Bulletin of the *Transilvania* University of Braşov - Special Issue
Series VII: Social Sciences • Law • Vol. 10 (59) No. 2 - 2017

# EDUCATION, ENVIRONMENTAL ACTION AND PRO-ENVIRONMENTAL BEHAVIOUR. COLLECTION OF USED BATTERIES BY SECONDARY SCHOOL PUPILS[1]

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***Abstract*** *Our research is based on Kollmuss and Agyeman's (2002) model and aims to analyse the used battery collection behaviour of 163 pupils in a secondary school in France, to identify the variables likely to predict this behaviour, and to study how this effect was maintained over 3 years and 10 years. It shows that an awareness-raising campaign can have an impact on sustainable behaviours, if participants are reminded of this action 10 year later.*

***Key-words***: *pro-environmental behaviour; intention to act; environmental values; school attachment; perceived behavioural control.*

## 1. Introduction

Since the Brundtland report (Brundtland, 1987) and the 1992 Rio conference, sustainable development has been an increasing concern of states, politicians and individuals. The question is how to foster the adoption of pro-environmental behaviour at the individual and community levels. The educational systems of most European countries have now incorporated sustainable development and citizenship in their curricula as part of their role of teaching certain core notions and values underlying the development of citizenship (Galichet, 2002). Like Romania, France has adopted a system based on a common core of education: all pupils are gradually made aware of environmental issues and receive lessons in sustainable development in class.

[1] Parts of this paper are taken from two articles:
Rioux, L. (2011)**.** Promoting pro-environmental behaviour. Collection of used batteries by secondary school pupils. *Environmental Education Research*, *17*(3), 353-373.
Rioux, L. & Pasquier, D. (2013). A longitudinal study of the impact of an environmental action. *Environmental Education Research*, *19*(5), 694-707.

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There are a large number of models explaining pro-environmental behaviour (Clyton & Myers, 2009; Steg & Vlek, 2009). Among those that look specifically at the influences and processes of individual decisions, we can quote:

- Rationalist models, which Burgess, Harrison and Filuis (1988) called information deficit models. They are the earliest models, postulating that there is a strong and direct link between environmental education and the adoption of pro-environmental behaviour.
- Models explaining the intention to act, based mainly on Ajzen's Theory of Planned Behaviour (1991). A person's behaviour is directly determined by his/her intention to behave in that way. This intention is dependent on three variables, (i) the individual's attitude to a particular behaviour, (ii) the subjective norm associated with it, and (iii) perceived behavioural control.
- Prosocial models, based in particular on Schwartz's (1977) Norm Activation Theory and Stern, Dietz and Guagnano's (1995) Value-Belief-Norm Theory. They postulate that environmental behaviour is based on the belief that our individual action has consequences on the objects of our attachment (ourselves, others, the environment). Pro-environmental behaviours are defined as intentional behaviours that provide benefits to others.

Kollmuss and Agyeman (2002) identified the main factors (demographic, external such as economic, and internal such as values) influencing pro-environmental behaviour. They used the term Pro-environmental Consciousness to describe the complex structure linking environmental knowledge, emotional involvement in environmental behaviour and attitudes, and other affective dispositions to this behaviour.

Our research is based on this model, focusing on internal factors likely to influence pro-environmental behaviours, specifically the sorting behaviour of used batteries in secondary school pupils (year 10 and 11). It has four objectives:

(a) to analyse the used battery collection behaviour of students in a secondary school in the centre of France;
(b) to identify the variables likely to predict the collection of used batteries;
(c) to study how this effect was maintained over time and to identify the implicative paths from starting point T1 over the following three years;
(d) to study how this effect was maintained over 10 years.

## 2. Method

### 2.1. The Sample

Participants were 312 young people attending two secondary schools in the Centre region (France). In the first school, 163 pupils participated in an awareness-raising campaign encouraging them to sort used batteries, while the 150 pupils in the second school formed a Control group. The participants were aged 13 to 17 years (M=15.11; SD=1.04); 53% were girls and 47% boys; 51% were in year 10 and 48% in year 11. All had attended the school for more than one year.

### 2.2. Material

A questionnaire was developed specifically to meet the needs of this survey. It had 4 parts:

(a) items about the sociodemographic characteristics of our sample (age, sex, year group, length of time at the school, parents' profession).

(b) A questionnaire identifying the sorting behaviour of the pupils prior to setting up the collection system:

"Have you thrown away any used batteries in the last four months? If Yes, how many?

Have you thought about taking used batteries for recycling in the last four months but not actually done so? If Yes, how many?

Have you taken any used batteries for recycling in the last four months? If Yes, how many?"

(c) A questionnaire based on rationalist models and referring to notions discussed in class: knowledge about batteries (4 items), their harmful effect on the environment (5 items), collection points for recycling (1 item).

d) A questionnaire basing on Ajzen's Theory of Planned Behaviour, including attitudes to collecting used batteries for recycling (e.g. "I'm in favour of recycling used batteries"), perceived behavioural control (e.g. "I feel able to take my used batteries to school"), and the intention to act (e.g. "When I've got used batteries, I intend to take them to school").

(e) A questionnaire based on prosocial and psycho-environmental models. It consists of the school attachment scale adapted from the workplace attachment scale (Rioux, 2006) (e.g. "It would be really difficult to leave this school for good"), and the Brief Inventory of Values-BIV (Stern et al., 1998), with 15 items divided into four scales: Conservatism (e.g. "Honouring parents"), Self-enhancement (e.g. "Authority"), Openness to change (e.g. "A varied life"), and Self-transcendence, which has two subscales: Environmentalism (e.g. "Protecting the environment") and Altruism (e.g. "Social justice").

### 2.3. The Survey Protocol

Phase 1: The researcher met the young people during the "Classroom life" lesson. After introducing himself, he asked them to complete the first tool comprising the Brief Inventory of Values, the school attachment scale, and the descriptive section relating to socio-demographic data.

Phase 2: At N+7, the teacher taking the sustainable development class focused the lesson on the impact of waste on the environment. He illustrated this with the situation of used batteries that young people frequently throw into the gutter when putting new batteries into their walkman on their way to school. He then led a 15-minute discussion with the students.

Phase 3: At N+14, the researcher asked the students to complete the second tool evaluating their sorting behaviour prior to the recycling system being set up, their perceived behavioural control, and their attitude to recycling used batteries.

The students were then told that they could bring their used batteries to school and were asked to answer the item evaluating their intention to do so.

Over a four-month period, the pupils could give their used batteries to a supervisor who noted the name of each child and the number of batteries. It should be noted that this was done unobtrusively to avoid any competitive behaviour biasing the results.

## 3. Results

### 3.1. The Sorting Behaviour before the Awareness-raising Procedure

Results (table 1) indicate that 35% of the students systematically threw their used batteries away (profile 2) and that only 2% sorted and collected them (profile 6). Profiles 3, 4 and 5 represent 29% of our sample and correspond to students who thought about recycling their used batteries.

It should be noted that 34% of the participants neither threw away nor collected their batteries. Informal interviews carried out after the questionnaires were completed indicated that this percentage included students who used rechargeable batteries (9%), some that did not use any (3%), and above all those whose parents dealt with their used batteries (22%).

Sorting behaviour before the awareness-raising procedure Table 1

| *"In the last four months,* | | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | % |
| Profile 1 | no | no | no | 34% |
| Profile 2 | yes | no | no | 35% |
| Profile 3 | yes | yes | no | 14% |
| Profile 4 | no | yes | no | 11% |
| Profile 5 | no | yes | yes | 4% |
| Profile 6 | no | no | yes | 2% |

1. Have you thrown away any batteries because they were used?"
2. Have you thought about taking the batteries for recycling but not actually done so?"
3. Have you taken any used batteries for recycling?

The arrangement to collect used batteries in the school can be seen to be successful, as 73% of the pupils used the system, and 620 batteries were collected in four months

However, 27% of the children said they had thrown used batteries in the trash or in the gutter and had not brought them to school.

*Sorting behaviour at T1* Table 2

| Number of batteries brought for recycling | % of students |
|---|---|
| None | 27% |
| Fewer than number of used batteries | 32% |
| Equal to the number of used batteries | 28% |
| More than the number of used batteries | 13% |

**Objective 1. The Sorting Behaviour after the Collection System was set up (T1).**

We observed (table 2) that 59% of the students brought fewer batteries than they used. By contrast, a sizeable percentage of students brought all their batteries (41%), or even more (13%). Regarding the latter, the informal interviews showed that these were mainly students who brought the batteries of the whole family.

**Objective 2. To identify the variables likely to predict the collection of used batteries**

A step-by-step ascending regression analysis was then carried out, with the behaviour of collecting used batteries as criterion. The predictors that were introduced correspond to the variables correlating with this behaviour. It should be recalled that these were Ethical variables (*"Openness to change" and "Environmentalism")*, Affective variables (School attachment, Attitude towards recycling), and Cognitive variables (Perceived behavioural control, Intention to act). Three variables ($R = .72$, $F(5,101) = 17.96$, $p < .00001$), namely the "Environmentalism" subscale ($R2 = .25$), school attachment ($R2 = .42$), and to a lesser degree, perceived behavioural control ($R2 = .36$), predicted the used battery collecting behaviour.

**Objective 3. To study how this effect was maintained over time and identify the implicative paths from starting point T1 over the following three years.**

- ***The effect over 3 years (to T1 from T4)***

The rate of pupils who adopted pro-environmental behaviour over time is not significantly different (table 3) from that of the control group $p>.05$), however, behavioural stability is higher ($p < .01$).

- ***The Implicative paths***

Unlike traditional psychometric methods, Statistical implicative analysis (Gras et al., 1996) made it possible to highlight non-symmetrical links, enabling the sequential organization of variables to be investigated. The CHIC (Classification Hiérarchique

Implicative et Cohésitive) program used to process the data in this study revealed the probable pathways from the starting point T1 over the following three years.

Table 3

*Comparison of groups with regard to maintenance of the effect over time (T1 - T4)*

| | Control Group | | Awareness-raising group | |
|---|---|---|---|---|
| | N | % | N | % |
| descending | 11 | 4% | 31 | 10% |
| random | 13 | 4% | 6 | 2% |
| stable | 66 | 21% | 31 | 10% |
| ascending | 60 | 19% | 95 | 30% |
| whole group | 150 | 48% | 163 | 52% |

Thus the young people who maintained the battery-sorting behaviour were:

(a) those who already had this behaviour prior to the awareness-raising action, and

(b) those who had never thought about sorting batteries because their parents dealt with it.

**Objective 4: To study how this effect was maintained over 10 years.**

10 years later, in 2017, we were able to contact 52 participants, i.e. 32% of the initial sample.

We asked them if they sorted their used batteries (1), and if they intended to do so in 2017 (2). Three months later, they completed a questionnaire about their overall sorting behaviour, not only for batteries but also other objects (plastic, bottles, medicine, etc.) (3) (see table 4).

*Sorting behaviour, 10 years later* Table 4

| | Awareness-raising group | | Battery sorting in 2017 (1) | | Intention to sort in 2017 (2) | | Sorting in 2017 (3) | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| descending | 17 | 33% | 4 | 7% | 6 | 11% | 5 | 10% |
| random | 3 | 6% | 1 | 2% | 1 | 2% | 1 | 2% |
| stable | 15 | 29% | 7 | 14% | 12 | 23% | 12 | 23% |
| ascending | 17 | 32% | 7 | 14% | 14 | 27% | 16 | 31% |
| whole group | 52 | 100% | 19 | 37% | 33 | 63% | 34 | 66% |

Ten years after the initial campaign, only 37% of the young people continued to sort their used batteries. A reminder of the awareness-raising action conducted in 2008 reactivated the intention to act and sort (not only used batteries but also plastic, bottles, medicine, etc.) of 63% of the young people we were able to contact.

## 4. Discussion-Conclusion

This research shows that the collection system set up in the school was used by 73% of the pupils (compared to only 6% before the awareness-raising action). The pre-requisites for adopting the behaviour of sorting used batteries for recycling were ethical ("Environmentalism" values), environmental (school attachment), and cognitive (perceived behavioural control).

The young people who maintained the battery-sorting behaviour for 3 years were those who already had this behaviour prior to the awareness-raising action, and those who had never thought about sorting batteries. In other words, this study confirms the importance of training young people as early as possible, before the question of whether to recycle or not is raised.

Ten years later, the awareness-raising campaign no longer had an impact, but a reminder of the action reactivated the young people's intention to act and recycle used batteries as well as other items (e.g. plastic, bottles, medicine).

At least 18% of the young people have adopted pro-environmental behaviour, involving spontaneous and self-determined acts that have become a habit or reflex.

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