An ethical basis for sustainability in the worldviews of first year students?

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Abstract— **A key focus in transforming the profession of ICT to one of contributing to a sustainable future is the education of students who may think and act as sustainable practitioners in computing. An important understanding in this is the relationship between ethics and sustainability in the student intake. This forms a baseline upon which higher education can build. It is argued that sustainability can be considered ethics expanded in time and space but it is not previously known if an ethical understanding relates to an ecological worldview or to desires for contributing to sustainability. This paper reports on a survey of the first year intake of a New Zealand polytechnic (n=52) and explores the link between ethics and sustainability in freshman students in their first week of higher education. A measure of ethical naivety was constructed based on standard measures of naive ethics (legalism, egoism, agency and relativism), the responses to this were compared to the standard measure of ecological worldview, the New Environmental Paradigm. The implications for education for ICT4S are discussed.**

Index Terms— **education, New Environmental Paradigm, ethics, ecological worldview**

I. INTRODUCTION

This paper explores the link between ethics and ecological worldview in a cohort of first year (freshman) computing students. Understanding this relationship is instructive in the design of curriculum and pedagogy for educating for sustainable practitioners in ICT.

There is a strong call by many for organisations and tertiary institutions to play a strong role in achieving the global sustainability vision [1] [2]. The call from the United Nations is that this is a matter for students of every discipline [3] [4]. Computing researchers have similarly promulgated a strong connection between computing and sustainability [5], [6]. The crucial sentence in education for sustainability is *"Our goal is that every graduate may think and act as a "sustainable practitioner"* This sustainable practitioner means more than technical skills but means we have to come to terms with worldviews, affective learning and action competences [7].

A. Sustainability in computing education

The understandings and beliefs of computing students are critical to the development of curricula and teaching strategies to provide a stream of graduates who may usefully contribute to a sustainable society. Rather than a focus on current technical matters as they relate to sustainability (data consolidation, virtualization etc), we are particularly interested in understanding the deeper worldviews of the students – a focus on the affective attributes of values, attitudes and beliefs [8]. This worldview is important as the desired approach to computing education for sustainability is one of integration or computing through the lens of sustainability rather than additions to the crowded curriculum [9].

1) Measurement

The most widely used measure of ecological worldview is the New Environmental Paradigm [10, 11]. Using a 15 point scale, participants can be scored according to a continuum of anthropocentric beliefs through to an ecological perspective. It has been previously used in benchmarking the worldviews of New Zealand student intakes [8, 12-14]. In general the computing freshmen were more anthropocentric than most other disciplines (roughly equal with business and engineering). Although there was a gender effect, this was not the whole story (as business was primarily female).

B. Ethics in computing education

Gotterbarn [15] argues that computing in all of its forms is not ethically neutral. He argues that if computing is to be taken seriously as a profession then we need to look beyond the narrow task focus and take seriously the wider responsibilities – with obvious implications for education "We need to make sure that students see the impacts of their decisions".

Mason [16] argues that we should all see through the lens of ethics, but that the "optics of ethics is very large indeed". They see four principles (agent's duty, act resulting in greatest good for greatest number, pursuit of virtue, pursuit of justice) as underlying most situations, but that "frequently however, the guidance deriving from one of these theories will conflict with that of one or more of the others. This requires a moral judgement". Hence ethics cannot sensibly be taught with reference to a rule book –' in case x do y' and instead is reliant on a rigorous application of underlying principles.

Ethics has been appearing in computing curricula for more than 20 years [17], [18]. In "Implementing a tenth strand in the CS curriculum" Martin *et al.* [19] argued that the social and ethical impact of computing was so fundamental that it should occur in every undergraduate curriculum.

Many students come to computer science with a hacker mentality; that is, they view the computer as a personal intellectual challenge, a test of their ability to solve logical problems and to control the computer. Such a narrow approach to computing emphasizes the relation between a solitary programmer and the computer. It implicitly denies any ethical responsibility or social obligation in the practice of computing skills.

Rather than just taking an instrumental approach to ethics – laws covering intellectual property, risk management and so on, Martin *et al.* recommended a focus on ethical principles such as honesty, fairness, autonomy, justice, and beneficence define personal responsibility.

These principles may not lend themselves to teaching. It is perhaps difficult to convey messages such as 'honesty is good' without appearing trite. Fortunately, Martin *et al.* proposed teaching through helping students to understand that "some easy ethical approaches are questionable". Students need to become aware of the differing grounds for ethical claims that have become common, and of the significant weaknesses of arguments often put forward in defense of an ethical choice. They pointed to four naïve approaches to ethical reasoning likely to lead the beginning ethical thinker astray:

Naïve Legalism. Equating ethicality with legality is a tempting way to dispense with serious ethical reflection. Students should certainly be aware of the legal issues that will confront them. However, assuming that "if it is legal, it is ethical" is asking more of the law than it can provide, and denies the legitimacy of principled disagreement with the law. • *Naïve Agency.* Surrendering all moral authority by claiming to be a simple agent of some other entity (e.g., an employer) has its own problems. In the end, even the legal system requires individual responsibility, and military codes of conduct require soldiers to disobey some orders. Personal responsibility cannot be this easily dismissed.

Naïve Egoism. The simple belief that selfishness is the best guiding principle can make it convenient to ignore duty to others while concentrating only on personal profit. This approach conceals a fundamental inconsistency, since its naïve form suggests everyone else should still follow ethical forms.

• *Naïve Relativism.* The belief that all moral choices are relative to the situation and the culture makes it easy to have polite conversations with others, since it requires no confrontations. However, when difficult choices have to be made, students need to realize a truth can emerge that is not culturally specific.

Martin proposes engaging students in "recognising the weaknesses in..using these simplistic approaches have significant flaws when used as reasons in ethical decision

making". Only then can skills be taught (such as arguing from example; identifying ethical issues in concrete situations; applying ethical codes to concrete situations).

But by 2008, Spradling *et al.* [20] concluded that there is still "work to be done".

1) Measurement

There are two primary ways to study ethical understanding: scenarios and ethical ideology. The scenario approach (eg [21]) tests participants' recognition and tolerance of violations. Unfortunately, the reliability of scenarios to uncovering unethical behaviour is questioned [22]: "we may well recognise good ethical behaviour and respond accordingly in a questionnaire but we may not have the moral stamina to stick to our good intentions when faced with a real life situation". The alternative approach is to try to elicit underlying principles or ideology eg [23].

C. Research question

It is clear that sustainability cannot be defined without reflecting on values and principles. As a result, as Bosselmann [24] argues, any discourse about sustainability is essentially an ethical discourse. Sustainability can be described as "ethics extended in time and space" [25] [26]. For Fagan [27] too, the ethical imperative is the basis of sustainability:

To live a particular lifestyle that, knowingly, impacts detrimentally on a neighbour—be that an individual living in the next house—or a country in the next region, cannot, arguably, be tolerated. To know of poverty in the economically developing world and not use that knowledge to act to relieve it, could be considered unethical. This position holds profound implications for politicians, schools and universities.

Most, if not all sustainability curriculum documents strongly feature ethics (see for example [2], [28]). Second Nature [29], state:

The context of learning would change to make the human/environment interdependence and values and ethics a central part of teaching in all the disciplines, rather than isolated as a special course or module in programs for specialists. All students would understand that we are an integral part of nature. They would understand the ecological services that are critical for human existence and how to assess and minimize the ecological footprint of human activity

So is sustainability just ethics rebranded? Could we dispense with teaching sustainability and focus on ethics? (Or vice versa?). If a student has a strong set of moral standards, does this make it easier to engage them in sustainability? An important understanding in this is the relationship between ethics and sustainability in the student intake. This paper explores the relationship between ethical sophistication and ecological worldview.

What is the relationship between ethical understandings and sustainability in freshman computing students? We are interested in understanding the sustainability worldviews and ethical underpinnings of students who have made their career path decision, but not yet been formally influenced by

teaching in the discipline. Little is known about the affective learning status of students at this stage but this survey begins to give a baseline of whom we, as educators, are working with.

II. METHOD

As part of a wider NZ IT Learning and Career Expectations project (of which this is the first publication), an online survey was taken by freshman students in the first week of semester in February 2014.

To measure ecological worldview we included the revised New Environmental Paradigm Scale (NEP [10]). The items are shown in Table 1. Respondents were asked to indicate their agreement with each item on a five-point Likert-like scale (Strongly agree, mildly agree, unsure, mildly disagree, strongly disagree). The revised-NEP contains seven items worded so that disagreement indicates a pro-ecological worldview and eight items worded so that agreement indicates a pro-ecological worldview. Items in each set were alternated and for our subsequent analysis the scores for seven disagreement = pro-ecological items were reversed, so that 1 (*strongly agree*) becomes 5 (*strongly disagree*), 2 becomes 4 and vice versa [11].

To measure ethical ideology we developed an instrument based on the four naïve ethics [19] (Table 2). To these we added two idealism elements from Forsyth's Ethical Position Questionnaire [30] . Respondents were asked the extent to which they agreed/disagree each statement. These were all measured on five-point agreement scales (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree).

III. RESULTS

A total of 52 respondents completed the survey (Table 4). The majority of respondents are males in aged between 17 and 20, 90.3% were male (these both align with the population of students in the programme). While gender effects might be expected in ethics based responses, the small numbers of females (n=5) mean statistical analysis of gender effects is not possible so the results are presented as a single cohort.

TABLE I.   THE 15 ITEM NEP. WORDS IN BOLD PROVIDE THE ABBREVIATED TERM USED IN SUBSEQUENT ANALYSIS

We are approaching the **limit** of the number of people the earth can support.
Humans have the right to **modify** the natural environment to suit their needs.
When humans **interfere** with nature it often produces disastrous consequences.
Human **ingenuity** will ensure that we do not make the earth unlivable.
Humans are severely **abusing** the environment.
The earth has plenty of natural **resources** if we just learn how to develop them.

Plants and animals have as much right as humans to exist.
The **balance** of nature is strong enough to cope with the impacts of modern industrial nations.
Despite their special **abilities** humans are still subject to the laws of nature.
The so-called "ecological **crisis**" facing humankind has been greatly exaggerated.
The earth is like a **spaceship** with very limited room and resources.
Humans are meant to **rule** over the rest of nature.
The balance of nature is very **delicate** and easily upset.
Humans will eventually learn enough about how nature works to be able to **control** it.
If things continue on their present course we will soon experience a major ecological **catastrophe**.

TABLE II.   THE ITEMS USED IN ETHICAL SOPHISTICATION

Naïve Legalism	If it's legal it's ethical
	If I'm operating within the law I don't need to worry about ethics
Naïve Egoism	Selfishness is the best guiding principle
	As long as everyone is following "they are in it for themselves" society as a whole will prosper
Naïve Agency	My employer will protect me if anything goes wrong, so long as I've followed their rules.
	My job as a computer professional is to provide the technical solutions (code or infrastructure), my managers will have considered the ethical implications
Naïve Relativism	Questions of what is ethical for everyone can never be resolved since what is moral or immoral is up to the individual.
	What is ethical varies from one situation and society to another
Relativism in Computing	Business is a special case, the ethics are different to personal life
	There is no room in business for soft things like ethics, if your competitor does it then you can
	Computing is largely theoretical or technical - with little consequence
Idealism	The dignity and welfare of people should be the most important concern in society
	It is never necessary to sacrifice others
	The existence of potential harm to others is always wrong, irrespective of the benefits to be gained

TABLE III. Data sample

Gender	Number of Respondents
Male	47
Female	5
Total	52

Age	Number of Respondents
Under 17	0
17-18	21
19-20	15
21-24	7
25-30	8
Over 30	1
Total	52

TABLE IV. Ethical Sophistication and NEP summary data

Scale	Mean	SEM	95% CI Low	95% CI High	t-test t	t-test Sig
NL	2.14	0.10	1.94	2.35	-8.23	< .001
NE	2.12	0.10	1.92	2.31	-9.06	< .001
NA	2.87	0.10	2.66	3.07	-1.31	0.194
NR	3.64	0.09	3.47	3.82	7.39	< .001
NRC	3.90	0.15	3.62	4.19	-4.08	< .001
Ideal	3.60	0.08	3.44	3.76	7.18	< .001
Ethics	3.39	0.06	3.27	3.51	6.41	< .001
NEP	3.48	0.07	3.34	3.76	6.77	< .001

Note: NL (Naïve Legalism), NE (Naïve Egoism), NA (Naïve Agency), NR (Naïve Relativism), NRC (Naïve Relativism in Computing) and Ideal (Idealism) are subscales of the Ethics scale. All scales are coded as 1 to 5, with a center of 2.5. *SEM* is standard error of measurement.

A. 2008 data.

The 2008 data was originally reported on a scale of 0 to 5 [31]. Re-expressing the findings on a scale where 1 is anthropocentric and 5 is ecological, as used in the present study, the NEP for the entire institution's intake was 3.02 (slightly pro-ecological) with a standard deviation of 0.38. The most pro-ecological student was in Veterinary Nursing who was pro-ecological for every question. The least pro-ecologic student, in Communication Design was anthropocentric for every question. The female NEP was 3.06, significantly more pro-ecological than the males 2.93 (p=0.003). In 2008 the combined IT NEP score was just, but significantly, anthropocentric at 2.94.

B. 2014 data

1) Ethics

Participants are not naïve in ethics. On a scale where 1 is naïve and 5 is sophisticated, the mean score is 3.39 with a 95% confidence interval of 3.27 to 3.51 (t=6.412, p<.001). Alpha reliability is 0.755 (Table 4). Looking at the sub-scales, the proportion of participants classified as Very Naive or Poor is in the range 4% to 31%. This is probably where we should focus educational effort – those areas of particularly naïve understanding in the student group. Most in need is Naïve Agency (31%), followed by Idealism (22%), relativism in computing (15%), Naïve Relativism (13%), Naïve Legalism (8%), and finally Naïve Egoism (4%).

Participants can be classified as not naïve for the subscales: Naïve Legalism (NL) and Naïve Egoism (NE). The result for the Naïve Agency (NA) subscale was not statistically significant. Participants can be classified as naïve for the subscales: Naïve Relativism (NR) and Naïve Relativism in Computing (NRC) and idealistic for the idealism subscale (Ideal). For the ethics subscales, participants were classified as very naïve, poor, ok or sophisticated according to their scores, in approximately equal score ranges. The proportions of the participants in these classifications for each of the ethics subscales are shown in Table 5 and graphically in Figure 1.

TABLE V. Ethical SubScales

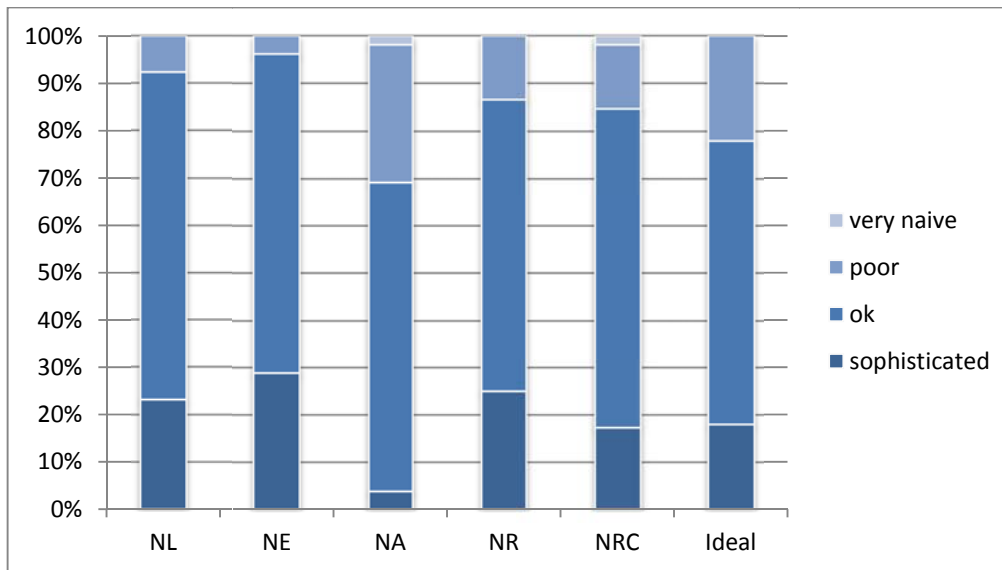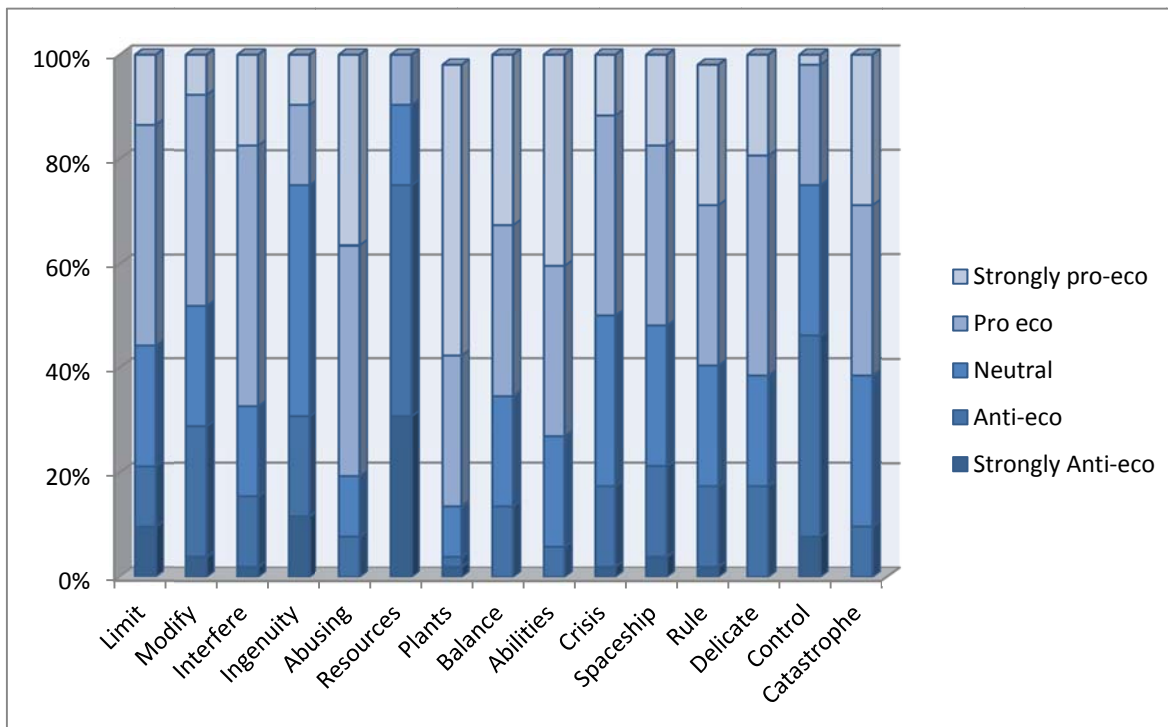|	NL	NE	NA	NR	NRC	Ideal
sophisticated	23%	29%	4%	25%	17%	18%
ok	69%	67%	65%	62%	67%	60%
poor	8%	4%	29%	13%	13%	22%
very naive	0%	0%	2%	0%	2%	0%
	100 %	100 %	100 %	100 %	100 %	100 %

Fig. 1. Ethics subscales (percentage)

Fig. 2. Ecological values percentages (NEP elements)

2) NEP scale

In general, participants are pro-ecological. The mean score is 3.48 with a 95% confidence interval of 3.34 to 3.76 ($t=6.77$, $p<.001$) (Table 4). Alpha reliability is 0.792. The question with the least pro-ecological endorsement was resources, for which the median endorsement was anti-ecological. Endorsement was neutral at the median point for question ingenuity and control. For all other questions, the median endorsement was pro-ecological. One commonality between these three less-endorsed questions is the dimension of optimism; all three suggest that people will be able to fix whatever ecological issues arise. The proportions of the participants' responses to each of the NEP questions are shown in Figure 2.

Overall, participants can be characterized as not naïve on the ethics scale and pro-ecological on the NEP scale.

C. Relationship

There is a significant correlation between Ethics and Ecological scores ($r(49)=0.3863$; $p=0.0051$), with higher values of ecological Scores associated with higher values of ethics scores. The relationship accounts for 15% of the variability; adjusted $R2$ was 13%. The 95% confidence interval of the adjusted correlation coefficient is 0.125 to 0.648 corresponding to an adjusted $R2$ of 2% to 42%. Because both Ecological scores and Ethics scores are measured with error, the relationship is attenuated. Applying a Spearman correction for attenuation, our best guess from these data at the level of correlation in the population is about 22% (13% / (.755*.792)).

The regression equation is "**EcoScore = 0.2653 • EthicsScore + 40.1110**"; the confidence interval of the coefficient of EthicsScore is: CI.95 = ($0.0856 \leq$ coefficient ≤ 0.4450).

A Jarque-Bera test of normality indicates ($p=0.2888$) that the distribution of the residual from the regression is acceptably close to a normal distribution, which suggests that a parametric approach is appropriate.

Within the sample, the best two predictors of variability in ecological scores are naïve egoism and idealism. An absence of naïve egoism and presence of idealism is associated with higher scores.
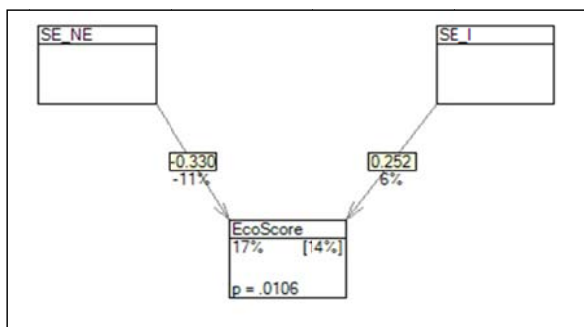

Fig. 2. Influence diagram of regression equation

The regression equation is EcoScore = 0.6960 SE_I - 1.7612 SE_NE + 52.4495

Anova for the regression is:

Component	SS	df	Mean square	F	Sig.
Model	496.8903	2	248.4452	4.9998	0.0106
Residual	2385.1489	48	49.6906		
Total	2882.0392	50			

IV. Discussion

This paper has described a study of the intake of computing students (freshmen) during the first week of semester in a New Zealand institution. Participants completed a questionnaire that rated both their ethical sophistication and ecological worldview.

While in general the students were not ethically naïve, there is a large range, with some exhibiting very poor ethical understanding. The naïve legalism and idealism are the areas of greatest concern. This would be a useful area to focus teaching of ethical concepts.

In general, the students were pro-ecological. There was a considerable shift in mean NEP scores from 2.94 in 2008 to 3.48 in 2014 ($p<.001$). This is a substantial shift, that if confirmed with further research will have implications for research and teaching. From a research perspective, it would be valuable to attempt to replicate this finding, and to explore reasons for it. Although this survey was administered in the first week of semester, it is possible that evidence of the institutional focus on educating for sustainable practitioners [2] – such as posters of sustainability-related senior capstone projects on the walls – had already substantially influenced the students on their first day. It is also possible that the students had chosen the institution on the basis of its publicised sustainable stance. A more likely explanation is a shift in societal norms over the six intervening years, and the authors plan to explore this in future research.

Whatever the reason for the increased pro-ecological worldview, there are implications for teaching. We do not think it means that educators should ease off on a sustainable practitioner imperative. First, the larger dataset in 2008 permitted exploration of patterns within the NEP data, including classification of individuals [8, 14] – within the sample were many individuals with components of strong anthropocentric views. Second, the worldview does not necessarily mean a commitment to action nor an understanding of the relationship between sustainability and the students' chosen career [31]. It might though mean that the current cohort of pro-ecological students is more open to the notion of ICT4S and sustainability in computing than the previous anthropocentric cohort.

The hypothesis that greater sophistication in ethics is associated with a more pro-ecological worldview is supported by the data of the current study. However, the relationship is likely to account for only 20% or so of the variability. This suggests that although teaching ethics should help develop a more pro-ecological worldview, it is not sufficient. While the two are related, sustainability is not simply ethics rebranded.

Thus, other means should also be used to develop awareness and a pro-ecological worldview. Further, while the pro-ecological worldview can be considered a useful precursor to developing graduates that may think and act as sustainable practitioners, it cannot be assumed that a pro-ecological worldview determines a sustainable practitioner. Hence, although they are related – and perhaps usefully so for developing teaching engagement strategies – ethical sophistication, an ecological worldview and the practice of being a sustainable practitioner each need to be the focus of deliberate acts of teaching. One strategy worth investigating would be to engage students via the different elements of ethical sophistication as scaffolding concepts for notions that

sustainability is "ethics extended in time and space" [25] [26].

This survey was undertaken in the first week of the first semester – before students had learnt much at a tertiary level. They had, however, chosen their field of learning –at least computing in general if not also their specific pathway. This study has examined the differences in the sustainability worldviews of students who have made that career path decision, but not yet been formally influenced by teaching in that discipline. It would be worth exploring if similar relationships to that this paper has found for sustainability, apply in other motivated computing endeavours such as Computing for Social Good, [32, 33] and Computing for Peace [34].

This study was undertaken with a small sample. This has produced statistically significant results for the whole cohort but is insufficient to examine factors such as gender or age. Unlike many studies involving students it is worth remembering that the student intakes (freshmen) are the target population so usual caveats about students representing the population do not apply. It would be worth repeating this study with a wider, multi-institutional sample. A longitudinal approach would also be worthwhile to investigate how the ethical sophistication and ecological worldview change during students' education.

V. CONCLUSION

This paper presents the results of a survey of the ethical sophistication and ecological worldviews of first year students entering a computer science degree programme. A greater sophistication in ethics is associated with a more pro-ecological worldview. While this relationship is sufficient to suggest integrated approaches to engagement, it is insufficient to suggest teaching only ethics or sustainability alone and hoping for automatic transference.

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APPENDICES

Ethics scales

		Question	SD 1	MD 2	N 3	MA 4	SA 5	Missing	Total
Naïve Legalism	Q32_1	If it's legal it's ethical	10	26	13	3	0		52
	Q33_2	If I'm operating within the law I don't need to worry about ethics	11	28	9	4	0		52
Naïve Egoism	Q32_3	Selfishness is the best guiding principle	14	19	14	5	0		52
	Q33_1	As long as everyone is following "they are in it for themselves" society as a whole will prosper	13	25	13	1	0		52
Naïve Agency	Q33_5	My employer will protect me if anything goes wrong, so long as I've followed their rules.	4	21	17	8	2		52
	Q34_2	My job as a computer professional is to provide the technical solutions (code or infrastructure), my managers will have considered the ethical implications	2	12	20	17	1		52
Naïve Relativism	Q32_4	Questions of what is ethical for everyone can never be resolved since what is moral or immoral is up to the individual.	1	5	12	24	10		52
	Q33_4	What is ethical varies from one situation and society to another	2	0	18	30	2		52
Relativism in computing	Q32_5	Business is a special case, the ethics are different to personal life	4	11	17	20	0		52
	Q34_3	There is no room in business for soft things like ethics, if your competitor does it then you can	7	27	11	6	1		52
	Q34-4	Computing is largely theoretical or technical - with little consequence	6	23	18	5	0		52
Idealism	Q32_2	The dignity and welfare of people should be the most important concern in society	0	0	14	28	9	1	52
	Q33_3	It is never necessary to sacrifice others	2	6	14	19	11		52
	Q34_1	The existence of potential harm to others is always wrong, irrespective of the benefits to be gained	0	11	18	16	6		51

Percentages

		Question	SD 1	MD 2	N 3	MA 4	SA 5
Naïve Legalism	Q32_1	If it's legal it's ethical	19%	50%	25%	6%	0%
	Q33_2	If I'm operating within the law I don't need to worry about ethics	21%	54%	17%	8%	0%
Naïve Egoism	Q32_3	Selfishness is the best guiding principle	27%	37%	27%	10%	0%
	Q33_1	As long as everyone is following "they are in it for themselves" society as a whole will prosper	25%	48%	25%	2%	0%
Naïve Agency	Q33_5	My employer will protect me if anything goes wrong, so long as I've followed their rules.	8%	40%	33%	15%	4%
	Q34_2	My job as a computer professional is to provide the technical solutions (code or infrastructure), my managers will have considered the ethical implications	4%	23%	38%	33%	2%
Naïve Relativism	Q32_4	Questions of what is ethical for everyone can never be resolved since what is moral or immoral is up to the individual.	2%	10%	23%	46%	19%
	Q33_4	What is ethical varies from one situation and society to another	4%	0%	35%	58%	4%
Relativism in Business	Q32_5	Business is a special case, the ethics are different to personal life	8%	21%	33%	38%	0%
	Q34_3	There is no room in business for soft things like ethics, if your competitor does it then you can	13%	52%	21%	12%	2%
	Q34-4	Computing is largely theoretical or technical - with little consequence	12%	44%	35%	10%	0%
Idealism	Q32_2	The dignity and welfare of people should be the most important concern in society	0%	0%	27%	54%	17%
	Q33_3	It is never necessary to sacrifice others	4%	12%	27%	37%	21%
	Q34_1	The existence of potential harm to others is always wrong, irrespective of the benefits to be gained	0%	21%	35%	31%	12%

Ecoscales

Counts

		1 SD	2 D	3 N	4 A	5 SA	Missing	Total
Q36_1	We are approaching the limit of the number of people the earth can support.	5	6	12	22	7		52
Q36_2	Humans have the right to modify the natural environment to suit their needs. [EV13]	4	21	12	13	2		52
Q36_3	When humans interfere with nature it often produces disastrous consequences.	1	7	9	26	9		52
Q36_4	Human ingenuity will ensure that we do not make the earth unlivable.	5	8	23	10	6		52
Q37_1	Humans are severely abusing the environment	0	4	6	23	19		52
Q37_2	The earth has plenty of natural resources if we just learn how to develop them.	0	5	8	23	16		52
Q37_3	Plants and animals have as much right as humans to exist.	1	1	5	15	29	1	52
Q37_4	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	17	17	11	7	0		52
Q38_1	Despite their special abilities humans are still subject to the laws of nature.	0	3	11	17	21		52
Q38_2	The so-called "ecological crisis" facing humankind has been greatly exaggerated.[EV8]	6	20	17	8	1		52
Q38_3	The earth is like a spaceship with very limited room and resources.[NEP4] [EV4]	2	9	14	18	9		52
Q38_4	Humans are meant to rule over the rest of nature.[NEP6] [EV6]	14	16	12	8	1	1	52
Q39_1	The balance of nature is very delicate and easily upset. [NEP1]	0	9	11	22	10		52
Q39_2	Humans will eventually learn enough about how nature works to be able to control it.	1	12	15	20	4		52
Q39_3	If things continue on their present course we will soon experience a major ecological catastrophe.	0	5	15	17	15		52

Percentages

		1 SD	2 D	3 N	4 A	5 SA
Q36_1	We are approaching the limit of the number of people the earth can support.	10%	12%	23%	42%	13%
Q36_2	Humans have the right to modify the natural environment to suit their needs. [EV13]	8%	40%	23%	25%	4%
Q36_3	When humans interfere with nature it often produces disastrous consequences.	2%	13%	17%	50%	17%
Q36_4	Human ingenuity will ensure that we do not make the earth unlivable.	10%	15%	44%	19%	12%
Q37_1	Humans are severely abusing the environment	0%	8%	12%	44%	37%
Q37_2	The earth has plenty of natural resources if we just learn how to develop them.	0%	10%	15%	44%	31%
Q37_3	Plants and animals have as much right as humans to exist.	2%	2%	10%	29%	56%
Q37_4	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	33%	33%	21%	13%	0%
Q38_1	Despite their special abilities humans are still subject to the laws of nature.	0%	6%	21%	33%	40%
Q38_2	The so-called "ecological crisis" facing humankind has been greatly exaggerated.[EV8]	12%	38%	33%	15%	2%
Q38_3	The earth is like a spaceship with very limited room and resources.[NEP4] [EV4]	4%	17%	27%	35%	17%
Q38_4	Humans are meant to rule over the rest of nature.[NEP6] [EV6]	27%	31%	23%	15%	2%
Q39_1	The balance of nature is very delicate and easily upset. [NEP1]	0%	17%	21%	42%	19%
Q39_2	Humans will eventually learn enough about how nature works to be able to control it.	2%	23%	29%	38%	8%
Q39_3	If things continue on their present course we will soon experience a major ecological catastrophe.	0%	10%	29%	33%	29%