

The impact of social attitude in waste prevention programs; the case study of the water plastic container from kids in primary schools in insular community.

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Abstract

Although reducing waste is at the top of the waste hierarchy, no real decoupling between waste generation and consumption has been demonstrated. Several waste Directives had been published from EU, but they have only brought minor changes within the key objective of reducing waste generation. Most efforts have been targeted towards greater amounts of recycling and better management of waste disposal. While these are desirable and socially beneficial goals, they are not sufficient for the achievement of long-term sustainability targets. The purpose of this study is to understand students' knowledge, attitudes and behavioural changes in relation to the water plastic bottle of 500ml. Understanding waste prevention behaviour (WPB) could enable schools principals, local authorities and committees as well as decision makers to design and implement more-effective policies for reducing the amount of specific waste streams that is generated. Students in a daily base bring their own water containers of 500 ml or buy water from the school as they don't fill safe to use other sources of water. 998 refiling Stainless Steel Water Refiling Bottles (SSWRB - of 600 ml) were shared to the students in 4 primary schools. The results indicated that the students are presented with different behaviours from Class to Class for many reasons; most of them are related with what their parents believes, and how themselves or the synergies between them reacts and affected.

Keywords: social behaviour, student's attitude, monitoring and evaluation, elementary schools, environmental education, prevention activities, waste prevention

1. INTRODUCTION

The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro during 1992, enrolled Agenda 21, which emphasized the potential role played by education in generating the awareness essential to protect the environment and contribute to sustainable development (Veleno et al., 2001; Peeters, 2003; Rickinson et al., 2009; Kanyimba et al., 2014; Voukkali et al., 2014). As described in chapter 36 of the Agenda "education is critical for promoting sustainable development and achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decisionmaking" (Earth Summit, 1992). The World Summit on Sustainable Development (WSSD), held in Johannesburg in 2002, suggested to implement Resolution 57/254, which confirmed the 2005-2014 period to be the United Nations Decade of Education for Sustainable Development (UNDESD) (Haigh, 2009). The main vision of the UNDESD was to develop a world where all humans will had the chance to benefit from education as well as to learn about the principles focuses on environmental protection. The UNDESD expressed a commitment to integrate Education for Sustainable Development (ESD) at all levels of training systems and education (UNESCO, 2006). According to WFD (Waste Framework Directive) (EP, 2008), "waste prevention are the measures taken before a substance, material or product has become waste, that reduce the quantity of waste, the adverse impacts of the generated waste on environmental and human health or the content of harmful substances". In the UK, Government has sponsored a large research program focuses on waste prevention. It includes a review of evidence analysing the behavioural occasions and barriers in household waste prevention, related with the effectiveness of various policy actions and measures (Read et al., 2009; Cox et al., 2010). The influence and impact of waste prevention awareness campaigns, and methods to measure, evaluate and monitor waste prevention through mass reduction and behavioural studies (Sharp et al., 2010; Zorpas and Lasaridi, 2013; Zorpas et al., 2014; Zorpas et al., 2015a) were also developed and examined in details. Existing decoupling indicators of waste prevention were also reviewed (Fell et al., 2010). It is, however, quite critical also to assess the environmental significance of waste prevention as this can reinforce evidence for policy development.

The model of ESD has also been established in educational policies around the world to restructure environmental educators contributions to sustainable development (Jickling and Wals, 2008; Foo, 2013; Hume and Barry, 2015). Nevertheless, the adoption of a sustainable development view in education offerings major shortcomings involving to anthropocentric bias and a rejection of the intrinsic value of nature (Sauvé, 1996; Selby, 2006; Kopnina, 2012a, b). Such shortcomings to ESD can, be offset by applying an EMS (environmental management system) in education. This will support a learning process implemented by a school organisational structure regarding social, environmental and economic factors. Furthermore, humans have started to understand different environmental problems including global warming, soil and water, pollution of air, acid rains, and an awareness as to the urgency of protecting the environment has arisen (Kaya and Turan, 2005; Nag and Vizayakumar, 2005). Problems and issues related to environment as mentioned above, not only turn the world into an uninhabitable place, but also intimidate human existence. Could be possible through environmental education (Kumar de and Kumar de, 2004; Erten, 2012) to help citizen to realized the seriousness of the situation without promoting any panic. The main target and objective of the environmental education is not only to raise aware eco-citizens who comprehend the nature as a whole, to be sensitive about environmental topics and improve a critical approach in their interaction with environment, but mainly to assist individuals figure out and do researches about environmental issues (Godwell and Ekpe, 2011). In this regard, the significance of environmental education to prevent and solve environmental problems and to raise sensitive and conscious citizens about environment comes into prominence (Uzun and Sağlam, 2006; Foo, 2013; Kopnina, 2014). Additionally, schools have a great role to play providing this education. The personal approached and attitudes of teachers at schools touch and affect the responses of the students too. Hence, it is essential for teachers to be an exemplary model. The behaviors of teachers as a decent model affect the knowledge, attitudes, awareness and behaviors of students about environment in a positive way (Littlelyke, 2008).

The purpose of this study was to develop students' knowledge and identifying behavioural changes in relation to the waste produced and more specific to the water plastic bottle of 500ml.

2. MATERIASL AND METHODS

2.1. Area Description

Municipality of Paralimni which are based in the Eastern Region of Cyprus has a permanent population up to 18601 according last inventory studied from the Cyprus Statistical Services on November 2011. Municipality consists the main economical lung of the island due to the fact that in this area there are the largest hotels resorts (15% of the total existing in the island) the permanent population increases to 50000/d from April to October every year (Zorpas et al., 2011; Zorpas et al., 2013), producing 15000 t/y of wastes (more or less). Municipality has Governmental and Private Schools. 4 primary schools, 1 Gymnasium, 1 Lyceum and 1 Technical School belong to the Government and 1 Private School.

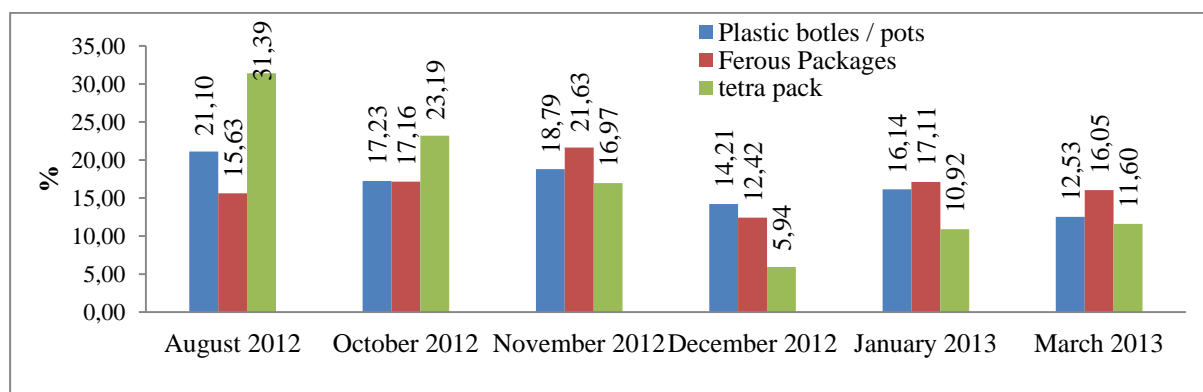


Figure 1. PMD Waste stream compositional analysis

Also several kindergartens exist in the Municipality. Schools are working for 180 d/y approximately. According to the lasted waste compositional analysis (Zorpas et al., 2015a) which took place for a period of 12 months was found that 26% products that can be composted (green waste, yard waste, fruits vegetables), 20% were food waste, almost 12% Toilets and Kitchen Papers including sanitary, 10.56% papers, 9.41% PMDs, 4.42% plastic films and 5.33% glasses, 2.26 % plastics non-recyclable and 0.84% aluminium. Furthermore, in the Urban Area of the Municipality are exist 110 recycle points as the Municipality participates in the Green Dots (GD) program (plus 240 are in the tourist area). GD Cyprus, raise awareness concerning recycling all around Cyprus and at the same time encouraging volunteerism. From the compositional analysis PMD fraction (Fig 1) mainly consists of

plastics bottles of 500 ml and pots which were equal to 6.05%. The main producer of those plastics bottles are the kids as the parents use to buy every week boxes of water to have in their house to be used from the kids when they went to school, or when they went to do sports or other activities after school.

2.2 Measuring Waste Prevention

Qualitative research approach was adopted in the present study. There is a general environmental plan that the teachers are following according to the requirements of the Ministry of Education but there is no any specific strategic plan that the schools must follow in the framework of waste prevention, although there is a Governmental Strategic Plan since 2013 (Zorpas et al., 2014; Zorpas et al., 2015b).

In this research a total of 998 students of the 4 primary schools were took place. The main problem was the plastic bottle of 500ml that is produced as a waste. Students ages 6-11 every day they have one plastic bottle with water. There 4 main categories of students (i) students that belongs on Class A and B (ages 6-8) and all of them have either a plastic bottle of water (500ml not refit able), either a plastic refiling bottle of water; (ii) students that belongs on Class C and D (ages 8-10) which most of them have a plastic bottle of 500 ml (not refit able) but few of them have a refiling bottle (as they shy); (iii) students that belongs to Class E and F (ages ages 10-12) which most of them either the bring their plastic bottle of water (500 ml non refit able) or most of them the use to buy at least one bottle of water) and (iv) students from all ages that they always have their own refiling plastic bottle of water.

The evaluation procedure was mainly carry out by using hybrid methods approach as described by Zorpas and Lazardidi (2013). 998 refiling Stainless Steel Water Refiling Bottles (SSWRB (of 600 ml – Table 1) were share to each student in all the primary schools only. For four weeks every day the teachers were measure attitudes and behaviour using a daily questioner with 4 specific questions: (Q1) which children's were bring their own plastic bottles, (Q2) how many of them refill the same bottle, (Q3) how many they used to buy water from the Scholl, (Q4) how many they bring their own water bag (any container). Then for a period of four weeks every day (and after a specific information that were given to the students) the teachers were asked the children's the same 4 questions (Q1-Q4), as well as if they bring with them the specific refiling stainless steel bottle that were given to them (Q5).

Table 1. Primary Schools in Paralimni Municipality

Primary School	No of Students
A' Primary School	250
B' Primary School	253
C' Primary School	222
D' Primary School	273

Each school has 6 classes: Class A (ages 6-7), Class B (ages 7-8), Class C (ages 8-9), Class D (ages 9-10), Class E (ages 10-11), Class F (ages 11-12)

3. RESULTS AND DISCUSSIONS

With the yearly increasing number of students in the primary schools the amount of all kind of wastes are continual increase every single day. The producer of waste typically originates from the canteens, from kids, and administration blocks. Students, teachers, staff, and visitors are predominantly the generators with students be in the first place. More than 40% of the kids from all ages they used to bring their own plastic bottles (Q1) which after they discharged as waste, indicate that are not familiar with recycling. Almost 10% of all ages they used to refill their water container from the School. Less than 2% of the students from Class A buy water from the School but on the other hand more than 20% of the Class F they use to buy every day at least one bottle of water from their Schools. As indicated from the evaluation period (Fig. 2 and 3) the smaller kids (Class A and B are used to bring their own small plastic bottles or their own water plastic bags) while the biggest ages (especially Class E and F) they use to have their own plastic small bottles (of 500 ml) and do not bring their own water plastic bags, while at the same time they used to (if they need more water or if they forgot to bring their own water) to buy water from the School. This behaviour is happening for two main reasons: (i) the parents used to give money (approximately €3) to the kids to have with them if they need to buy something from the school and (ii) due to the fact that biggest ages are shame to bring their own water plastic bags and they preferred to buy, indicated to the others that “we are getting teenagers” and “we are controlling our self's”.

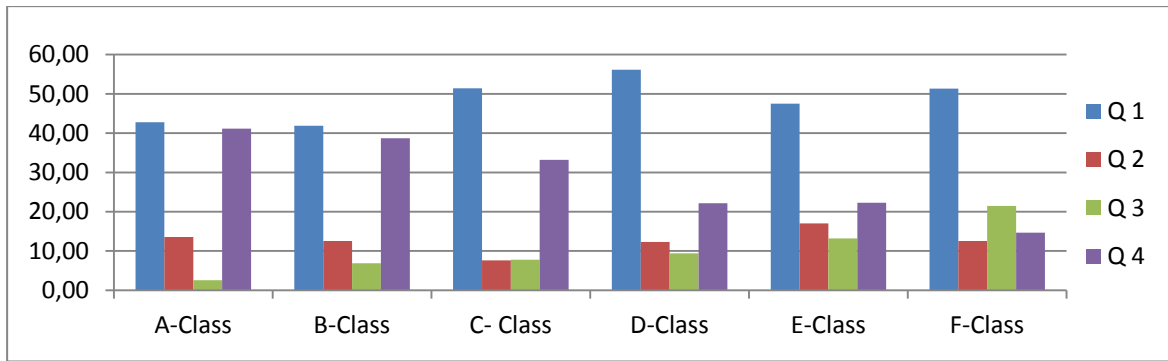
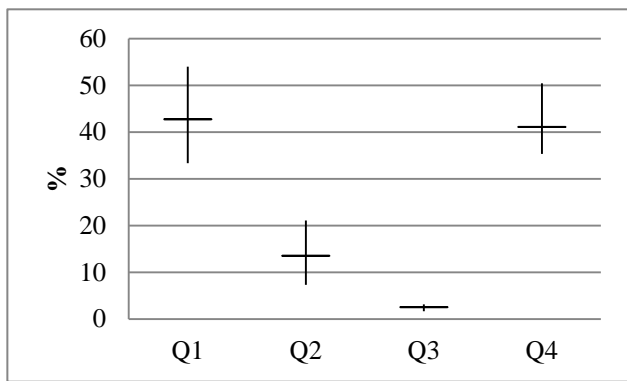
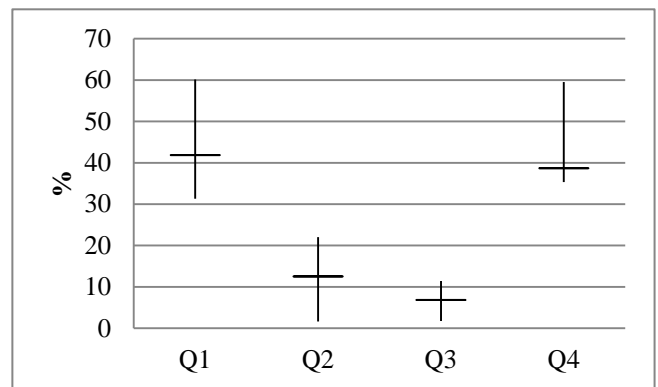


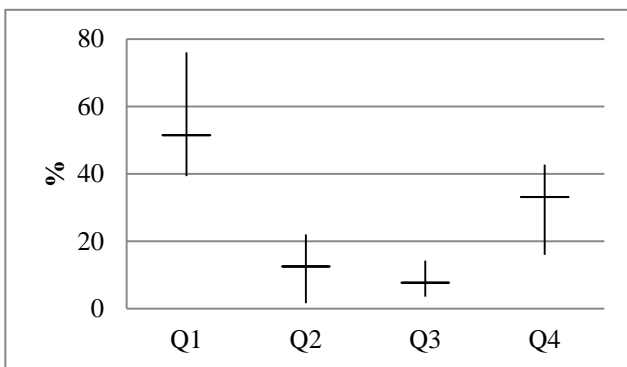
Figure 2. Comparisons of Students Behaviours per Class and for all the four primary schools and for the period of four week



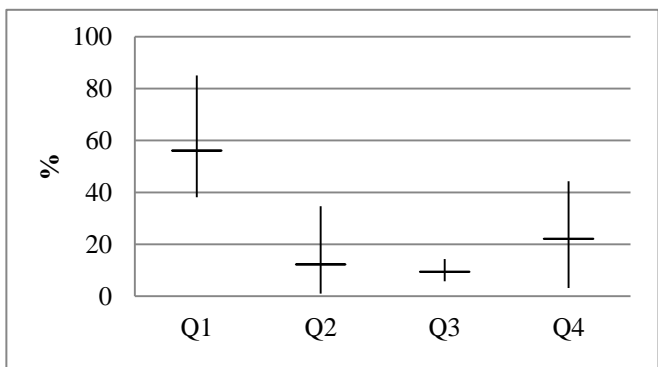
A class evaluation for all primary schools



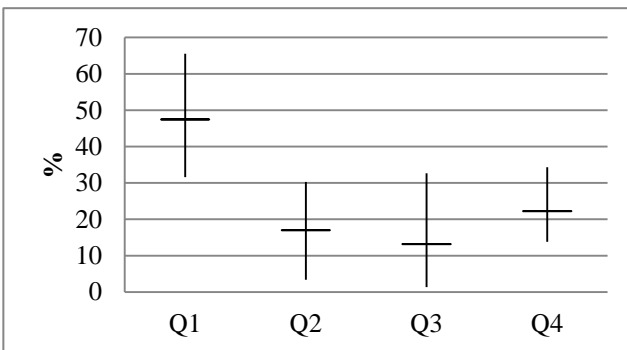
B class evaluation for all primary schools



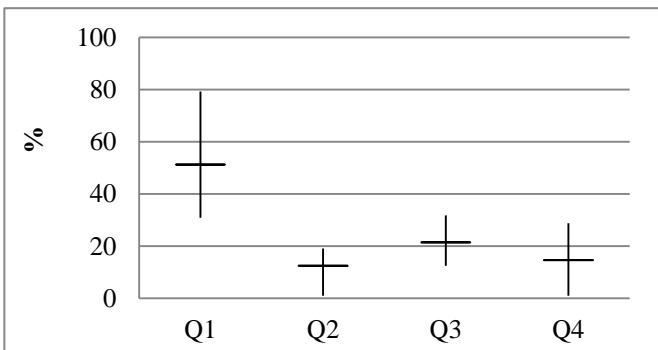
C class evaluation for all primary schools



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E class evaluation for all primary schools



F class evaluation for all primary schools

Figure 3. Evaluation of Students Behaviours per Class and for all the four primary schools and for the period of four week

It is obvious that when the kids are grow up their behaviour is changed; from 42% of the participants in Class A, that they broth their own water bag (any container- Q4), only 13% of the kids from Class F they continue do that. If we look deeper why this is continue happens we will find out that: (a) economic crisis is one of the main reason, as to buy water (at least one bottle) cost 0.5€/day/bottle; (b) students are continue educated from their parents; (c) they start thing more “green”. Through this research it was found out that a student will cost to each family at least €90±7.5 every School year if they used to buy at least one bottle of water and only the hours that the kid staying in the School, producing at the same time approximately 120-200 plastic items per school year and per kid. Moreover, as most of the kids (90%) have usually outside activities like sports, dancing, and foreign languages this amount is triple.

The main reason that the smaller kids (Class A and B) used to bring their own plastic bottles or their own water plastic bags is due to the fact that parents wants to be sure that their kids, they will have during the day their own water as they fill more save. Actually the parents every morning prepare their kids school bags (including sandwich and water, juice or milk). They do not fill save to provide them with money to buy something from the school for many reasons (the most important are that usually they lost their money or they afraid that someone may stole them). Another, significant reason is due to the fact, that, private companies commercialised very smart the “game” of selling “more save drinkable water” than the drinkable water which exist free in each school in central taps or directly from the water fountains given by the Municipality. It is quite easy to declare (without specific evidences) that the free drinkable water is affected from pathogen microorganism like *Total* and *Faecal Coliform* as well as *Escharieta Coli*. This is usually occurring (Shar et al., 2008) because water from different sources i.e.lakes, rivers, reservoirs, groundwaters or from desalination process is subjected to varying degrees of *faecal* pollution, and therefore freshwater is a path of transmission of many pathogenic bacteria, protozoa and virus. The safe supply of water is the responsibility of the Water Department Authorities and the Municipality and this based on Human Consumption Water Law; the water must be free of pathogens. Specifically, the concentration of *Total Coliforms* must be less than 10 cfu /ml while the other microorganism like *staphylococcus aureus*, *E-coli*, *faecal streptococci*, *pseudomonas aeruginosa* must not be identified (National Law, 2001).

Figure 4 and 5 presents the results from the second period and after the teachers and the kids were totally informed regarding the benefits of using the same water plastic bag with cleaning information’s. The same information’s were given to all the Kids parents and more specific emphasis to them were given on how many euros they yearly spend to buy plastic bottles of water -500ml, as well as with problems that plastic bottles are presented. It was carefully explained to parents and teachers that plastic bottles are usually presented with bisphenol A (Cooper et al., 2011). Bottled water has become very common as it is perceived as source of clean water. Nevertheless, due to its low diffusivity and chemical inertness (Franz and Welle, 2002), PET (polyethylene terephthalate) is the most popular material for food or beverage packaging, accounting for >99% of all beverage bottles (ILSI-Europe, 2000). However, recent studies demonstrated that PET bottles can release harmful chemicals such as antimony (Sb) and bisphenol A (BPA) into water (Westerhoff et al., 2008; Santhi et al., 2012). BPA in PET bottled water has been mentioned (Li et al., 2010). BPA is mainly used extensively in the production of polycarbonate plastics, consumer goods, epoxy resins and coatings used to line metallic food and beverage cans (Cooper et al., 2011; Fan et al., 2014). There is great worry regarding the possible harmful effects from BPA discharge into foods and beverages from packaging containers (mainly plastics). At room temperature the concentration of BPA migrating from polycarbonate bottles ranged from 0.2 to 0.3 mg/l. Examination of BPA in urine samples indicated that BPA is present in over 93% of the US population (Calafat et al., 2005). The mean urine BPA concentrations in various US populations are found to be in the range of 1-6 lg/L, or nearly 6-26 nM (Calafat et al., 2005; Cooper, et al., 2011). BPA has been exposed to impact the actions of endogenous estrogenic steroid hormones (e.g. 17b-estradiol, estrone or estriol), but the full extent of its effects are not been yet to been clearly understandable (Cooper et al., 2011)

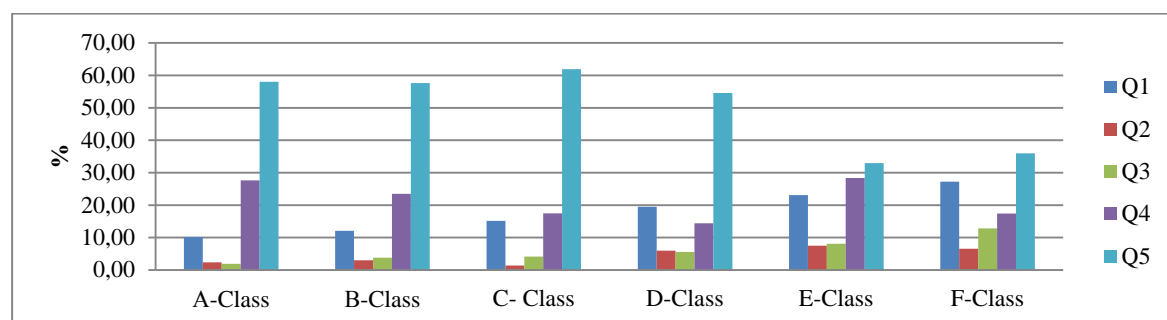
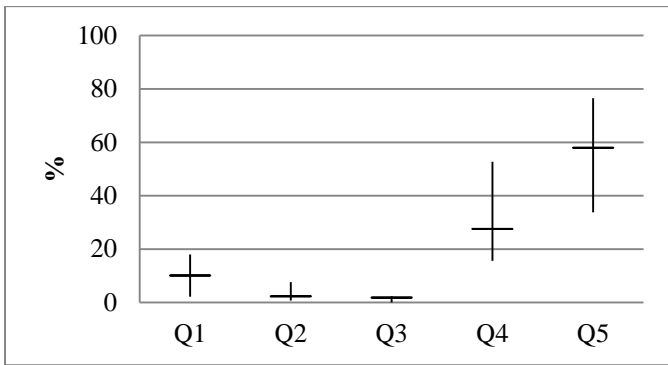
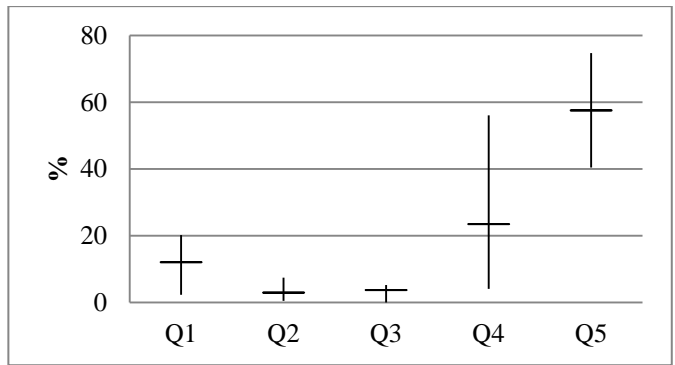


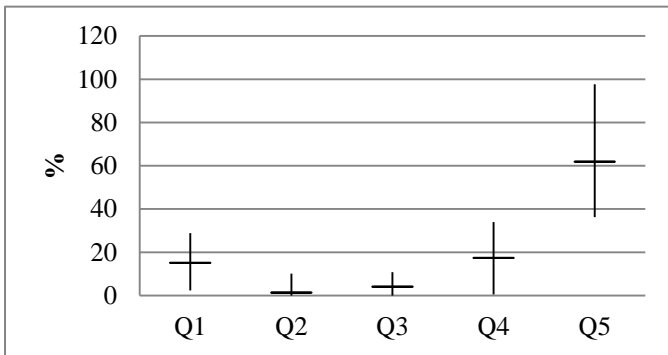
Figure 4. Comparisons of Students Behaviours per Class and for all the four primary schools and for the second period of four weeks (with the SSWRB)



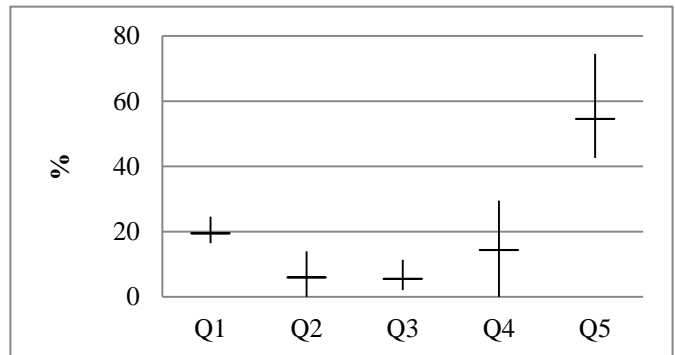
A class evaluation for all primary schools



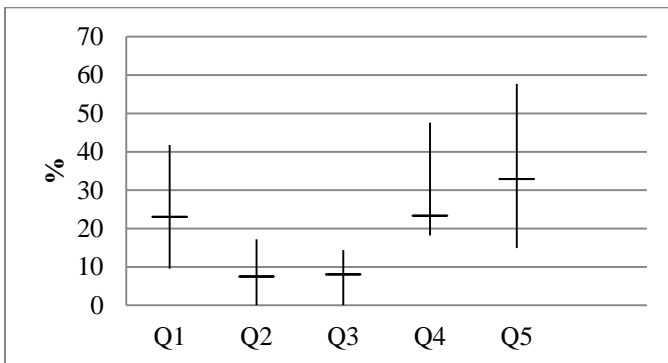
B class evaluation for all primary schools



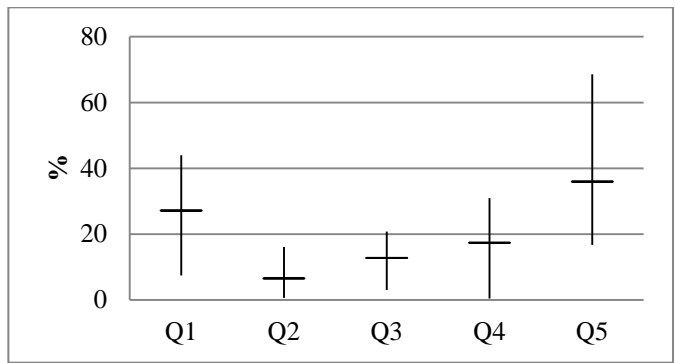
C class evaluation for all primary schools



D class evaluation for all primary schools



E class evaluation for all primary schools



F class evaluation for all primary schools

Figure 5. Evaluation of Students Behaviours per Class and for all the four primary schools for the second period of four week (with the SSWRB)

It is obvious that after the specific information's that were given to the teachers, parents and students from all ages accept the Stainless Steel Water Refiling Bottles (SSWRB) but mostly the smaller kids (A Class 59% and then B Class 58%) as are more receptive and enthusiastic for something new. Impressing was that the biggest kids (E and F Class) they accept to use this new Stainless Steel Water Refiling Bottles (SSWRB) in more than 30% and they didn't buy water from the school (the percentage of buying water from the school from the first to second week were reduce from 13% to 8 % regarding Class E and from 21% to 2 % for Class F). However, as the biggest kids behave or want to presented as adolescents they chose to reuse their plastic bottle, or to bring their own water plastic bag or to have the new Stainless Steel Water Refiling Bottles (SSWRB) in more than 90 % for Class E and more than 87% of Class F. During the first period of the evaluation a total amount of 48% of the kids all ages were discharged their plastic bottles to waste bins. This amount was reducing to 18% of the kids all ages. At the same time more than 60% of the kids all ages were accept to prevent using either their own water bags and either the SSWRB that were given to them.

A very important result is that, all students after the second period (Fig 5, Question 2) they do not fil up the same plastic bottle that they use to bring with them. The first period the total percentage from all the ages and all the schools (Fig 3) that they use to refill the same plastic bottle was 12.66 ± 5.24 %; while during the second period

(Fig 5) this was reduce to $4.48 \pm 2.74\%$. This is due to the fact that during the second period were totally explain that usually if they use those plastic bottles without washing them, those will presents several problems like high amount of bacterial like *Heterotrophic bacteria* and *Total Coliforms* which usually are more than 10 cfu/100ml (Oliphnat et. al., 2002). Those microorganisms (Oliphnat et. al., 2002) are the results of the absence of personal hygiene; like insufficient and inadequate hand washing after students have used the bathroom services could result in *fecal coliforms* in the schoolrooms.

The main aim of the environmental education is not only to increase conscious eco-citizens who comprehend the nature as a whole, develop a critical approach in their interaction with environment, and are sensitive about environmental issues, but also to help individuals figure out, and make researches about environmental issues as well as in their efforts to solve the problems and take decisions as to the matter (Atasoy and Ertürk, 2008; Godwell and Ekpe, 2011). According to this, the importance of environmental education to prevent and solve environmental issues and problems and to increase sensitive and conscious citizens about environment becomes very important (Uzun and Sağlam, 2006). The schools plays significant role in providing this education. The attitudes of teachers at schools affect the responses of the students, too. Thus, it is vital importantt for teachers to be an exemplary model (Littledyke, 2008). Schools according to Bell (2002) are no longer expected simply to produce general development plans that focus on any aspect of the school's work that might be identified as a priority at that time. School goals must derive from national ones for similar schools. The plans into which these goals are combined must focus on strategies for bringing about curriculum change that will lead to improvements in public performance. Environmental awareness must developed and apply in any school as humanity suffers from many environmental problems which need to be tackled at the individual level, requiring individuals to develop those attitudes which will guide them to environmentally supportive behaviour (Ahmed and Mohammed Al-Mekhlafi, 2009). Formation and change of attitude are complicate. People (of all ages) are always modifying, adopting and abandoning attitudes to fit the ever changing needs, benefits and interests. Attitude cannot be improved and changed by simple training or education. Acceptance of new attitude mainly depends on who is presenting the knowledge, how the person is perceived, how it is presented, the credibility of the communicator, and the conditions by which the knowledge was received. Research in social sciences has exposed and indicate that knowledge on a topic may increase; people could even change attitudes, but the step to improved personal behaviours and practices is depending on psychological factors which is a complex social set. According to Gagne and Skinner (Curzon, 2003), opinions, behaviours, and attitudes that are satisfied and reinforced are likely to be repeated and combined into our personal value set. Quite often our attitudes about politics as well as about environment come from information and persuasive communications (Johnston, 2010) and been affected from our social environment and our families believes (sometimes).

5. CONCLUSIONS

Waste prevention encompasses a range of policy options and has a broad range of benefits. Targeting at-source waste creation, it reduces the amount and toxicity of waste before composting, recycling, energy efficiency and landfilling become options. Waste prevention includes measures to reduce the adverse impacts of the produced waste on the environment and human health. The waste minimization prevention campaign is in priority in order to achieve all the proposed activities. Public awareness event must be taken into account before the establishment of any prevention action. It is not easy to change people's behaviour without any specific awareness event. To move the agenda forward on prevention, particular emphasis on behavioural change must be done starting from young ages. Moreover behaviours are complex and non-linear. Each behaviour is determined by various (often interrelated) factors, many of which need addressing simultaneously to facilitate change. Furthermore different audiences, different segments of society in relation to environmental issues behave differently, and require targeted and/or tailored interventions.

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