

ENERCITIES: EDUCATIONAL GAME ABOUT ENERGY

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Summary

Project EnerCities offers a game about energy. A survey will measure the game's effectiveness to change several energy-related attitudes, behavioural intentions and actual behaviour of EnerCities players in comparison with non-players. In addition, several moderators are taken into account. First results are available in the second quarter of 2010.

Keywords: educational game, energy saving, attitude / behavioural change

1 Introduction

Reduction of energy consumption, and thus CO₂ emissions, has become the focal point of environmental policies worldwide. The 1997 Kyoto Protocol and The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) have spurred the European Union (EU) to reduce emissions 20% below 1990 levels by 2020.

There is growing consensus, however, that the required substantial efforts to reduce energy consumption have repercussions not only for industry or transportation, but also for the household. In fact, some have argued that focusing on household appliances and domestic lighting constitutes a cost-effective way to achieve energy savings [6]. Although currently available technology (like double-paned windows, insulation technology, energy-saving light bulbs) has the potential to reduce present energy consumption by an estimated 30% [6], it would be a mistake to ignore the role of consumer behaviour (cf. [10]). Indeed, changing consumer behaviour may contribute substantially to modern technology's energy-saving potential. In fact, some researchers have argued that focused attempts to change consumer behaviours may result in a minimum energy reduction of 10% ([7]; cf. [2]).

2 Educating tomorrow's energy consumers

In order to reach energy conservation goals, policymakers increasingly focus on kids and teenagers to stimulate their awareness about and behaviour regarding energy saving. Media channels and institutes, e.g. schools, offer excellent possibilities to reach youngsters to educate them about energy behaviour. Nevertheless, non-interactive media channels and traditional education programmes seem to match only suboptimally with the information processing styles, communication and social routines of young people [12]. Teenagers, often called the Net Generation or Digital Natives [11], are grown up in a world of computers, internet, cell phones and video games [5]. Typically, this particular age group

is proficient at multitasking, prefers visual information over textual, is cross-media oriented, and is highly active on social network sites. In order to be successful, strategies aiming to educate youngsters about energy saving should take account of these aspects.

Reaching youngsters to influence their energy behaviour effectively also means using digital (learning) tools as intervention method. Educational or serious games are often regarded as effective learning tools [3] due to their engaging character and are used in various contexts (e.g. [9]). Nevertheless, their actual effectiveness for influencing attitudes and behaviour has not been established unequivocally. In the current project, we will therefore test the effectiveness of the educational game EnerCities, developed to positively influence energy-related household behaviours. We will do so by introducing the game among a large sample of people of high school age in several EU countries, and subsequently comparing measurements within this group with a control group, in which EnerCities is not introduced. In addition, moderators of effectiveness are considered.

3 Moderators of effectiveness

Importantly, efforts to influence youngsters' energy-related household behaviours should factor in the mitigating effects of the nature of the behaviour under consideration, and of personal characteristics. With regard to the former, the degree to which behaviour is repetitive is of crucial importance. Many studies have suggested that simple behaviour that occur in the household, such as light regulation and waste recycling, tend to become habitual when they are frequently performed (e.g. [13], [1]). In essence, this means that these behaviours are instigated and performed in a more or less automatic fashion, and hence are difficult to control by consciously forming intentions [8]. As such, strategies aiming to influence behaviours by creating awareness or increasing relevant knowledge among the target group may be less successful if these behaviours are habitual.

Of the personal difference variables that may moderate the effectiveness of the current strategy, especially scepticism and distrust towards "eco" science, technology and institutions are especially relevant. As climate science has recently received a bad press, it could be expected that influence attempts are less effective among those who question the trustworthiness of climate science. Similarly, one could expect an important mitigating influence of the degree to which members of the target group feel personally responsible.

4 The current project: EnerCities, an educational game about energy

EnerCities is a European project that rolls out a game in which players are challenged to build a sustainable city. It runs online (www.EnerCities.eu) and on Facebook and is available in six EU languages. The game and related educational materials are freely available for schools and individuals across Europe. Large-scale usage of the game on schools is expected as from September 2010. In parallel, individuals are invited to sign up and play the game. In a later stage, game players and control group members will be asked to fill in questionnaires, the results of which will be used to ascertain the game's effectiveness in changing energy-related attitudes and several household energy-related behaviours.

The game starts with a small village and a small piece of land to build on. A drag-and-drop interface lets players build structures (e.g. residential and industrial areas, renewable / non-renewable energy sources, green zones) to expand the city. The gamer needs to balance *people*, *planet* and *profit* while supplying the growing city with sufficient

electricity, implementing energy conservation and CO₂ emission measures and minimizing fossil fuel use. Each player's decision influences the scores for *people*, *planet* and *profit*. When done well, players receive more potential city space to expand their city and to utilize extra available game options (see fig 1). The game allows players to execute several strategies and see the results of their actions on the long term. The duration of the game is approximately 15-45 minutes, depending on the player's strategies. Playing the game on Facebook gives players additional functionalities to share scores and experiences with Facebook friends. In this way, involving the player's social network could lead to intensified competitions among youngsters to break the EnerCities high scores.



Fig. 1 Screen shots taken during various stages in the EnerCities game

5 Analysing effectiveness on energy-related attitudes and behaviours

To test the intervention effectiveness of the game on several energy-related attitudes and energy-related household behaviours of the players, a quasi-experimental design is adopted. Thus, measurements of attitude and behavioural intentions as a result of the intervention (in the so-called experimental group) are compared to measurements in the control group. A six-language questionnaire will be used: www.EnergyQuestionnaire.eu.

Looking at the every day life setting of youngsters, several specific energy-related behavioural (intention) variables form the core of the analysis: e.g. lowering the thermostat, turning off lights when leaving an unoccupied room, switching off the computer when it is not in use, standby, buying household appliances that are more energy efficient, and taking shorter showers. These main dependent variables were chosen taking into account the theory of planned behaviour [4]. Attitudes towards behavioural intentions, social norms and perceived behavioural control are measured.

Several additional measures are included in the questionnaire in order to study the effect of habituation as well as the role of individual difference variables. The self-report habit index [15] was incorporated to establish the extent to which various energy-relevant behaviours in the household are subject to habituation. To establish the role of a-priori negative perceptions towards (climate) science and technology, a short version of the confidence in science and technology scale [12] was used, as well as a modified version of the institutional trust scale to measure distrust towards climate science [14]. Finally, scales regarding personal, consumers' and government responsibility are incorporated [16].

This study could lead to interesting conclusions. First of all, what are the energy-related attitude and behaviour intention distinctions between players playing the game in a school setting and playing the game individually without any stimulation from a school? Secondly, do we perceive attitude and behavioural differences between Facebook players (offering players social networking functionalities) and players using the regular EnerCities game website. Thirdly, what are the influences of habits and the described a-priori negative perceptions? First results will be available in the second quarter of 2010.

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