenhouse gases in the atmosphere – has failed, as seen at the Copenhagen Climate Conference in Denmark in 2009. If we continue to deceive ourselves, we will be left unprepared and so lessen our chances of constructing a lifestyle that will minimize the dangers we may experience in a climate-disrupted world. Adaptation may now be the only realistic option. A lifestyle of adapting to climate change will mean living simply and sustainably, rejecting today's fashion for over-consumption, and demanding the right to an equal distribution of (and access to) resources – what Hamilton calls "democratizing survivability" (2010, p.223). Bringing young people to an understanding of this ought to be an urgent task for tertiary educators. However, in order to provide relevant and challenging components to their curricula, it is necessary for educators to have an awareness of the level of student knowledge about climate change issues and to discover what attitudes they hold. The survey was conducted with this intention.

4. Survey Results and Discussion

(i) Aims and Method

The survey attempted to assess the extent to which students have considered the way their lives are likely to be different as a result of climate change. It aimed to reveal how well students understand climate change and what it means to them personally, who they believe is responsible and how they regard the appropriateness of certain actions aimed at reducing its effects. Perhaps for the first time it can be said that this issue represents a serious concern for young people, so a second purpose of the survey was to discover the extent to which the issue is present in the minds of Japanese university students, particularly when it competes with other legitimate concerns related to future occupation, family and pension security.

The survey comprised of 15 statements divided into roughly four sections. Respondents were asked to choose on a five-point Likert Scale a number that most closely matched their opinion, with the number '1' corresponding to 'strongly disagree', the number '3' to 'undecided' and the number '5' to 'strongly agree'. Before taking the survey, respondents were given a preliminary question asking about their future concerns. The first section of the survey covered perceptions of how climate change may affect respondents on a personal level while the second section dealt with the extent to

which students understand climate change. The third section related to issues of responsibility for climate change and what action can be taken against it, while the fourth section attempted to elicit responses to government involvement in preparing for climate change impacts.

The survey was administered to 72 undergraduate students at two Japanese universities in October and November 2010. Students surveyed at one university included not only Japanese nationals but also a small number of Chinese and Korean students on study-abroad programs. Before taking the survey, students were asked in a preliminary question to consider their future life over the next 10 to 40 years and to identify any worries they have when contemplating their lives over this time scale (for the exact wording in both English and Japanese, see Appendix 2). This was administered on a separate slip of paper. Examples of potential worries were not given as this could have prejudiced student thinking. The purpose of this preliminary question was to determine whether the issue of climate change would, unprompted, be something that came into respondents' minds.

(ii) The Preliminary Question

Data analysis of the preliminary question revealed that out of the 72 students, two respondents identified climate change as their primary concern, while three others included climate change in combination with other anxieties they had (see Appendix 1 for a full breakdown of all results). Of the remaining survey-takers, two did not write anything while sixty-five (90%) expressed concerns related to family issues, future occupation, health and retirement pension, but did not mention climate change.

From this we can see that an overwhelming majority of the students surveyed do not, unprompted, identify climate change as a significant enough issue to specify as a future worry. There are perhaps several reasons for this. First, it may be that the issue still remains more of an abstract concern than a real one; something that will affect them, but only indirectly, in contrast to other anxieties. Students do not seem to hold any notions of how climate change will impact on their daily lives. Second, concerns related to searching for work, etc, are probably perceived as more pressing and urgent, especially in view of the severe economic difficulties the world is currently experiencing. The impression of the consequences of global recession on their future appears significantly stronger than that of how climate change may affect them. Third, it is possible that students have reached a stage in which their predominant psychological perception of climate change is that nothing can be done, either at an individual level or a global level, and therefore it is futile to occupy their minds with it.

(iii) Section 1

The first four statements of the survey proper sought to discover how students imagine climate change will affect them personally (for a list of all statements on the survey, see Appendix 2). Students were asked for their reactions to statements about the seriousness of climate change, whether they believe it will have an effect on their lives in the future, and if that effect is likely to be negative. In addition, they were asked to respond to a statement on the possible impact of climate change on the lives of their children and grandchildren.

Results showed that 54 of those surveyed (75%) 'agree' or 'strongly agree' with the statement, "Climate change is a serious problem for the world". Ten respondents (14%) were undecided while eight respondents (11%) marked 'disagree' or 'strongly disagree'. A very similar outcome was found in response to the statement, "Climate change will have a big effect on my own life in the future" with 55 subjects (76%) choosing 'agree' or 'strongly agree', nine selecting 'undecided' (13%) and eight opting for 'disagree' or 'strongly disagree' (11%).

Regarding whether climate change will have a *negative* effect on students' lives in the future, twice as many were undecided as on the previous two questions. Twenty respondents (28%) choose this option, mostly moving from the 'agree' or 'strongly agree' options which went down to 64% or 46 respondents. Those who selected 'disagree' or 'strongly disagree' on the previous questions remained largely unchanged at 8% (six respondents).

Interestingly, when asked to give an opinion on the statement, "Climate change will have a negative effect on my children and grandchildren," the results resorted to a similar pattern as the first two questions, namely, 58 respondents (80%) choose 'agree' or 'strongly agree' with nine students (13%) being undecided and five (7%) opting for 'disagree'.

The responses to these questions would show that most students are aware that climate change will impact on their lives in the future. Only around 10% of respondents appear to reject this. However, it can be seen that considerably more students appear to doubt that climate change will have negative future impacts on their lives. This may indicate that students believe that, although climate change will affect them, they view it as possibly producing only occasional discomfort or even no more than a benign influence. They may feel that it will have a greater effect on poorer communities than their own.

A further interpretation could be that it reflects the way students see the progress of climate

change revealing that they have not contemplated how climate change will become more severe. However, if we compare responses to the statement on negative effects likely to be felt by their descendants, a different interpretation emerges. The more pessimistic picture (in the shift of opinion from 'undecided' to 'agree' or even 'strongly agree') suggests that students may be aware that climate disruption will progressively worsen but that the negative consequences will only be widely experienced after a longer time span. It might also indicate that students have some awareness of the cumulative effects of unsustainable development and wasteful use of resources.

A less tentative conclusion that can be reached is that most respondents believe climate change will be a problem that their children will have to confront rather than themselves. Unfortunately this would imply that young people are relatively unperturbed by climate change and, therefore, are unprepared to begin the process of adapting to it or of mobilizing themselves for meaningful action in meeting the challenges it will bring.

(iv) Section 2

The purpose of the second section was to assess the degree of basic knowledge related to climate change. This presented a problem in question construction. As the concept of global warming (rather than climate change) is as universal a term as one could be, it means that a respondent who feels less than confident about what climate change is and how it is caused, may experience a reluctance in confessing it. Consequently, a statement in which a respondent (even an anonymous one) is asked to admit to not knowing something that they feel others may regard as 'common knowledge', might produce an answer that is less than forthright. To nullify this effect, respondents were encouraged to think of the statements at a remove. Therefore, instead of using the pronoun 'I', statements in this section began with, "Young people… or, "Most young people…" as in the statement, "Most young people understand what climate change means". Respondents were ostensibly being asked to comment on their assessment of other people's state of knowledge. However, the statement put in this way would perhaps elicit a more honest answer than one that asked them to comment on their own level of understanding, particularly if they felt their knowledge to be less than others might expect it to be.

In response to the statement, 'Young people should be worried about the future effects of climate change', there was a remarkable degree of uniformity. With only 7% of respondents disagreeing with the statement and a further 7% being undecided, the remaining 86% (62 respondents) indicated agreement or strong agreement. At first glance, this might seem to contradict the results from question three in which only 64% of students were concerned about negative effects

on their future lives. However, this can be interpreted as reflecting a difference in familiarity with the concepts. It is possible to conceive of respondents feeling that although climate change may not have a negative effect on their future lives it is still nevertheless something that should concern young people. In contrast, students are perhaps less likely to have confronted the possibility of negative effects and may therefore be more disposed to rejecting it. As they are more likely to have considered the idea that young people generally should be concerned about what we are doing to the earth, they may be more amenable to agreeing with such a statement.

Results from statements six, seven and eight make for sober reading. In response to the statement that most young people understand what climate change means, only 20 respondents (28%) marked 'agree' or 'strongly agree'. The number of those choosing 'undecided' was a further 28%, while 44% or 32 respondents disagreed with the statement. Unsurprisingly, this trend was even more pronounced in response to the statement that said young people understand the connection between emissions, global warming and climate change. Thirty-five respondents (48%) disagreed while a further 23 (32%) were undecided. Only 14 students (19%) agreed with the statement.

The meaning of these data would seem to be clear. Young people do not possess a good understanding of what climate change means or appreciate how some of the key elements in climate change science link together. This data has serious implications, not least in that, for some reason and despite years of exposure to a wide range of sources in a myriad of forms, students are still relatively uninformed about a process that is changing the earth's environment. It would not be difficult to argue that people ignorant of the science of climate change would have lower levels of motivation in pursuing adaptive strategies than people who were more aware of how climate change is caused.

Respondents appear to have a healthier skepticism about the potential of technology to provide solutions. A total of 40% disagree with the statement that soon-to-be-developed technology will provide solutions to climate change. However, as the largest category of student answers to this question fell in the 'undecided' category (35% / 25 respondents), this could simply mean that students are relatively uninformed about the nature of the debate. Are students skeptical about technology because they are unaware of some of the (largely impractical and extremely expensive) ideas that have been expounded, or are they genuinely doubtful about how much technology could be utilized? The previous Bush administration of the US toyed with ideas of spraying aerosols into the atmosphere or hanging huge mirrors in space to deflect sunlight (The Guardian, 18

November, 2008). Would respondents view the role of technology more positively if such ideas were widely circulated? The data cannot answer this question, but the possibility needs to be considered.

(v) Section 3

The third section aimed at eliciting respondents' opinions on who is responsible for climate change and which options among those often proposed have the potential to ameliorate climate change. In response to the question that climate change has been brought about by humankind, 78% (56 respondents) chose 'agree' or 'strongly agree' with 12% dissenting and 10% undecided. In this survey, it would seem that the so-called climate skeptics have lost the argument. Results were far more ambiguous however, on statements related to what should be done in response. There was significant resistance to the idea that climate change could be halted if we "change our lifestyle". A total of only 27% agreed with the statement, while 42% disagreed and 31% were undecided. Respondents were more inclined to "cutting down consumption" as a form of action. Here, 59% (42 respondents) 'agree' or 'strongly agree'. It is interesting to conjecture why these two sets of data differ. It may be that respondents believe that cutting consumption does not necessarily mean that they have to abandon their desired lifestyle. Once again, further research would be needed to answer this question.

Despite the failures of the most recent climate conference in Copenhagen, Denmark, 39% or 28 respondents believe that if the world's governments succeed in taking concerted action, then the current direction may be reversed, Only 23% of respondents disagree with this view with 38% being undecided. This response may reflect the common belief that the solution to climate change will follow a 'dose-response' relationship: that once the medicine is taken, recovery will ensue. Unfortunately, there is evidence to suggest that the world will not follow this convenient, linear pattern. Rather, the consequences of adding more carbon to the atmosphere may cause other phenomenon that will amplify the effects of carbon release in what is called a positive-feedback effect (Hamilton, 2010). It is reasonable to assume that among students this non-linear effect is poorly understood, and that respondents may well have a false sense of security in believing that once governments become serious about addressing the issue, then all will be well.

(vi) Section 4

The final set of statements attempted to elicit student opinions about the connection between government and climate change. Opinions about whether governments are preparing for climate change were mixed. While 34% of respondents agreed that their government was making

preparations, 37% felt that it was not, with 28% were undecided. A similar percentage (29% / 21 students) was also undecided about whether young people should pressurize their government to do more. However, a much larger percentage (55% / 40 students) agreed with the statement that young people should be exerting pressure on governments to do more. This is encouraging and may indicate that students are willing to take a more active role in meeting the challenge of climate change. Finally, respondents showed themselves amenable to the idea of supporting poorer countries afflicted by severe weather events due to climate change. A total of 74% (53 students) agreed with the statement that poor countries suffering from the negative effects of climate change should be helped. This may be attributable to both the recent extensive media coverage of flooding on the Indian sub-continent and an earthquake in Haiti, and the generally acceptable notion that it is right to support people who are victims of natural disasters, irrespective of whether caused by climate change or not.

There are four major conclusions that can be drawn from this research survey. First, although students seem aware of the seriousness of climate change for the world, they see it as being more of a serious threat to their descendants than themselves. Unfortunately if the next generation is to have a good chance of avoiding the worst consequences of climate disruption, they need to benefit from effective policies and adaptive measures (for example, the strengthening of sea walls) that are put into place today and for which young people need to mobilize and become active in their communities. Second, data indicates that the level of respondents' knowledge about the science of climate change is low. It is of course not necessary that students outside science disciplines become expert in climate issues, but a basic knowledge is more likely to provide the motivation for lifestyle changes that are going to be hard to make and challenging to maintain. Third, it can be seen that students are not convinced that lifestyle adjustments have to be made (though there is a degree of acceptance that high consumption is environmentally damaging). Furthermore, the belief held by many that government action will prevent the worst scenarios from being realized may only serve to engender a passive attitude towards climate change. Finally, a majority of respondents see the need for pressuring government to take preparatory action, therefore helping students to explore their options and become informed would seem to be important.

5. Education for Sustainability and Adaptation

Education for sustainability is an approach that has been on the periphery of academia for a long time. There have been several initiatives over the years from Agenda 21 of the UN

Conference on Environment and Development in 1992, to the UN Decade of Education for Sustainable Development (2005 – 14) aimed at connecting sustainability with education. However, with the growing need to address climate change, it is perhaps appropriate to link the concept of education for sustainability with adaptation, as these represent two prongs of an anticipatory (or proactive) strategy for responding to climate change (Smit, et al, 2009).

It is widely held that universities have a role to play in this. The Talloires Declaration of 1994, a plan developed in the US by the University Leaders for a Sustainable Future, committed its signatories to "developing interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities" (ULSF, 2010). The Declaration currently has around 400 supporting universities, although only two in Japan. Reinforcing this is the Sapporo Sustainability Summit Declaration of 2008 which stated that

> Universities have a critical role to play in educating future generations, disseminating information about sustainability, and… training leaders with the skills to solve regional and local problems from a global and interdisciplinary perspective (G8 University Summit, 2008, quoted in Jones, et al, 2010, p. 21).

Some universities have taken a lead in promoting sustainability as part of the curriculum, notably the University of Plymouth in England which has developed an holistic '4C' model – Curriculum, Campus, Community and Culture – representing key areas of focus for action on sustainability (Jones, et al, 2010).

The interdisciplinary nature of sustainability and adaptation presents several advantages that might not be noticeable at first. It may also make the challenge of "mainstreaming" – that is, adding the imprint of sustainability to a subject area – less daunting for the educator than may initially appear. An interdisciplinary approach provides an appropriate way of helping teachers to help students gain an understanding of the interconnectedness of the world, and of the complexity and systemic nature of its problems, including climate change. It also helps students to develop the skills of flexibility and innovation; likely to be valuable attributes in a world of increasing unpredictability. Further, being interdisciplinary – that is, a discipline that informs other disciplines - means that the educator does not have to acquire a whole new subject area in order to incorporate it into established content. Teachers can merely link it to their discipline's key areas. Of course, there are many institutions which treat sustainability as a discrete subject area, but for many educators, introducing sustainability into their courses could simply mean adopting a

different way of looking at their discipline's core ideas. In addition, interpretations of sustainability are extremely diverse. There is no universally accepted definition. For educators seeking to bring sustainability into their classroom, this ambiguity could be the focus of continuing and developing discussions explored together with students, thus obviating the need for the educator to be an "instant expert". This leads to the final advantage, namely, that the principles underpinning sustainability and adaptation encourage educators and students to explore real world problems related to their discipline, in open-ended and non-judgmental ways (Cotton and Winter, 2009).

It is perhaps useful at this point to look briefly at some examples of sustainability and adaptation in particular subjects. In universities where there are departments teaching business studies, it is likely that subjects such as eco-efficiency and 'green' business management are covered. Mainstreaming sustainability would set out on a different tack by exploring beyond the company interests and the triple bottom line to focus on related issues such as "equity, burden-sharing and democracy" (Springett, 2009, p.78). Sustainability does not represent a threat to business studies. It does not attempt to convert students to a particular ideology, and in this sense, sustainability is not an 'ism'. Instead, the aims of mainstreaming sustainability into the business curriculum are "emancipatory and intended to foster a healthy skepticism as well as the habit of critical enquiry" (Ibid). Businesses everywhere will be interested in adapting effectively to climate change. Globalization means that local businesses are affected by global business conditions, while companies with international links may be concerned for the future reliability of overseas countries to provide markets and raw materials. How will businesses in Japan react to these challenges? Giving sustainability a place in the business curriculum may help students, who later become company employees and managers, the wherewithal to come up with responses.

In another example, in departments concerned with welfare issues, mainstreaming sustainability could have a significant impact in a world affected by climate change. Instead of viewing welfare and nursing as being about individual care, a sustainability approach can direct university departments to consider the health of society itself (Goodman and Richardson, 2009). With the threat to public health that record temperatures represent, a consideration of climate change and its consequences for health would make care workers and nurses more effective, especially with the likelihood of an increased demand on emergency and health services. Helping people to adapt would be a valuable service. In addition, the emphasis on healthy living styles promoted by many authorities would seem to dovetail naturally with sustainable living.

6. Conclusion

This paper has attempted to make the case that, from indications gained by surveys at two Japanese universities, students in Japan may be inadequately prepared for a world that will change dramatically owing to climate change. It has argued that students need to develop a greater awareness of what climate change will mean for them and their families. It proposed that universities should do more to fill this gap by mainstreaming sustainability into its curricula and providing students with the skills to pursue adaptive strategies in order to cope with the problems that climate change will bring. Clearly, from such a small sample, all conclusions are necessarily tentative and open to dispute. It is accepted that data from a larger sample obtained from several institutions and supported by in-depth discussions with selected students would reveal a more nuanced picture. This should be the focus of future research.

Although I have argued that climate change is inevitable, I would posit that there are still many actions that we can take today which could have a positive and significant effect on the future. Educators in universities are in a position to empower their students with the capability to survive in a soon-to-be precarious world. As Rees and Wackernagel rather despairingly noted in 1996,

> (T)he world may well simply stay its present development course in the blind hope that things will all work out. If so… humans may well become the first species to document in exquisite detail the factors leading to its own demise (without acting to prevent it).

But if we want to avoid this, we have no choice but to act.

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APPENDIX 1: SURVEY RESULTS

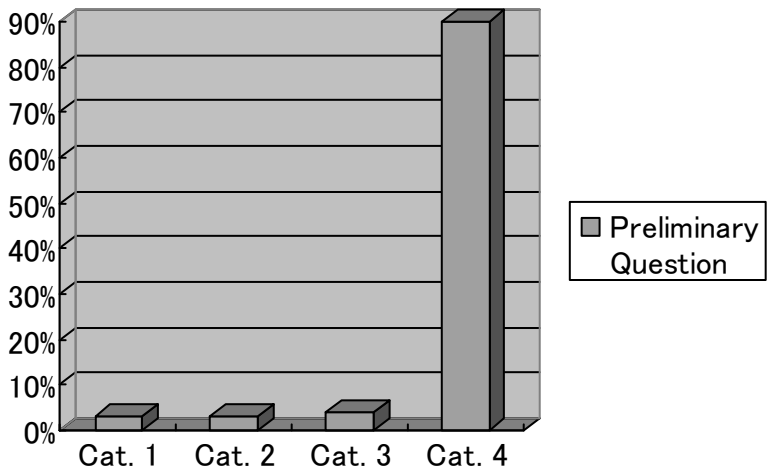
The data is presented in both table and graph form. While the graphs are self-explanatory, it may be helpful to briefly explain the tables. The top line of figures represent the five-point Likert Scale (with the number one corresponding to 'strongly disagree', the number three to 'undecided' and the number five to 'strongly agree'). The second line of figures represents the number of students choosing each particular answer, while the bottom line shows an approximate percentage. Please note that, due to rounding up/down the total does not always add up to exactly 100%. In the graphs the responses 'disagree' and 'strongly disagree' have been combined as have the responses 'agree' and 'strongly disagree'. This has been done to more clearly show the distribution of student reactions.

Preliminary Question

"When you think about your future life, (10-40 years) is there anything that worries you? If yes, please write what it is."

Responses can be grouped into four categories: (1) no comment, (2) concern about climate change specified, (3) concern about climate change together with other issues specified, (4) concern about climate change not specified

Category 1: **2 (3%)**; Category 2: **2 (3%)**; Category 3: **3 (4%)**; Category 4: **65 (90%)**



Survey statements (on a Likert Scale of 1 ~ 5)

1. Climate change is a serious problem for the world.

1	2	3	4	5
1	7	10	19	35
1%	10%	14%	26%	49%

2. Climate change and global warming will have a big effect on my own life in the future.

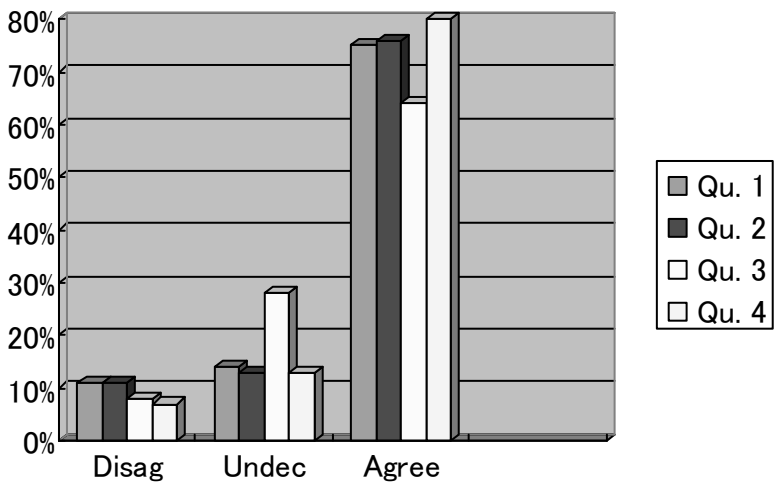
1	2	3	4	5
1	7	9	31	24
1%	10%	13%	43%	33%

3. Climate change will have a mainly negative effect on my own life in the future.

1	2	3	4	5
0	6	20	38	8
0%	8%	28%	53%	11%

4. Climate change will have a mainly negative effect on the life of my children and their children.

1	2	3	4	5
0	5	9	32	26
0%	7%	13%	44%	36%



5. Young people should be worried about the future effects of climate change.

1	2	3	4	5
1	4	5	35	27
1%	6%	7%	49%	38%

6. Most young people understand what climate change means.

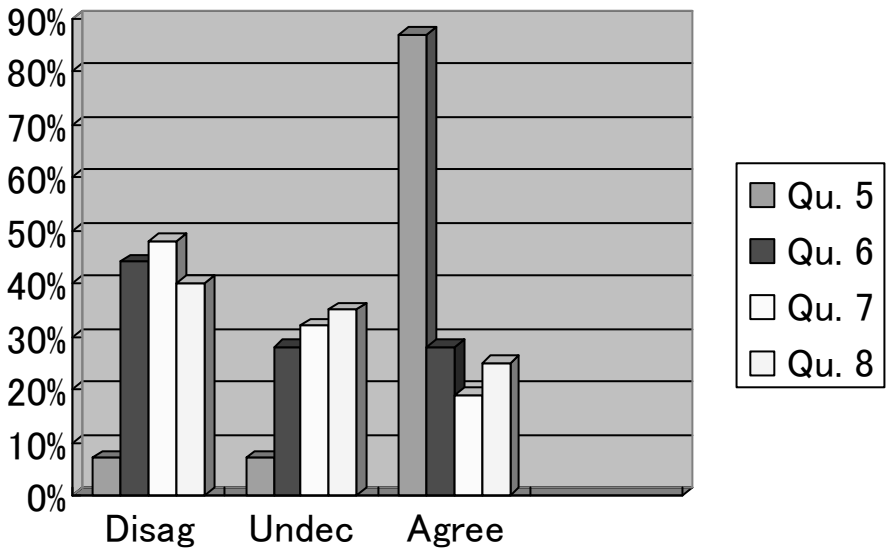
1	2	3	4	5
8	24	20	18	2
11%	33%	28%	25%	3%

7. Most young people understand the connection between greenhouse gas emissions, global warming and climate change.

1	2	3	4	5
14	21	23	12	2
19%	29%	32%	16%	3%

8. There are technological solutions to climate change which we will develop soon.

1	2	3	4	5
10	19	25	13	5
14%	26%	35%	18%	7%



9. Climate change has mostly been caused by the actions of humankind.

1	2	3	4	5
1	8	7	35	21
1%	11%	10%	49%	29%

10. Most young people believe that if we change our lifestyle, we can stop climate change.

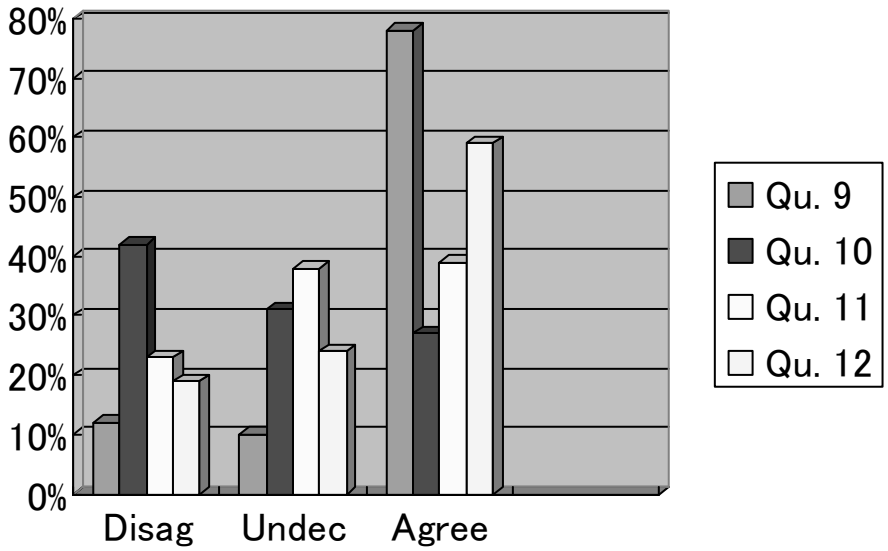
1	2	3	4	5
4	26	22	19	1
6%	36%	31%	26%	1%

11. When the governments of the world decide to take action, we will be able to rescue the situation.

1	2	3	4	5
3	14	27	26	2
4%	19%	38%	36%	3%

12. Young people should take action to reduce emissions by cutting down consumption.

1	2	3	4	5
4	9	17	27	15
6%	13%	24%	38%	21%



13. Young people should be pressuring the governments of their country to do more to prepare for the big impact of climate change.

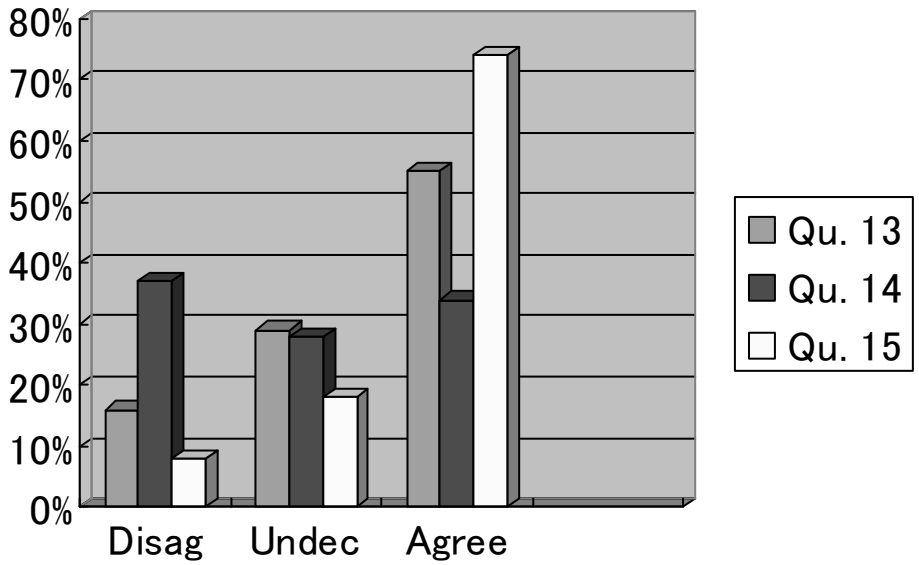
1	2	3	4	5
2	9	21	29	11
3%	13%	29%	40%	15%

14. The government of my country is preparing for the big impacts of climate change.

1	2	3	4	5
6	21	20	24	1
8%	29%	28%	33%	1%

15. The government of my country should prepare for the negative effects climate change will have on poor people.

1	2	3	4	5
1	5	13	33	20
1%	7%	18%	46%	28%



APPENDIX 2: SURVEY

Preliminary Question

When you think about your future life, (10-40 years) is there anything that worries you? If yes, please write what it is.

自分の将来の人生を考えたとき、何か心配事がありますか？もしあればここに書いてください。

Survey

Please circle a number: 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree.

あなたの同意のレベルをたずねます。一番近いと思う番号に○をつけて下さい。 1＝強く同意しない　2＝同意しない　3＝決められない　4＝同意する　5＝強く同意する

A. Climate change is a serious problem for the world.

気候変動は地球にとって深刻な問題です。

1　　2　　3　　4　　5

B. Climate change and global warming will have a big effect on my own life in the future.

気候変動および地球温暖化は、将来の自分の生活に大きな影響を及ぼすでしょう。

1　　2　　3　　4　　5

C. Climate change will have a mainly negative effect on my own life in the future.

気候変動は、将来の自分の生活において、主にマイナスの、良くない影響を及ぼすでしょう。

1　　2　　3　　4　　5

D. Climate change will have a mainly negative effect on the life of my children and their children.

気候変動は、私の子供たち、及びその次の世代の子供たちの生活において、主にマイナスの、良くない影響を及ぼすでしょう。

1　　2　　3　　4　　5

E. Climate change has mostly been caused by the actions of humankind.

気候変動は、主に人間が行なったことが原因となり引き起こっています。

1　　2　　3　　4　　5

F. Most young people understand what climate change means.

ほとんどの若者は、気候変動の意味を理解しています。

1　　2　　3　　4　　5

G. Most young people understand the connection between greenhouse gas emissions, global warming and climate change

ほとんどの若者は、温室効果ガス、地球温暖化、気候変動が、それぞれどのように関係しているか理解しています。

1　　2　　3　　4　　5

H. Most young people believe that if we change our lifestyle, we can stop climate change.

ほとんどの若者は、私たちが生活スタイルを変えれば気候変動を抑止することができると思っています。

1　　2　　3　　4　　5

I. There are technological solutions to climate change which we will develop soon.

近い将来、科学技術の進歩によって、気候変動を解決できると思います。

1　　2　　3　　4　　5

J. When the governments of the world decide to take action, we will be able to rescue the situation.

地球上の各国家が処置（行動）をとると決めたとき、私たちは、事態を救うことができるでしょう。

1　　2　　3　　4　　5

K. Young people should be worried about the future effects of climate change.

若者は、気候変動の将来及ぼす影響について心配するべきです。

1　　2　　3　　4　　5

L. Young people should take action to reduce emissions by cutting down consumption.

若者は、消費を減らすことにより、CO2 排出量削減の行動をとるべきです。

1　　2　　3　　4　　5

M. Young people should be pressuring the governments of their country to do more to prepare for the big impact of climate change.

若者は、自分の国の政府に対して、気候変動の及ぼす大きな影響に備える（処置や行動など）より行なうよう圧力をかけるべきです。

1　　2　　3　　4　　5

N. The government of my country is preparing for the big impacts of climate change.

私の国の政府は、気候変動の及ぼす大きな影響に対する準備をおこなっています。

1　　2　　3　　4　　5

O. The government of my country should prepare for the negative effects climate change will have on poor people.

私の国の政府は、気候変動が、貧しい人々に対して及ぼす、マイナスで良くない影響に対する準備をするべきです。

1　　2　　3　　4　　5

Are We Failing to Prepare Our Students for Life in a World Altered by Climate Change?

Trevor Ballance

Abstract

This paper asks the question of whether, as tertiary educators, we are adequately preparing our students for a world in which, owing to climate change, they will encounter new and complex challenges. It takes the position that attempts at mitigation have failed and that climate change is now all but inevitable. It argues that we should instead direct our attention to issues of adaptation and the practical issues of how to respond effectively to the conditions that a climate-altered world will create. Through surveys conducted at two Japanese universities, the paper argues that Japanese students do not yet possess an understanding of what climate change will mean for their lives. Without this understanding, students will not acquire the skills and knowledge necessary to meet these challenges. The paper states that a focus of sustainability and adaption in education could provide a way to empower students for the coming challenges and it gives two examples of how students in business studies and welfare/nursing departments in universities may be prepared more appropriately for what is a worrying and unpredictable future.