

**Green schools action on energy. Can children's knowledge and attitudes influence their
parents to help the environment?**

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Abstract

Global warming, overpopulation, overflowing landfills, ozone depletion, acid rain, loss of green space, water pollution and species extinction are all problems that are primarily, if not exclusively, caused by human behaviour. The purpose of this quantitative research was to explore the effects of the Green School Energy Program, the study was designed to test, first, whether environmental attitudes and knowledge on energy conservation of participants changed relative to nonparticipants, and second, whether green school children influenced their parent's environmental attitudes and knowledge. The study was a post-test pre-test intervention with 2 schools one control school (n= 94) and the experimental school (n=162) with children aged 9 -12 and their parents. The analysis showed there to be a significant relationship among the children and parents attitudes of the green school pre and post intervention. Significance was also evident of the children's knowledge after the intervention in comparison to the control school. And finally Parents of the green school conveyed a positive change in attitudes on energy conservation. The study discusses the possible barriers to change and theories in attempt to explain the effects of education on proenvironmental knowledge and attitudes among parents and their children.

Literature review

Introduction

As we all know environmental concerns have been ongoing and growing for many years with big reports and research like the modern U.S. environmental movement in the mid 1960's from inspirations like Rachel Carson (1962) and Aldo Leopold (1949). There is much research on people's knowledge and attitudes towards the environment, and environmental education, as will be discussed throughout the essay. There is however little research on children's influence on society and their parents in improving pro-environmental action.

The aim in carrying out this research is to look at the relationship between the parent and child's attitudes and knowledge towards the environment. The test will inform us on whether children can influence their parents in helping conserve energy by the knowledge and awareness they are taught in school. The green school energy program will be introduced to this school and they will be compared against a school not in the program.

Why do we need to take action?

This research was planned and carried out when our population was over 7 billion, World Population Balance (2014, para 1) tells us it has doubled in the past 45 years and is between 2-3 times higher than what the earth can sustain. Environmental problems are on the increase from rapid population growth, industrialisation and urbanisation, and the problem isn't just the population growth it's human behaviour.

The energy people go through on a daily basis is releasing carbon dioxide into the earth's atmosphere which is increasing global warming. Environmental protection Agency's (2014, para 2) research tells us the average temperature has risen by 0.7% between 1890 and 2009. It is evident that there is a change in the eco system with growing seasons and increased

rainfall. Figure 1 below illustrates the substantial increase in electricity consumption going from 18.42 (billion kWh) to 26.1 in just 12 years.

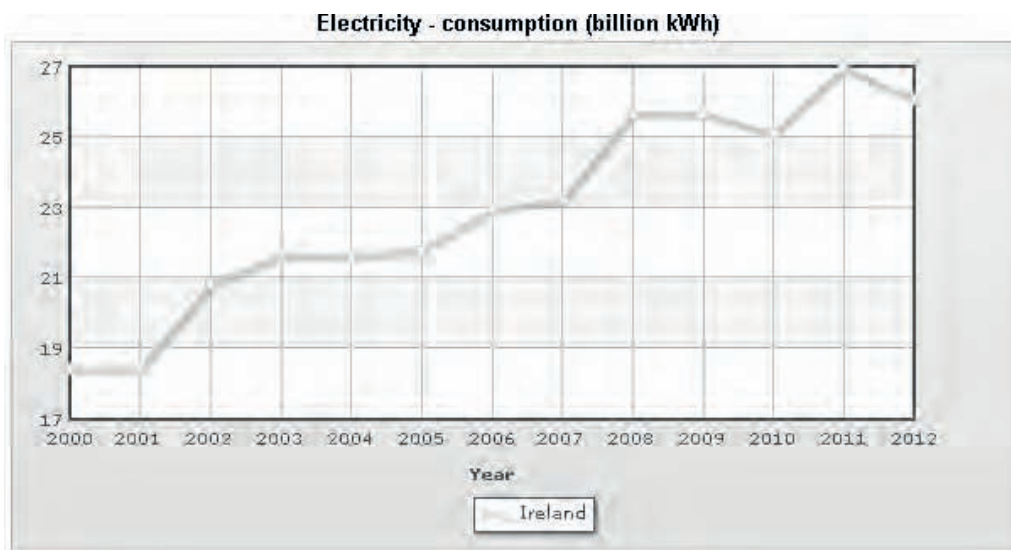


Figure: 1 Electricity Consumption between 2000 and 2012

Source: Index Mundi 2014

The impact of climate change in Ireland includes intense storms and rainfall, flooding in coastal areas where most of our towns are situated, water shortages, and extinction and change in distribution among certain species (The Nature Conservancy, 2014).

There are agreements put in place to help with reducing greenhouse gas emissions, such as the Kyoto Protocol, which is active within 15 EU countries. They are in good progress with reduced emissions by 8% between 2008 and 2012 from figures in 1990, and have a plan of reducing by 20% its base year level by 2020 (European Commission 2014, para. 3). This knowledge is not widely available enough to the human population; it could be very encouraging to pro-environmental attitudes as some people feel there is very little they could do to make a difference due to industry and businesses causing a large proportion of the problem of energy usage and greenhouse gases. Throughout this project it will be highlighted what impact knowledge has on pro-environmental behaviour.

What will also be addressed is the importance in understanding what motivates people to preserve and conserve our natural environment, and with this in mind we are going to put forward (a) the impact of a school environmental program on children's knowledge and attitudes in energy conservation and (b) their influence on their parents in the fight to reduce energy consumption.

Evaluating the Green Schools Program

Ireland has made collaborative efforts to improving its environment and reducing greenhouse gas emissions to meet climate change goals is a key issue.

Even though Ireland's use of renewable energy has improved since 2003 it still has a very high ranking in the E.U for dependency of fossil fuels for electricity generation. Green Schools Ireland, known as Eco schools internationally is coordinated and operated by the environmental Education Unit An Taisce. It is a whole school action for the environment with 6 themes in sequence, litter and waste, energy, water, travel, Biodiversity and global citizenship (Green Schools Ireland, 2014).

Eagles & Demare (1999) discusses how attitude structures are well formed by the end of high school; major change occurring most readily in the younger years. Attitude flux occurs throughout youth, up to the early teen years. At this time the attitudes solidify and become much less amenable to change. The key influences--talking at home, watching films, and reading--occur at home and at school. They are long term and continuous. Educating children at primary school level on environmental awareness can possibly lead to pro-environmental attitudes on a long term and continuous basis.

Evans & Gill (1996) also discusses how children's perceptions can become increasingly negative as they get older and even superficial during college years from possible misconceptions on major environmental matters.

Education is a way in attempting to prevent many problems that today's society are faced with, not only the environment. A study showed how the effects of a health education and stress management program yielded significant results in the reduction in cardiac mortality and positive effects on blood pressure, cholesterol, body weight, smoking eating habits and physical exercise (Dusseldorp et al, 1999). Another study assessed the relationship between knowledge, attitudes and intentions with self-efficacy beliefs to HIV and pregnancy prevention among a large number of secondary school students. A mastery structure in health education classes lead to a more positive attitude in waiting to have sex, knowledge about HIV and the student communication with parents (Anderman et al., 2011).

The green schools program focus is that the interventions aim to change children's basic environmental awareness through education in the hope that it will be long lasting. The question is however; can they encourage adult's pro-environmental behaviour?

Green-Schools Ireland (2013, para 5) state that they;

are an initiative of and co-ordinated on an international level by, FEE (Foundation for Environmental Education)? Currently, the Programme is being implemented in over 50 countries around the world, involving over 40,000 schools, 11,000,000 students, 850,000 teachers and 5,700 local authorities.

Scoil an Spioraid Naoimh in Bishopstown in Cork carried out an energy survey and and estimated a decrease of 12% on heating bills from 2009 to 2010 (see figure 2).

The school was on phase 2 of green school program on energy.

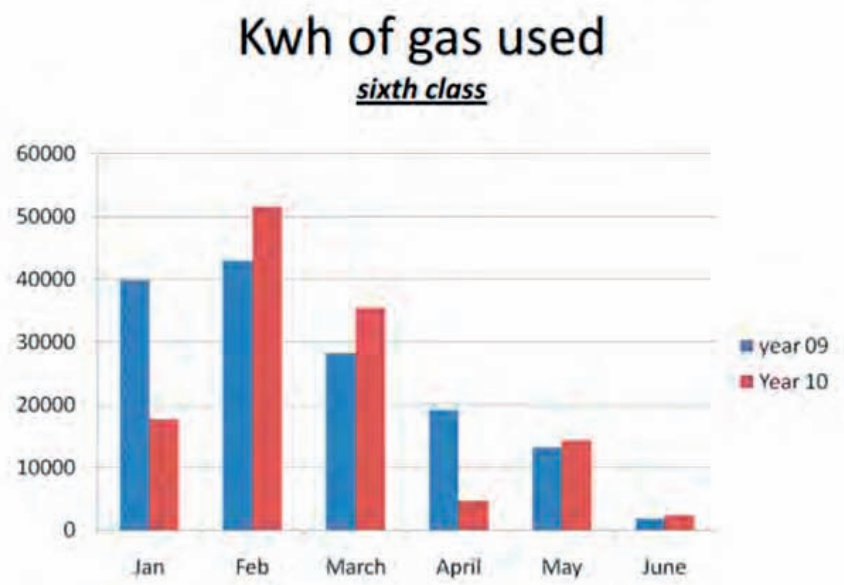


Figure 2: Difference Between 2009 and 2010 kWh of gas used

Source: Green School Ireland 2010

Theory of planned behaviour and other possible theories

Psychologists inform us of how education is more likely to work if it doesn't clash with people's values and ethics like security, fresh food and quality family time.

Rachel Carson (1962) wrote one of the most widely read books on educating people on the problems in the environment and how to change behaviour towards the environment. She was specifically targeting the dangers of pesticides. Carson's message worked because it does not change people's basic values, giving up pesticide use didn't mean giving up something valuable like fresh food. (Gardner & Stern, 2002, p. 74).

Harland et al (1999) proposed an interesting theory of Value Beliefs Norms (VBN). This theory states that the individuals norms are shaped by their beliefs and in turn are influenced by their values of interests and the interests of others (Gabler et al, 2013, p. 162). So in saying this, in relation to the environment, a person's moral norms and values are dependent on environmental altruistic behaviour. They are explained through awareness of consequences of

an action and the responsibility the person takes over their actions towards the environment (Gabler et al., 2013).

Stern et al. (1993) explains that when people are faced with environmental issues they ask themselves “how is it likely to harm me or anything I value”? If it does there is a sense of moral obligation to take what action is needed. He also found that peoples values correlated with their behaviour and that their willingness to act is affected by their beliefs about the adverse effects of the environments conditions (Gardner & Stern, 2002). They went on to say that if people were to understand the consequences of their actions that their beliefs and values towards the environment might change. Barr et al (2003, p. 419) supports this stating, “People were more willing to recycle if they were concerned about the waste problem”.

Aguilar-Luzón et al (2012) carried out a study in comparing the (VBN) with the well-known theory of planned behaviour (TPB). It was tested among Spanish housewives regarding glass separating behaviour. The theory of planned behaviour is based on personal attitudes and beliefs that are shaped by experiences and subjective norms, this implies there are external factors influencing behaviour. With the theory being expanded on further by Ajzen and Fishbien (1975) it lead to there being an internal factor also in that people do believe their actions make a difference. The study showed that the theory of planned behaviour is a more suitable theory for exploring environmental behaviour as it fit the empirical data better than the VBN.

(Nigbur et al (2010) describes another study that would back up this theory and have findings useful to the extension of the TPB. This study predicted that recycling behaviour can be predicted by aspects of the theory of planned behaviour. It gave much support to self-identity to the prediction of intentions and behaviour and that injunctive norm can also encourage behaviour (Nigbur et al., 2010).

Barriers to change

One of the many barriers in changing attitudes in favour of reducing energy consumption among adults are what they believe to be an expense (for example upgrading you insulation) when on the long term it will save on bills. Conflicting evidence suggests however that people were willing to pay higher taxes where necessary due to environmental concern between 1993 and 2002 (Motherway et al, 2003) .Geller (1981) conducted a study on the correlation between attitudes and behaviour. He discovered people had showed a positive change in their beliefs and attitudes in energy conservation after being educated in the area, but when investigated found that it was not translated into pro-environmental behaviour (Gardner & Stern, 2002)

The external barriers would not however have much if any effect on children in learning about the effects of the excessive energy consumption is having on the environment, or in expressing a more proenvironmental attitude.

Gardner & Stern, (2002) discusses how internal barriers however can have an effect on the children, as lack of information is a big barrier and that simple straightforward information can have a positive impact.

Gardner & Stern(2002,p.76) states “the more of these barriers that exist, the less difference a strong attitude in favour of saving energy will make in terms of behaviour”. The program teaches children why, how and what energy conservation is all about from simple tasks like turning off taps to turning down heat. So if the internal barriers among the children are resolved in school through the green school intervention is it possible that they can influence their parents to be more pro-environmental at home?

Evaluating Children's influence

Children can be extremely motivated to carrying out energy projects. Studies have shown that environmental action has been put in place from pressures of students (Evans & Gill, 1996). The findings also showed when there was an environmental class given in school, parents were influenced to recycle more from pressures from their children. Another study testing a similar school environmental program showed a significant change in attitudes after an environmental program however no significant effect on their knowledge, a significant change was also evident in pro-environmental behaviour amongst the parents compared to a control groups (Leeming et al, 1997).

Recognition and feedback to children for their work and efforts has for decades been known to have a positive effect on children as famously researched by Skinner. His theory of operant learning, explains how to be motivated to save energy the action that people take needs to be rewarded frequently, just before or after the action and the feedback needs to be in direct relation to the behaviour (Gardner & Stern (2002, p. 83). They also mention internal barriers like laziness or forgetting, could the children tighten the links between attitudes and behaviour in the household, Reminding parents about lights, heating, water etc.? Maybe even taking note on metre readings and informing parents on the family energy usage on a day to day basis? Gardner & Stern (2002) made a valid point stating that those that receive feedback on their efforts to reducing energy in their homes show a stronger commitment, than those that were asked to make a commitment but received no energy-use feedback.

The plan of the green school intervention is to overcome the internal barriers of lack of information on the children's environmental knowledge and then onto their parents also. This research does not involve external barriers like expense or even time. The intervention consists of low cost, simple and effective actions that can be taken together as a family like using less water or walking to school or getting a bus.

Ajzen & Fishbien (1980) Theory of Reasoned Action, an important theory in the lead to the modification of TPB explains how people intent to perform behaviour when it's positively evaluated and they believe important others think they should perform it. Children's important others like teachers and parents have a considerable role to play in the child's subjective norms. This theory is designed to predict volitional behaviour and recognize its psychological elements(Ajzen, 1985, p. 12). There are however internal and external barriers that can influence volitional behaviour even for children and these barriers are mainly subjective of their important others like lack of enthusiasm or acknowledgement of their efforts, negative attitudes towards the environment, and also not receiving the subsequent knowledge on environmental needs and problems to take the action.

Rationale

Traditionally the adults tend to be the educators, but as Evans (1996) pointed out children are aware of environmentally friendly actions and can have an influence on adults. In addition to this research the current study will have a control group not receiving the environmental education program to evaluate the impact of the program on the children knowledge and attitudes towards energy and the environment.

Derksen & Gartrell (1993) shows us another study of interest to the current research, as 2 different cities were tested for recycling activity one with access to a recycling program and the other with no access. There was a significant difference in recycling activity in the city in the program. The current research will expand on this in testing 2 schools side by side and consisting of parents and children living in the same community so it will give a general outlook of the knowledge and attitudes in that community, and on the relationship between the children and their parents knowledge and attitudes towards energy conservation. As mentioned a large amount of the research covers changes in recycling behaviours, the recycling phase 1 in the green schools program is one year long, and plan and effect can be

completed in that time, the energy program however has more involved and is completed in 2 years (Green Schools Ireland 2014).

There are many studies on adult's knowledge and attitudes towards environmental behaviour naming a few above, but there is a lack of research among children in relation to these topics. Considering these few studies, there is some evidence that environmental education can have an impact on children's knowledge and attitudes and possibly translate into the home and onto the parents. The current research is going to expand on the research in this area by evaluating the green school program on the children's knowledge and attitudes towards energy conservation and also the impact they may possibly have on their parents after the program.

Aim and Hypothesis

This research will provide us with an insight on the impact of the green schools action on energy by comparing the control group school (non-green school) and the experimental school (green school). It will also be tested to see whether the children and the parents' scores on the questionnaires correlate on their attitudes and knowledge both before and after the energy program.

The objectives of this study are that when the children are educated in energy usage and concerns for the environment, and educated in taking action to rectify these problems, that they will influence their parents in their knowledge and encourage taking these actions in the home also.

Is there a relationship between children's attitudes and knowledge and that of their parents? And does the green schools program have an impact on people's attitudes and knowledge to the environment. It is hypothesised that:

1. There will be a relationship between the children's knowledge and attitudes and that of their parents both before and after the green schools programme on energy.
2. It is also hypothesised that there will be a significant difference in the knowledge and attitudes on energy resources between school 1 the school receiving the intervention, and school 2 the school not receiving the intervention.
3. It is hypothesised that there will be little or no differences in the knowledge and attitudes of environmental concerns with school 2 (not receiving the intervention) between time one and time 2. Also, that there would be a significance difference from the green school receiving the intervention between time 1 and 2.

Methodology

Participants

The study was carried out between September 2013 and March 2014.

The participants for this study were an opportunity sample and can be considered to be a good representative of Dublin but and a strong representative of this particular area of Dublin. The participants taking part in the program consisted of 4th, 5th and 6th class (n=170) attending an Educate Together School in Tyrrelstown in the West of Dublin and their parents (n=170), the experimental group (n=340) that will receive the green school program. 162 pupils completed the full experiment and 81 parents took part at time 1 and time 2 from the experimental school.

The control group consisted of 4th 5th and 6th class students and their parents from a catholic school, neighbouring the Educate Together School. The control groups students (n= 125) and their parents (n=125) participated in the control group not receiving the intervention. From the control group 94 children completed time 1 and time 2 questionnaires and a 28 parents filled in the survey at the 2 time points. The children were all eligible for the study and could understand questions and instructions. The majority of the children and parents taking part in this study live in the Tyrrelstown area, which could give us a general consensus of the knowledge and attitudes in the area with and without the intervention.

A factor that may affect the outcome of the study is that even though there is some control over receiving most if not all the children's surveys there is a lot less control over receiving the adults surveys as they will be sent home with the children and may not send them back. The number of parents that return the questionnaire can have an impact on the overall differences between the 2 schools, considering that there are 81 parents from the

experimental school and 28 from the control school that completed the full study this will have an effect on the overall results; uneven sample size can lead to sampling error.

Another factor that may affect the outcome of the study is that the experimental school are one year into the green school program, and even though the first year involves recycling there is a possibility it may have an effect on their attitudes before the energy intervention in comparison to the control school.

Design

For hypothesis 1, a correlational design investigated if there is a relationship between the children's knowledge and attitudes and that of their parents before and after the programme.

For this design the predictor variable (PV) is both the attitudes and the knowledge of the children and the criterion variable (CV) is the knowledge and the attitudes of their parents.

For hypothesis 2 and 3, this is based on quantitative research and is a true experimental mixed design using both the between factor, hypothesis 2: measuring the difference between school 1 (experimental group) and school 2 (control group), and the within subjects design to measure time 1 and time 2 (hypothesis 3). It will be well controlled experiment with only the experimental group receiving the intervention.

The variables used for this mixed design is an independent variable (IV) and a dependant variable(DV). However there are 2 different types of variables to measure, both knowledge and attitudes. The IV's will be in both cases the exposure to the intervention, the green school program. The DV is the attitudes and knowledge score on time 1 versus the attitude score on time 2, and also the knowledge score at time 1 versus the knowledge score at time 2.

Materials

All instruments are accessible to the participants for filling out the questionnaire. We will be taking a percentage of the measures from the Children's Environmental Attitudes and Knowledge Scale for our measure and the CHECKS scoring rubric. (Leeming, F. C., Bracken, B. A., & Dwyer, W. O., 1995). Harraway et al (2012) discusses how this revised NEP is valuable and suitable for children. Wu, (2012) also supports the NEP with the younger age groups between 10 and 12 which are the target age group in the current research.

The subscales chosen from the children's environmental scale were handpicked to suit the green school program on energy. Each question is measuring knowledge and attitudes towards energy usage and water. There were subscales concerning animals and general issues for example "I would be willing to stop buying some products to save animals lives". These were left out of the scale for this study as they are not relevant to the intervention and the study. There are 12 subscales measuring attitudes and 6 subscales measuring knowledge. The attitudes subscales are measured on a Likert scale from 'very true' giving a rating of 5 to 'very false' giving a rating of 1, for example, "I would be willing to save energy by using less heating". And the knowledge subscales are questions with 5 possible answers. For example, "which is an example of a renewable resource? (a) nuclear (b) oil (c) wood (d) uranium (e) solar.

There were some subscales that needed to be slightly altered to suit the population, for example: "I would not be willing to save energy by using less air conditioning" was changed to "I would not be willing to save energy by using less heating", this was due to the consistency of central heating being used in Ireland over air conditioning.

"To save water, I would be willing to use less water when I bathe" was also changed to "To save water, I would be willing to use less water when I have a bath or a shower". The

following was only changed for the parent's survey "I have talked with my parents about how to help with environmental problems". To "I have talked with my children about how to help with environmental problems.

From the knowledge subscales the following were changed "Which is an example of a perpetual energy source? To "Which is an example of a renewable energy source? It is less complicated for the children to understand. Also the subscale "Which uses the most energy in an average house in the United States? Was changed to "Which uses the most energy in an average house in Ireland? And one of the options to answer this was "a refrigerator" was changed to "Fridge".

A number of the subscales were negatively worded and these were reversed scored by hand while inputting the data into spss they were not recoded.

According to (Peterson, 1994) the attitudes scale has a weak internal consistency with a Cronbach alpha coefficient reported of .67 in the current study has a Cronbach alpha coefficient of .7 for values and beliefs. The knowledge scale was also tested to have a weak internal consistency with a Cronbach Alpha coefficient reported of .58.

Procedure

A consent form was provided and signed by the principal of both schools, before the surveys were given to the children.

Each class was visited and informed that they are been given the opportunity to take part in an environmental awareness survey and it consists of questions on your knowledge and awareness of energy consumption and the environment. There were a couple of classes the experimenter did not get to hand the surveys out to the children, in this case the teacher was provided with exact instructions on what to do and say to the children during the survey process. The teacher had been prepped on this. The survey and how to fill it in was described

in detail to the children, answering any questions throughout the lesson like “what if we don’t know the answer”? They were also informed that the surveys were anonymous. The children then put their date of birth on their survey and their parent’s survey; they then put the parent’s survey in their bag and began to fill theirs out. The procedure of getting around each class took 2 days for each school, and instructing informing and filling out the survey took approximately 15 minutes for each class. The children then returned their parents survey back within a week with a few at a later stage.

The parent’s instructions consisted of the experimenter’s name and details including contact in case of any questions, also stated was that the survey was for gathering data on environmental awareness, that it is an optional survey for senior pupils and their parents, and by filling in this optional survey they are consenting to taking part in this study, and have a right to withdraw at any time. All research data gathered from this survey will be treated sensitively and no identifiers (i.e. date of birth) will be used in class or in any other publications, and to feel free to address any questions regarding this research to the details above. The final instruction was to answer the following questions by choosing the options provided. Answering as truthfully as possible, And to match the parents and children’s answers the student’s date of birth must be in the space provided.

Once the time 2 surveys were returned the children were all debriefed on the exact reason why their parents and their surveys had to be matched up and that they would be informed of the results as soon as they are ready.

Results

Hypothesis 1

For hypothesis 1 a Pearson's correlation was conducted to test the relationship between the children and their parents on their knowledge and attitudes both before and after the green school energy program.

Table 1:

A Pearsons Correlation displaying the Relationship between the Children and the Parents of the Experimental group on their Knowledge and Attitudes pre and post intervention.

Variable	Parent Attitude Time 1	Child Attitude Time 1	Parent Knowledge Time 1	Child Knowledge Time 1	Parent Attitude Time 2	Child Attitude Time 2	Parent Knowledge Time 2	Child Knowledge Time 2
Parent Attitude Time 1		.316**						
Child Attitude Time 1	.316**							
Parent Knowledge Time 1				-.009				
Child Knowledge Time 1			-.009					
Parent Attitude Time 2						.278**		
Child Attitude Time 2					.278**			
Parent Knowledge Time 2								.073
Child Knowledge Time 2							.073	

**Correlation is significant at the 0.01 level (two tailed)

*Correlation is significant at the 0.05 level (two tailed)

Table 1 shows a correlation table which was only conducted with the experimental group to show if the intervention the children took part in had any influence on their parents. The Pearson's correlation demonstrates that there is a significant relationship between the children's attitudes on the energy program at time 1 $r(94) = .002$, $p = .316^{**}$ and after the program $r(114) = .003$, $p = .278^{**}$. Therefore the null hypothesis can be rejected.

The correlation did however discover that there was no relationship between the children and their parents in their knowledge on the energy program both before the program $r(95) = -.009$, $p = .928$, or after the program $r(114) = .073$, $p = .441$. Therefore the null hypothesis cannot be rejected in relation to the knowledge variable. When testing the relationship between parents and children of the non-green school the Pearson's correlation demonstrated that there is a significant relationship between them on knowledge scores at time 1 $r(38) = .035$, $p = .344^{**}$ and at time 2, $r(52) = .003$, $p = .409$.

Hypothesis 2

An Independent t-test was conducted to test hypothesis 2, the differences between the 2 schools. Parents attitudes between the experimental group (refer to table 2 for Mean and SD) were not significant to the control group at time 1, 95% confidence intervals shows that the population mean difference of the variables at time 1 lies somewhere between -1.63 and 2.23.

However at time 2 the independent t-test showed that there was a statistical significance in parent attitudes between the experimental school and the control school with 95% confidence intervals showing that the population mean difference lies somewhere between 4.00 and 6.67; therefore the null hypothesis can be rejected. Consequently the remaining variables cannot be interpreted due to them not being equal or non-significant to begin with.

Table 1 :

An independent sample t-test table displaying the differences between the school receiving the green energy program (experimental) and that that are not receiving the program (control).

Variables	Groups	Mean	SD	t	df	P
<u>Time 1</u>						
Parent Attitude	Experimental	46.28	5.54	.309	132	.758
	Control	45.98	4.17			
Parent Knowledge	Experimental	28.55	6.76	3.09	52.37	.003
	Control	23.08	10.17			
Child Attitude	Experimental	44.26	7.12	1.27	265	.205
	Control	43.17	6.23			
Child Knowledge	Experimental	18.11	8.34	3.97	266	.000
	Control	13.84	8.81			
<u>Time 2</u>						
Parent Attitude	Experimental	51.70	5.00	7.19	136.3	.000
	Control	48.37	3.51			
Parent Knowledge	Experimental	28.58	6.74	2.96	164	.004
	Control	25.27	6.54			
Child Attitude	Experimental	44.49	6.43	1.58	258	.115
	Control	43.20	6.24			
Child Knowledge	Experimental	21.94	6.34	7.18	258	.000
	Control	15.15	7.44			

Hypothesis 3

To test hypothesis 3 a paired sample t-test (Table 3, below) gave the differences in scores from the experimental school and the control school pre and post intervention.

Table 2:

A paired sample t-test table displaying the differences pre and post intervention, with both parents and children of both schools (1=experimental school, 2= control school) on their scores on knowledge and attitudes on energy conservation.

Variables	School	Groups	Mean	SD	t	df	P
Parent Attitude	1	Time 1	46.44	5.51	-12.96	79	.000
		Time 2	51.56	5.44			
Parent Knowledge	1	Time 1	28.81	5.51	.552	80	.582
		Time 2	28.52	5.44			
Child Attitude	1	Time 1	44.30	7.19	-.578	161	.564
		Time 2	44.47	6.44			
Child Knowledge	1	Time 1	18.04	8.26	-7.501	161	.000
		Time 2	22.04	6.23			
Parent Attitude	2	Time 1	45.50	4.46	-2.13	27	.042
		Time 2	46.89	3.69			
Parent Knowledge	2	Time 1	24.21	11.01	-.273	27	.787
		Time 2	24.64	6.99			
Child Attitude	2	Time 1	43.10	6.20	.126	93	.900
		Time 2	42.99	6.21			
Child Knowledge	2	Time 1	13.58	8.58	-1.847	94	.068
		Time 2	16.17	7.22			

The mean score for the experimental group on their knowledge scores at time 2 (refer to table 3) was significantly higher than the mean score at time 1. The 95% confidence limits show that the population mean difference of the variables lies somewhere between -5.05 and -2.95. The paired sample t-test showed that there was a significant difference between the children's knowledge at time one and 2 among the experimental school. Therefore the null can be rejected. The paired sample t-test also showed that the parents attitudes from school 1 (experimental) has a mean (table 3) difference higher at time 2 than time 1 with 95% confidence intervals showing the population mean difference lies somewhere between -4.34

and -12.96. The t-test showed us that there is a significant difference in parent's attitudes between time 1 and time 2 with the experimental school.

Discussion

The aim in carrying out this research was to look at the relationship between children and their parents and their attitudes and knowledge towards energy and the environment. The test informed us on whether children can influence their parents in helping conserve energy from the green energy program implemented in school. They were also compared against a control group, a school that have not been introduced to the program at all. The second phase of the program is on energy and this is what both schools were tested on.

Hypothesis 1: the child parent relationship on environmental knowledge and attitudes.

It was hypothesized that there would be a relationship between the children's knowledge and attitudes and that of their parents both before and after the green schools programme on energy. In relation to the parents and children's attitudes the study supports this, finding a significant relationship before and after the program.

There was however no significant relationship found among the children and parents knowledge. It appears in the descriptive statistics that the parents got more of the knowledge questions correct than the children at time 1 but there was no change at time 2 with the parent's scores. The children's scores improved at time 2 but still were not as high as the parents. It is possible also that the parents could have influenced the children higher scores in knowledge at time 2, there is little evidence to show that the children had an influence on their parents, as the tests would need to show a significant difference between time 1 and 2 with the children's scores and also a strong relationship between the children and parents at time 2. In correspondence with these findings it's important to mention that the effects of these results may possibly be down to internal barriers. As discussed children's biggest barrier to change is lack of information. It was noticed from discussion with the teachers that some showed lack of enthusiasm and effort in the application of the green school program

and had no action plan in place (Green School Energy Action Plan,(2014). As Gardener & Stern (2002) stated the more barriers that exist the less difference a strong attitude will make.

Hypothesis 2: the differences between the green school and the non-green school.

It was hypothesized that there will be a significant difference in the knowledge and attitudes on environmental energy conservation between school 1 the experimental school, and school 2 the control school.

In correspondence to this the parent's attitudes appeared to be better from the experimental school than the control school. Leeming, F. (1997) study supports these findings with changes in attitudes between schools but no significant change in knowledge.

With little evidence showing that there was no influence from the children and the green school program in translating their knowledge and attitudes to their parents, the theory of planned behaviour can possibly explain the change in parents attitudes from the experimental school at time 2, the environmental survey persuading a change in attitude, not so much gaining information but a reminder of what they are already knowledgeable about? Interestingly the majority of the variables among the two groups (see table 2) did not appear to be equal to begin with. Post intervention there was a difference on the knowledge scores before the intervention was introduced, so the knowledge differences are not reliable. Also at time 2 the children's attitudes in the green school appeared to improve however it was not significant, whereas the parent's attitudes from the green school were significantly better than the non-green school after the intervention. For the variables we can interpret, the findings support this hypothesis, however the significance is weak.

In another attempt to explain the attitude change in the adults, the Value Belief Norm can be a possible explanation these findings. The parents change in attitudes and possibly behaviour, developing from becoming more aware of their actions and changing their attitudes towards the environment. Geller (1981) would however contradict this from his research showing that

beliefs and attitudes may not translate into pro-environmental behaviour. When this was tested further between the 2 variables on water it showed that there was no significant relationship between the subscales “I turn off the water in the sink while I brush my teeth to conserve water.” and. “I am not worried about running out of water.”

Hypothesis 3: pre and post intervention

It was hypothesized that that there will be little or no differences in the knowledge and attitudes of environmental concerns with school 2 (non-green school) between time 1 and time 2, Also, that there would be a significance difference from the green school receiving the intervention between time 1 and 2.

The findings of the present study partially support this hypothesis as the results showed that the intervention had a significant effect on the children’s knowledge and awareness on energy conservation, however it appeared to have little effect on their attitudes. The findings also support the hypothesis as there was no significance in the children’s knowledge or attitudes post intervention with the control school. The parents in the experimental group also appeared to have a better attitude after the intervention but had no significant change in their knowledge scores. These findings are not in support of Eagles & Demare’s (1999) research. The children did not go through major attitude change, in relation to the green schools intervention over the period of six months, there were however changes among the parents. With considering Ajzen and Fishbien (1975) theory of planned behaviour/reasoned action the children’s attitudes towards energy conservation should have significantly improved, this was not the case. Internal barriers very possibly are consequence in preventing this study from having a significant result across tests as each and every child, parent and teacher could have a different barrier to change, whether it is a lack of information, habit, inconvenience etc. is unclear(Gardner & Stern, 2002, p. 159). An interesting point here is that the children’s knowledge scores were significant after the intervention but it did not translate to the parents

as the relationship between them on their knowledge scores did not correlate. The significant relationship between their attitudes however is reassuring as there was no relationship among the children and parents of the non-green school, so the findings provide an understanding that the children and the green school program are possibly having some impact on the parents and family home.

Limitations

Strengths

This was the first study to look at the effect children's knowledge and attitudes that are introduced to the Irish green school energy program have on their parents. The main strengths to the current study is that there is a large sample size (n=545), and a good gender balance and age variance among the children. As popular as the green school program is throughout Ireland this is the first study carried out in relation to parent-child correlations and energy. Strength to this study is that both schools are neighbouring each other so the study is a good sample of the population of that community. The principals are also very cooperative and keen on future environmental research.

Weaknesses

One of the main weaknesses of this study is the lack of enthusiasm within the control school (n=207) in comparison to the experimental school (n=338). There were only 28 parents from the control school that filled in the questionnaire for both time 1 and 2, making the results on parents knowledge and attitudes between the 2 schools somewhat biased. Also one of the teachers didn't give the questionnaire to the children at all.). A negative implication of this study is that the experimental group had some previous environmental experience before the energy program. As shown in table 3 the program had an impact on the school when comparing it to the scores from the control school, so the control school were at a

disadvantage to begin as the green school recycling program the year before may have had an influence on the experimental school.

Another weakness in this study was the parent's age and sex was unavailable, as even though it was requested for on the front of the survey the majority of parents entered their child's sex and age in error from unclear instruction.

The energy program is normally educated over the space of 2 years. In accordance with the Green School Ireland (2013) the first few months are important in organising an action plan in the classrooms so the children have goals to achieve and are motivated to do so. Green schools Ireland have many resources and implementations available to help the teachers along. the green school however for the current study showed a very weak foundation to show much significance after 6 months, as many teachers did not have an action plan in place or were seen to be using any of the green school energy resources like appliance audits, meter readings or recording light usage (green schools Ireland, 2014

Future research

As the energy green school program is educated over the space of 2 years future research for the program would be for the program to be in production for at least one year before testing the same hypothesis and carrying out time 2 tests. Even though tests have shown to make a significant effect over this same time period they were studies for recycling which is a shorter program (Evans & Gill, 1996)

It may also be a suggestion to have an action plan in place for the teachers and children to follow to test on what classes are more enthusiastic making more effort and the effect it has on their attitudes and knowledge and that of their parents.

“Educational programs are more effective when they are designed according to the psychological principles of communication and also directly address the links between attitudes and behaviour”(Gardner & Stern, 2002, p. 93). Educating the parents through the

children can work better with other interventions put in place, like feedback. Because there is often more than one barrier to any positive environmental behaviour instead of a single theory, combined interventions could work better. Gardner & Stern, (2002, p. 159) mention the success of the Hood River Conservation Program how it provides information, incentives and community management. For the children and parents to notice an effect on their behaviour an electricity monitor sent home by the children could be effective. These monitors have shown a reduction in electricity between 5 and 10% (Patricia Frazer, 2010). With this in place along with information from the children on how the reduction in electricity is helping the environment and how much can be saved, it could also strengthen the normative messaging and the subjective norms among children and parents throughout the school and community (Nolan, 2008). the monitor could also help this study in eliminating the value-action gap on attitudes and actions in that people may state one thing but do another (Fahy, 2005). There is nothing in the study to show if the behaviours are really changing. Unfortunately, the distant and sometimes invisible negative consequences of environmentally damaging behaviours seem to be overpowered by the relatively immediate and certain reinforcers of comfort and convenience (Lehman & Gellar, 2004).

Application/implication

The green school committee that took part in the program are very interested in carrying out this study again in approximately one year. They plan to write up a newsletter on the results and the effects the program has on the school, the children and their families, which will be sent home to parents. This will be of great benefit to the whole community and to green schools Ireland also.

The study can also aid the teachers in discovering what the children do and do not know in relation to energy conservation. And discreetly discover their attitudes towards pro-environmental behaviour.

Conclusion

Given that environmental degradation threatens the well-being of all inhabitants of our planet, environmental preservation may be one of the most important social issues of our time. In conclusion to this study unfortunately there is no evidence to suggest that children had an influence on their parents when introduced to the green energy program, these findings did not however come without its limitations as the intervention had not been fully completed. The green school program does show to have an impact on the experimental school in comparison to the control group however this is inconclusive as the knowledge scores of both groups were not equal in the first place. Considering the evidence however that there is a relationship among the children and parents attitudes of the green school that does not appear with the non-green school, we can speculate that the green school program is making a difference even though it may not all lie with the energy awareness(phase 2) yet. For the limited time span for this study it still shows changes among the children and the parents of the green school. To repeat this study when the intervention is complete would only be a more confident contribution to the current research.

References

- Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckmann (Eds.), *Action Control* (pp. 11–39). Springer Berlin Heidelberg. Retrieved from http://dx.doi.org/10.1007/978-3-642-69746-3_2
- Anderman, E. M., Cupp, P. K., Lane, D. R., Zimmerman, R., Gray, D. L., & O’Connell, A. (2011). Classroom Goal Structures and HIV and Pregnancy Prevention Education in Rural High School Health Classrooms. *Journal of Research on Adolescence (Wiley-Blackwell)*, 21(4), 904–922.
- Barr, S., Ford, N. J., & Gilg, A. W. (2003). Attitudes towards Recycling Household Waste in Exeter, Devon: quantitative and qualitative approaches. *Local Environment*, 8(4), 407.
- Derksen, L., & Gartrell, J. (1993). THE SOCIAL CONTEXT OF RECYCLING. *American Sociological Review*, 58(3), 434–442.
- Dusseldorp, E., van Elderen, T., Maes, S., Meulman, J., & Kraaij, V. (1999). A meta-analysis of psychoeducational programs for coronary heart disease patients. *Health Psychology*, 18(5), 506–519.
- Eagles, P. F. J., & Demare, R. (1999). Factors Influencing Children’s Environmental Attitudes. *Journal of Environmental Education*, 30(4), 33.
- Environmental Protection Agency (2014). Climate change : Environmental Protection Agency Ireland. Retrieved from:
http://www.epa.ie/climate/communicatingclimatescience/whatisclimatechange/whatimpactwillclimatechangehaveforireland/#.UxT00_1_uM4
- Evans, S. M., & Gill, M. E. (1996). Schoolchildren as educators: The indirect influence of environmental education in schools on... *Journal of Biological Education (Society of Biology)*, 30(4), 243.

- Fahy, F. (2005). The right to refuse: Public attitudes and behaviour towards waste in the west of Ireland. *Local Environment*, 10(6), 551–569.
- Frank C. Leeming, Bryan E. Porter, William O. Dwyer, Melissa K. Cobern, Diana P. Oliver. (1997) *Effects of Participation in Class Activities on Children's Environmental Attitudes and Knowledge*. Vol. 28, Iss. 2.
- Frazer, P (2010). Using Behavioural Analysis to Reduce Domestic Fuel Consumption in Northern Ireland: Feedback and Goal setting Intervention to conserve Electricity. *Faculty of life and health Sciences*.
- Gabler, C. B., Butler, T. D., & Adams, F. G. (2013). The environmental belief-behaviour gap: Exploring barriers to green consumerism. *Journal of Customer Behaviour*, 12(2/3), 159–176.
- Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior*. Boston, MA: Pearson Custom Pub.
- Green School Ireland (2010) Green-Schools Theme 2 Energy. Retrieved from:
http://www.greenschoolsireland.org/_fileupload/energy%20resources/Energy%20module.pdf
- Green Schools Ireland (2014). Appliance audit. Retrieved from:
http://www.greenschoolsireland.org/_fileupload/energy%20resources/Appliance%20Audit.pdf
- Green Schools Ireland, (2013) About us. Retrieved from:
<http://www.greenschoolsireland.org/>
- Harraway, J., Broughton-Ansin, F., Deaker, L., Jowett, T., & Shephard, K. (2012). Exploring the use of the Revised New Ecological Paradigm Scale (NEP) to monitor the development of students' ecological worldviews. *The Journal of Environmental Education*, 43(3), 177–191.

Index Mundi (2011, January 11) Electricity Consumption. Retrieved from:

<http://www.indexmundi.com/g/g.aspx?c=ei&v=81>

Irelands Energy 1990-2012. Retrieved from:

http://www.seai.ie/Publications/Statistics_Publications/Energy_in_Ireland/Energy-in-Ireland-1990-2012pdf

Lehman, P. K., & Geller, E. S. (2004). Behaviour analysis and environmental protection: Accomplishments and potential for more. *Behaviour & Social Issues*, 13(1).

Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is under detected. *Personality and social psychology bulletin*, 34(7), 913-923.

Peterson, R. A. (1994). A Meta-analysis of Cronbach's Coefficient Alpha. *Journal of Consumer Research*, 21(2), 381-391.

The Nature Conservancy (2014, January 12). Climate Change Impacts.

Retrieved From:

<http://www.nature.org/ourinitiatives/urgentissues/global-warming-climate-change/threats-impacts/wildlife-at-risk.xml>

World Population Balance. (2013). Current population is three times the sustainable level. Retrieved from:

http://www.worldpopulationbalance.org/3_times_sustainable

Wu, L. (2012). Exploring the new ecological paradigm scale for gauging children's environmental attitudes in China. *The Journal of Environmental Education*, 43(2), 107-120.

Appendix**Children's Survey****Environmental Awareness Survey (children's)**

Please answer the following questions by choosing the options provided. **Answer as truthfully as possible.** You do not have to fill the survey in if you choose not to, and can stop filling it out at any time if you want to.

To match the parents and children's answers **the student's date of birth** must be in the space provided.

Student Date of Birth



Age: _____

Male/Female _____

Using the scale below, please write the number that corresponds to how much you think each statement is true or false.

5	4	3	2	1
Very True	Mostly True	Not Sure	Mostly False	Very False

- ____1. I would be willing to save energy by using less heating.
- ____2. To save water, I would be willing to use less water when I have a bath or a shower.
- ____3. I would be willing to ride the bus to more places in order to reduce air pollution.
- ____4. To save energy, I would be willing to use dimmer light bulbs.
- ____5. I have talked with my parents about how to help with environmental problems.
- ____6. I turn off the water in the sink while I brush my teeth to conserve water.
- ____7. To save energy, I turn off lights at home when they are not in use.
- ____8. I leave the fridge door open while I decide what to get out.
- ____9. It makes me happy to see people trying to save energy.
- ____10. I am not worried about running out of water.
- ____11. I do not worry about environmental problems.
- ____12. It frightens me to think how much energy is wasted.

Now please circle the correct answer to each statement.

13. Burning coal for energy is a problem because it:
- Releases carbon dioxide and other pollutants into the air
 - Decreases needed acid rain
 - Reduces the amount of ozone in the stratosphere
 - Is too expensive
 - Pollutes the water aquifers
14. Which is an example of a renewable energy source?
- Nuclear
 - Oil
 - Wood
 - Uranium
 - Solar
15. Coal and petroleum are examples of:
- Fossil fuels
 - Renewable sources of energy
 - Energy sources that are plentiful
 - Alternative sources of energy
 - Recycled resources
16. Environmental problems are a threat to:
- Mostly people in small countries
 - Only people who live in cities
 - Only wild animals and endangered species
 - Mostly tropical plants and animals
 - All living things in the world
17. An example of a nonrenewable resource is:
- Petroleum
 - Trees
 - Ocean water
 - Sunlight
 - Animals raised for food
18. Which uses the most energy in an average house in the Ireland?
- Lights
 - TV
 - Hot water heater
 - Telephone
 - Fridge

Adults Survey

Environmental Awareness Survey (Parents)

My name is Niamh Murphy and I am **once again** gathering data on environmental awareness in the area. You may notice that the questions are the same as before which is important to the overall results. Again it would be very much appreciated if you could take the time to fill in my survey.

This survey is not from Tyrrelstown ETNS, it is an optional survey for senior pupils and their parents.

By filling in this optional survey you are consenting to taking part in this study, and have a right to withdraw at any time.

All research data gathered from this survey will be treated sensitively and no identifiers (i.e. date of birth) will be used in class or in any other publications.

Please feel free to address any questions regarding this research to me: Contact details:

Please answer the following questions by choosing the options provided. **Answer as truthfully as possible.** To match the parents and children's answers **the student's date of birth** must be in the space provided.

Students Date of Birth

Survey Questions

Using the scale below, please write the number that corresponds to how much you think each statement is true or false.

5	4	3	2	1
Very True	Mostly True	Not Sure	Mostly False	Very False

- ____1. I would be willing to save energy by using less heating.
- ____2. To save water, I would be willing to use less water when I have a bath or a shower.
- ____3. I would be willing to ride the bus to more places in order to reduce air pollution.
- ____4. To save energy, I would be willing to use energy saving light bulbs.
- ____5. I have talked with my children about how to help with environmental problems.
- ____6. I turn off the water in the sink while I brush my teeth to conserve water.
- ____7. To save energy, I turn off lights at home when they are not in use.
- ____8. I leave the fridge door open while I decide what to get out.
- ____9. It makes me happy to see people trying to save energy.
- ____10. I am not worried about running out of water.
- ____11. I do not worry about environmental problems.
- ____12. It frightens me to think how much energy is wasted.

Now please circle the correct answer to each statement.

19. Burning coal for energy is a problem because it:
- f. Releases carbon dioxide and other pollutants into the air
 - g. Decreases needed acid rain
 - h. Reduces the amount of ozone in the stratosphere
 - i. Is too expensive
 - j. Pollutes the water aquifers
20. Which is an example of a renewable energy source?
- a. Nuclear
 - b. Oil
 - c. Wood
 - d. Uranium
 - e. Solar
21. Coal and petroleum are examples of:
- a. Fossil fuels
 - b. Renewable sources of energy
 - c. Energy sources that are plentiful
 - d. Alternative sources of energy
 - e. Recycled resources
22. Environmental problems are a threat to:
- a. Mostly people in small countries
 - b. Only people who live in cities
 - c. Only wild animals and endangered species
 - d. Mostly tropical plants and animals
 - e. All living things in the world
23. An example of a nonrenewable resource is:
- a. Petroleum
 - b. Trees
 - c. Ocean water
 - d. Sunlight
 - e. Animals raised for food
24. Which uses the most energy in an average house in the Ireland?
- a. Lights
 - b. TV
 - c. Hot water heater
 - d. Telephone
 - e. Fridge

Information Sheet for Teachers

Information sheet for teachers

My name is Niamh Murphy and I am currently doing my final year psychology degree at Dublin Business School. My final year project is going to be research on the impact the Taisce Green Schools program has on the children's attitudes and knowledge on the environment and the influence they have on their parents. (The children don't need to know this information). As Tyrrelstown is in the 2nd year of the green flags I will be comparing the research of the 2 schools.

Thank you very much Liam for allowing me to gather the research and thank you all for your time and effort also.

Instructions

1. Tell the children they will be filling out a quick survey on environmental awareness.
2. That it is not a test. And they can stop filling it out at any time if they like.
3. They are not expected to know the questions and just have a guess if you don't know the answer.
4. Hand them out 2 surveys, copy 1(children's) and copy 2 (parents).
5. Ask them to put their Date of Birth on both copies.
6. Ask them to put copy 1 into their bag to take home.
7. Get them to fill in their copy.
8. Collect their copy and put in the folder provided.
9. Ask the children to take the other survey home to their parents to fill in and that the parents are to fill it out on their own. Putting the parents age and sex on the parents survey.
10. Ask the children to bring it back in the next day.
11. Put the data into the folder provided and file away.

DON'T HESITATE TO CONTACT ME IF YOU FEEL THE NEED:

THANK YOU MY FELLOW TEACHING EMPLOYEES

YOU HAVE MADE MY DAY 😊