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Just Google It?! But at What Price? Teaching Pro-Environmental Behaviour for Smart and Energy-Efficient Use of Information and Communication Technologies

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Abstract

Teaching young people about sustainable and environmentally friendly aspects of living is one of the many important challenges in the 21st Century. The title question "Google it?! But at what price?" should not be understood solely in terms of economics, but also with regard to the costs the environment 'pays' for the extensive use of information and communication technologies (ICT). ICT, and especially social media, play an important role in adolescents' lives. To 'google' something, or 'youtubing', for instance, have become a common leisure activity of young people, but how a search engine processes requests, and how much power is consumed by the data's travel through the net, are operations that remain hidden to the person in front of the monitor.

The transdisciplinary EU-funded project 'useITsmartly' addresses the issue of energy efficient ICT consumption via peer education. Adopting a participatory approach, its aims are capacity building and subsequent behavioural change. The paper will outline the background of the project, as well as present the results of focus group discussions and creativity workshops with young people, which have formed the methodological base for the development of a special didactical concept for 'Green IT Peers'. This concept will be implemented in five European countries during spring and summer 2015.

Keywords: Green ICT, Behavioral Change, Peer Education, Capacity Building

Introduction

In an endeavour of greater involvement in the discussion of complex real-world problems, such as widespread unemployment, global climate change, and escalating health care costs, policy makers have identified certain forms of engaged scientific research and disciplines to be motivators of change (Gibbons et al., 2001; Bammer, 2013). Scientists have increasingly taken on the task not merely of researching data, but also of applying methods in the production, transfer, exchange and dissemination of knowledge with the aim of generating a shift in practices and accordingly have an impact on those real-world problems.

This is where the EU-Project "useITsmartly"[1] connects in its objective of raising awareness and conveying the message of energy-efficient use of information and communication technology (ICT[2]) among and with youths of 16–20 years. Previous research by Kirsten Gram-Hanssen has found that "…teenagers in a household entailed a considerably higher rate of energy consumption than an average adult in any given household, and we know that this is primarily due to their washing and cleaning behavior, as well as their use of information and communication technology (ICT)" (p. 1246, 2005). The acknowledgement of young people as some kind of 'heavy users of ICT' makes them an ideal target group for the objectives of the useITsmartly project. Since the 16–20 age bracket will soon have their own households, it becomes even more important to inform them about of the ecological, ethical as well as financial consequences of ICT related energy consumption.

The project is currently funded within the Intelligent Energy Europe-Program (IEE), and its outcomes support EU energy efficiency and renewable energy policies aiming to achieve EU's 20-20-20 targets[3] (that is, a 20 % cut in greenhouse gas emissions, 20 % improvement in energy efficiency and 20 % of renewables in EU energy consumption). Participating project countries are Austria, Denmark, Germany, Norway, and The Netherlands, with the institutional guidance of the University of Wuppertal in Germany. The central motivation of the project is capacity building and subsequent behavioral change in young people via peer education.

Main objectives and approach of useITsmartly

In order to achieve a reduction in ICT-related energy consumption among adolescents it is not sufficient simply to present young people with information on the issues. It is equally important to deal with how this is done, in particular with how knowledge on the link between personal IT use and its consequences is presented. While young people currently learn about energy and energy consumption in school, the extent of its depth and coverage varies, depending on the curricula. A further challenge lies in how to encourage young people to become involved in the issue, since a lack of information on energy-saving ICT practices has been accepted as a major cause for energy-inefficient behavior in private users. Rickinson et al. (2009) refer to "two aspects of learners in relation to environmental education: their environmental characteristics (such as attitudes, knowledge, concerns, perceptions, etc.) and their educational perspectives (such as experiences, preferences, etc.)" (p. 29). Thus a central question to be addressed by the project is that of *how to sensitize pupils to the topic*, and to motivate interest in this specific field of information and *how levels of interest and knowledge at schools can self-sustain in the long term beyond completion of the project*. A methodology had to be established, which would keep

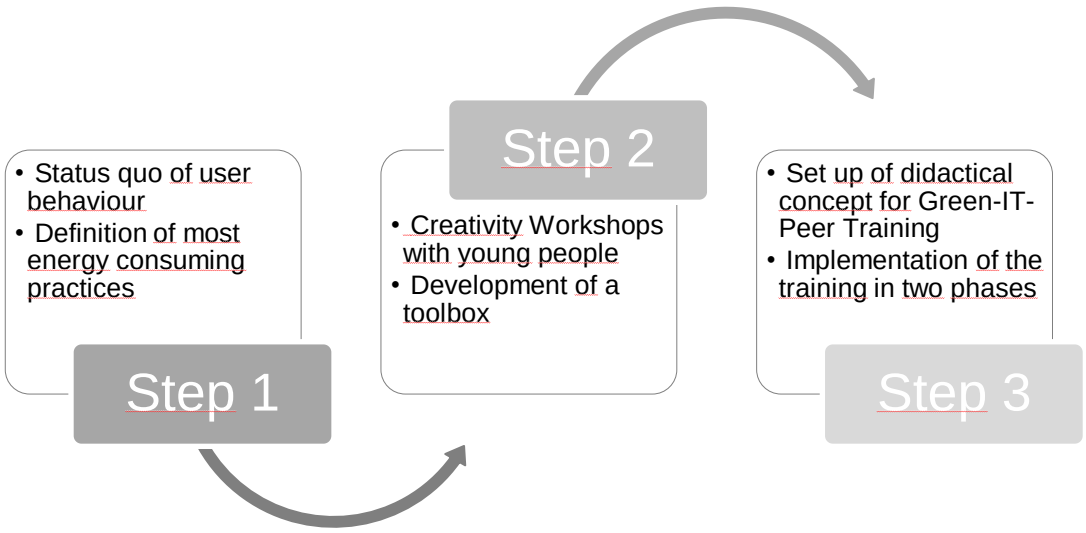
[1] useITsmartly is the abbreviation for Peer-to-peer education for youths on smart use of Information and Communication Technologies. For more information see www.useitsmartly.com.
[2] ICT = overall category including both IT and consumer electronics (including entertainment, music, video etc.)
[3] See: http://ec.europa.eu/clima/policies/package/index_en.htm [6.10.2014].

the young people involved and enable them to autonomously change their habits and further spread their knowledge.

The emphasis on a participatory approach, entailing the inclusion of young people in as many project steps as possible, was realized right from the outset. In a preliminary step, focus groups on adolescents' ICT user behavior were carried out to get a better understanding of how they had integrated information technology into their lifestyles and daily routines. The second step in the process was the organizing of creativity-workshops, during which the target group could propose their own ideas on strategies or solutions to reduce ICT-related energy consumption, guided by a certain set-up of workshop. The third and the main goal of the project is to educate "Green-IT-peers" who will be equipped with a toolbox as a support in communicating their knowledge to others, simultaneously educating other pupils to become IT-peers and further function as multipliers.

The program's fundamentally inclusive approach is grounded in the belief that individuals who have been actively involved in the development process of an idea or product will have more interest in becoming instrumental in its dissemination in contrast to those who are only informed about the results. On this basis, our thesis is that young people will a greater compulsion to implement new habits and energy-efficient practices if they and others of their cohort have been involved in the process of their development.

Figure 1 visualizes all project steps referred to here in a comprehensive way:



Focus group results: ICT user behavior of young people

The project's preliminary assessments were to find out about the target group's existing level of knowledge on saving energy, individual ICT-user behavior, and which kinds of energy-efficient user habits they applied.

For setting up the creativity workshops it would be important to determine the main fields of interest and the main sources of energy consumption of the young people. In order to obtain this kind of information focus groups were organized in schools, each averaging six participants and at least one interviewer. A questionnaire about their ICT-user habits was to be filled in, and being thus sensitized to the topic, the discussion was then initiated by the interviewers with questions for reflection. The aim was to encourage lively discussion, which

would take place mostly among the adolescents. The interviewers endeavoured to stay as much as possible in the background, and intervening in the conversation with a question or remark only in the event that it broke down or ceased altogether. The results of the focus groups were compared with those of other studies on youth and ICT-user behavior. In Germany, for example, the results were compared with the JIM-Study (Medienpädagogischer Forschungsverband Südwest 2013), a national survey that collects data on media usage among 12–19 year olds. The focus groups' main findings on ICT-user behavior were to be further matched with facts on the energy consumption of those habits.

The main ICT apparatus used as a source of entertainment, communication and information is, as was expected, the smart phone, being the constant companion during both school and leisure time. The device is least used for its original purpose – telephone calls – and mostly for written exchanges, such as with *What's App* (instant messenger application), or for the streaming of data such as *YouTube*-videos.

Results show that youths had to charge their mobile phone batteries at least once a day or on weekends; they even would keep their devices on the charging cable in order to keep them running.

Investigations into the energy consumption rate of smart phones revealed that their direct energy consumption is low in comparison to their indirect energy consumption, and their effect on overall energy consumption is significantly smaller than was expected.[4] (*Direct* energy consumption was defined as the energy consumption related directly to the use of the device; while *indirect* energy consumption is connected to all internet-related energy consumption and embodied energy consumption).[5] Therefore, even though the smart phone in its direct energy consumption has no substantial effect on energy efficiency, its indirect energy consumption has a marked impact and is becoming a growing area of interest. The streaming of music, video clips and the use of broadband connections are very energy intensive activities, and consumption of these is even increasing.

Interestingly, young people seemed to be aware of the socially limiting influences of IT. They cited a sense of isolation, or feeling stress as a result of being permanently available. Further, they indicated that they would "in principle" like the idea of acting in an environmentally friendly way, but would feel powerless and alone. Even though the question of "who's responsible" for reducing energy consumption came up in most focus groups in general, young people seem to allocate the responsibility to other actors than themselves. They said things such as: "the industry/politicians should" or "it doesn't make sense if I do it alone". One German focus group participant even compared saving energy via ICT to being on "slimming diet" while the rest of the household would just go on with their eating habits as usual.

It also emerged that tacit knowledge of energy saving strategies in order to keep phone batteries running proved to be high among this group of heavy users. Many would simply not give in to the fact that they have to charge their batteries daily. These users had little explicit

[4] "The energy consumption and the greenhouse gas emissions related to smart phones are in general higher than for mobile phones. The difference is mainly due to higher environmental costs related to the manufacturing of smart phones. Thus, a LCA study by Nokia shows that the climate change impact of a basic mobile phone (in this study a Nokia 105) equals 7 kg CO2e, whereas the impact of a smart phone (a Lumia 720) is three times higher (21 CO2e). For the smart phone, the GHG emission related to the usage phase only represents about 10 % of the total emissions, whereas the same figure for the basic mobile phone is about 20 %. (Santavaara & Paronen 2013) Similarly, Sony also finds that the GHG emissions of producing 'high-end phones' in general are higher than for 'low-end' phones (Sony 2013). Thus, for smart phones, the manufacturing is even more important for the overall energy consumption and climate impact than it is for mobile phones" (Christensen 2014, p.13).

[5] "Embodied energy consumption: Is the energy consumption related to all other life-cycle phases of ICT products; i.e. to the production of ICT devices (including energy consumption for extraction and manufacturing of raw materials/metals) and for the disposal and waste handling phase. Internet-related energy consumption: Is the energy consumption related to the provision of internet-based services accessed by ICT devices (e.g. video streaming, social media, e-mail etc.). This includes the energy consumption for internet data traffic (the infrastructure for transmission of data between users and data centers etc.) and for storing and processing data at data centres. This might (in some studies) also include the energy consumption related to access networks (providing the access to the internet; e.g. local area network (LAN) that the user is connected to at home or mobile broadband connections" (Christensen 2014, p.10).

knowledge about energy intensive activities, yet knew how to reduce energy consumption with minimal personal inconvenience. They would switch off the mobile broadband when there was no need for it because it is using lots of energy, for example. Such topics offered several starting points, which participants in the creativity workshops could connect to and build on in developing their ideas on saving energy through ICT. In the kind of approach we adopted, which does not intend to find some single, best solution to the problem but rather to generate several, perhaps unconventional or surprising ideas to tackling the problem, we consciously encouraged divergent thinking.

Creativity workshops: Using young people's knowledge and imagination

Following the focus group discussion of the project's second phase, creativity workshops in schools were arranged as sources of production and dissemination of knowledge. In innovation research and production of technology, creativity techniques are often applied as problem solving strategies. Such techniques encourage a creative dynamic and focus on a variety of aspects of creativity, including techniques for idea generation. Creativity in this context can be original, productive, and useful. In form of association richness and flexibility, creativity includes the ability to change and transform. According to Edward de Bono (1992) creativity is a major factor for change and moreover an ability which can be learned.

One objective of useITsmartly's creativity workshops was to gather as many ideas as possible from young people on reducing energy consumption of ICT production, usage and disposal. Ideas to be developed could include technological, behavioral or dispersive solutions. A desired side effect of the workshops was that an enhanced awareness of the need for change in energy consumption should lead to a raised awareness of the broader issue of climate change.

Set-up of creativity workshops

The procedure of the workshops was as follows: After an introduction to the topic and completion of a questionnaire on young people's ICT user behavior, designed to clarify the scope and aims of the project and workshop, a warm-up game was played to foster a relaxed mood and enable more creative thinking by breaking down any restrictive associations with a "classroom atmosphere", (Rommes et al., 2014). Next came the distribution of posters summarizing "problematic" ICT energy consuming practices[6], and pictures as visual support for the topics were distributed to groups of up to 6 pupils, followed by a free brainstorming phase to bring up many different viewpoints, including random perspectives. The workshop leaders would stay with the groups, answering questions and clarifying that there could be no "wrong" or silly ideas, since fault tolerance fosters creativity. Brainstorming rules (Osborn, 1948) include:

- Definition of the problem
- Articulation of spontaneous solutions
- All suggestions are written down
- No suggestion is evaluated, dismissed or prioritized
- Comments are prohibited
- Time limits are set
- Rules in conclusion
    - All associations have their right, "*no thinking, associating*"
    - No criticism, even "*wild, crazy, curious ideas*" are welcome

[6] The eight practices displayed a combination of energy consuming habits and fields of interest for young people (cf. section 2.1.): 1. Switch off/unplug, 2. Useful life/new acquisition, 3. E-Waste, 4. Simultaneous usage of devices, 5. W-LAN vs mobile broadband, 6. School, 7. Ways of spreading knowledge/information, 8. Saving energy through ICT.

- Provoke solutions "*out of the box*"
- Quantity instead of quality
- Your own expertise/perspective can inspire others
- No personal copyright on recited ideas

Proceeding to the next phase, a variant of the 6-3-5 Method (Rohrbach, 1969) was introduced as an evaluation tool of the ideas. The basic layout of this process is that six individuals sit around a table, each prepared with paper and pencil; given five minutes, everybody writes down three ideas in response to the stated problem; the papers are then handed around clockwise, each individual adding his or her ideas on the next sheet; the process is complete when everybody has written on every sheet. Finally, the group selects the most promising ideas and presents them to the others. For each workshop a duration of 2 hours was anticipated.

Sample

As a prior step to the project, four target groups for the creativity workshops were identified: Technologically and environmentally active youths; youths who are not interested in the environment nor very active in their ICT use; youths who are very environmentally interested but not very active with ICT; and finally, a group which is exactly opposite to the latter mentioned. The main purpose of making these distinctions was to be able to reach as diverse a sample as possible, since previous knowledge (either about environmental issues or ICT) might exercise an influence on the outcomes of the workshops and the resulting approaches to be defined for the toolbox. Our thesis was that "some, e.g. the environmentally interested, might need less motivation and attitude changes, as they are already motivated to change their practices, whereas changing attitudes is of more relevance to non environmentally interested youth" (cf. Rommes/Renkens, 2014: 6). It was almost impossible to find youths who see themselves as 'environmentally engaged'.

In every country, participants were recruited through schools. In many cases teachers were enthusiastic and organized their class of young people to participate. Participation thus became mandatory. Only in the case of a few workshops did the project partners manage to find participants on a voluntary basis.

Three to four creativity workshops were held in each participating country in the period from February to June 2014, with the aim of reaching 80 to 100 young people. In five countries, 19 workshops were held, 415 young people were reached and 232 ideas were gathered from these young people (Rommes/Renkens, 2014).

Results from the creativity workshops

The adolescents came up with a numerous ideas of a great variety. These were often connected to the pictures they had been given, or when enhancements, creative, new concepts nevertheless emerged. The most important fact was that exchanges on the topic had taken among participants place by activating and externalizing their own tacit knowledge. Nonaka and Takeuchi (1995) stated that tacit knowledge via externalization can become explicit knowledge and through combination and internalization a "new" knowledge can be produced, following a spiral form and so on in an open ended process. During the workshops pupils applied their tacit knowledge of energy consumption and environmentalism to the problem-solving task. By discussing and sharing their ideas with their peers they recombined these to finally create a new state of knowledge. On the meta-level they furthermore discussed the factors which would stimulate them to finally change their habits. Belonging to the group of addressees, additionally, they added their informal "expert-knowledge" to their ideas at times consciously at other times

unconsciously. From the perspetive of North's "stair of knowledge" (2005) the pupils would have then gained the fourth (and highest) degree of maturation, having passed through the stages of information, knowledge and ability to the stage of action and competence.

The results further showed that creative problem solving does not depend on the school degree; since various kinds of European schooling institutions participated in it, and any preconceptions such that higher degree-schools would obtain "better" results (in terms not of the quality of the ideas but of quantity or creativity in general) were not borne out. It seemed, at least with reference to the German workshops, that higher levels of interest and compliance it was were more in evidence the lower the schooling level was. Moreover, apparent that the younger pupils were very eager and open to participating and working creatively. How much of this knowledge will remain with the pupils, and might be transferred into action, however, cannot yet be evaluated.

Green-IT-Peer-Training

Most schools and pupils expressed an interested in participating in the project's next step – the education of "IT-peers" – and we can safely assume even at this early stage that, having at least extended their knowledge of ICT-related-energy consumption, the participants will be more inclined towards a behavioral change, so indicating a successful learning-process. As stated above, 232 ideas on how to save energy or promote energy efficient behavior among their peers were developed by 415 young people throughout Europe. An important component of the entire concept behind realizing creativity workshops and introducing the participants to the concept was that their ideas gathered from them would be further evaluated by experts and included in a project toolbox[7]. Furthermore, the resultant pool of ideas forms an important base for the IT-Peer training, which has been implemented in all project countries since spring 2015. By emphasizing these two points, young people should see that their knowledge and output were instrumental and appreciated.

Didactical concept for Green-IT-Peer-Education

The next step in the project outline foresees a workshop over several days for the IT-peer-training. Here the set-up draws on the theories of the Peer-Led Team-Learning (PLTL). "Peer leaders facilitate the workshops, clarify goals, ensure that the team members engage with the materials and with each other, and they provide guidance as needed in solving problems. The process encourages collaboration and builds confidence" (Varma-Nelson, 2008: 1). The workshops are planned to take place in a non-threatening environment without any performance pressure, and most preferably outside of schools. As in the PLTL-approach "the workshop leaders play an essential role because they are recent learners of the material. They relate to the students in the group as peers, understand how they learn, and explain material in ways that connect with them" (Varma-Nelson, 2008: 1). In the first run the "first generation" of IT-peers will be trained with the materials that have been collected by the consortium members. The peer education will have to work on various levels:

- Fact sheets with knowledge (and sources of information) on IT and energy consumption
- Soft-skills in how to speak in front of others or "teach" others have to be acquired.
- A variety of materials to choose from have to made available for setting up further workshops on their own

[7] The toolbox based on the ideas of young people can be retrieved under http://www.useitsmartly.com/toolbox/ [22.6.2015].

Figure 2 pictures the set-up of Day 1of the IT-peer training of the Austrian didactical concept which was adapted by the participating countries to their needs[8] (Pilz/Auer, 2014):

Austrian Didactical Concept - Green IT-Peer Training I, Day 1

TIME	WHAT?	WHY? HOW?	MATERIAL
10:00 - 10:30	welcome introduction project presentation	information about objectives and content, lecture	beamer, laptop. ppt
10:30 - 11:00	introduction game: meeting café	warm-up, team-building, teamwork	sheets for the „meeting café“
11:00 - 12:30	"I know, what you did last summer“	every day practice, chacing Paula Maroni, find the profile, count the clicks, pair-work	computer/internet, smartphones, work sheet
12:30 - 13:30	Lunch		
13:30 - 14:30	data protection, make your mobil safer, transparent costumer	capacity building: security measurements, own experience and/or pair work, discussion	input, working sheet, computer, smartphones
14:30 - 17:00	counting mouse clicks, energy consumption, serverfarms, search engines	evaluation mouse-clicks, own experience, lecture, discussion	ppt., laptop, beamer

In order to combine knowledge on saving energy as opposed to simply lecturing about it, the "vehicle-theory" was used. This consists in the idea that a topic many youths are generally interested in, regardless of social background, gender or prior knowledge, can be used as a vehicle to trigger young peoples' interest in science and technology related subjects (Thaler/Zorn, 2010). In the case of useITsmartly, energy and environmental issues are the focus, and it is important that the vehicle topics do not have to be associated primarily with ecology or IT by the youths at first glance. Subjects such as designing solar fashion articles or e-waste-sculptures, for example, can serve as vehicles to convey information on energy saving practices via artistic arrangement in practice. This practical and rather experimental approach responds to youths' statements that they would prefer experiments in science classes to the less creative and practical, standard of teacher-oriented methods (Dahmen/Thaler, 2009). Since "traditional, lecture oriented instruction stands in stark contrast to the process of scientific discovery, which builds on prior knowledge but requires vigorous debate and discussion, without slavish adherence to authority" (Gosser, 2012), the PLTL approach seemed of great value to us to work with. "Peer-Led Team Learning (PLTL) is a specific form of small group learning recognized by Project Kaleidoscope as best practice pedagogy (Varma-Nelson, 2004). PLTL was first developed by Woodward, Gosser, and Weiner (1993) as an integrated method that promoted discourse and creative problem solving in chemistry at the City College of New York" (Quitadamo et al., 2009: 29). Peer leaders do not have to be content experts or surrogate instructors, the approach being characterized rather by a "cohort-based social learning structure whereby trained undergraduates, or 'peer leaders', guide 4–8 less experienced peers toward

[8] The didactical concept underlying the useITsmartly peer trainings can be found in the download section of the project website under www.useitsmartly.com in various languages.

conceptual understanding" (Quitadamo et al., 2009:29). Drawing on the principles of optimal learning conditions, which are grounded in theories of cognitive science, the need for facilitated active engagement is given prominent attention in this set up. The optimal learning environment has been summarized (Norman, 1993) as having the following characteristics:

- Provide a high intensity of interaction and feedback
- Motivate
- Provide a continual feeling of challenge
- Provide a sense of direct engagement
- Provide appropriate tools that fit the task

Within useITsmartly these principles are implemented within the whole set up of the peer training approach: The concept combines the vehicle-approach, during which the peers will acquire the "by-product" environmental knowledge in practice sessions, with the rather fact-oriented sessions about background information on ICT and energy consumption. A closing session on soft-skills will enable the Green-IT-peers to pass that knowledge on to their friends and schoolmates.

Implementation of the IT-Peer-Training

All implemented training was adapted for transference according to the specific national situations and circumstances, e.g. possible time frames, group size, age of participants etc. Also pre-existing knowledge on environmental issues should be checked since "students are not neutral or 'blank slates' in relation to either the environmental or the educational aspects of environmental education" (Rickinson et al., 2009: 30). In all countries the approach is based on the above-mentioned didactical concept in a translated and adapted version.

An important point to clarify with the young participants right from the outset is that with the training the project makes no attempt to convince young people *not to use ICT anymore*; our aim is to inform and educate them on how to use it in a more responsible way. By emphasizing this we want to avoid attitudes of resistance in the earliest stages of the workshop, since not using ICT at all seems on first sight the easiest solution for reducing related energy consumption. With the workshop concept other suitable ideas and possibilities were introduced to the young people.

Sessions of reflection together with the written feedback of the participants on the last training day showed that the learning units most available for recall were those most closely connected to participants' personal user habits or which introduced them to practical opportunities of change. So for instance during the feedback-rounds and in the evaluation questionnaire it was often stressed that playing the "Google-Game"[9] in a fun way illustrated a very common habit that has a very high energy-consumption. Since this was followed up by calculating the energy costs of "clicking", the participants were highly surprised at their personal energy consumption in everyday activities which they hadn't previously perceived as at all very energy consuming.

Since finally changing behavior is the hardest task, it was appreciated when practical solutions were offered that would not result in a loss of convenience while using ICTs. Projects such as "Fairphone"[10] or refurbishing projects of ICT, presented to the youths found most appeal

[9] The Google Game is a competition of two groups trying to find a most (or least or quickest) entries for a compound of which one part of the word is already predefined.

[10] "Fairphone" is a social enterprise that is building a movement for fairer electronics. By making a phone, we're opening up the supply chain and creating new relationships between people and their products. We're making a positive impact across the value chain in mining, design, manufacturing and life cycle, while expanding the market for products that put ethical values first." (https://www.fairphone.com/about/) [26.06.2015].

among them. Being able to speak to specialists in various fields proved to have a sustainable effect on participants. One of the founders of the Austrian IT-refurbishing company "Compuritas"[11] joined the German training in a Skype-conversation, in which the youths enjoyed the chance to ask questions directly and which gave them a more concrete idea of projects of this kind.

It is too early at this stage of the training to make a prognosis about the long-term effects of participation in the training, but the second training phase is expected to yield more insight into the sustainability of the content learned. It is important for the project that pupils not only act accordingly but also further spread their knowledge. Here we also encounter a key problem of the project outline; that is, when the first and second generation of IT-peers is educated and has achieved the ability to actively use their knowledge, the project's funding will come to an end, with no extension foreseen and with the responsible persons no longer available. Thus, the difficulty we are facing is how to keep the IT-peer-education running without someone in a supervising role. It is possible that in some schools teachers will take over the responsibility of overseeing the project, but due to a strict curriculum and time deficit it is very unlikely that we will find a volunteer in every school. This can be compared to knowledge management in the private sector; in response to the departure of an experienced employee and a consequent loss of expertise and knowledge, enterprises have routinely established various structures for maintaining the knowledge pool of the corporate collective. There are web 2.0 based solutions, such as cloud systems and databases or WIKIS, but also "analogue" reactions like regular meetings with knowledge exchange etc.

So far we have identified two ways of targeting this problem. Two strong factors are intrinsic and extrinsic motivation, a further help being a possible a database of information that could be accessed as an ongoing resource. We will start with the "technical" solutions. There are several ways of establishing a database – there is the project-homepage, the project's Facebook page and the Instagram account. All these facilities could be taken over or supervised by a teacher, or alternatively be passed on to the next generation of IT-peers. A toolbox containing material for the peer-training will be handed to the IT-peers in all events, and which is supposed to be augmented and maintained by the IT-peers who have taken over the responsibility. We strongly hope that teachers or group leaders in non-schooling organizations or institutions will assist the students in that this. Teachers could also make use of the teaching material in class to re-initiate the program. The set-up of the creativity workshops will, for example, form a part those materials. Another approach could be to generate WIKIs that contain relevant information on ICT and energy-efficiency. Writing a school-blog on the project could be a further means to keeping the project's momentum beyond funding. A Wikipedia-entry for the whole project, outlining its targets and course, and encouraging contribution to it might be helpful. Alternatively, some endeavour to establish an internet-platform could be launched, where energy-efficiency in ICTs and related issues could be discussed and free expertise in environmental-energy-issues could be made available. Besides the intrinsic motivation, smaller skills can be acquired, such as hosting a webpage or writing a blog or speaking freely in front of groups, organizing events etc.

The extrinsic motivation could be provided by the vehicle-activity during which a skill is acquired and completion of peer-training workshop, which will be awarded with a certification.

Intrinsic motivation will in this case arise from environmental awareness which must be generated or intensified through the engagement with the topic. In accordance with the idea of the stair of knowledge (North, 2005), our thesis is that the IT-peers will feel a stronger impulse to proceed with the project because their own creative potential was addressed and because they

[11] Compuritas is a social and ecologically sustainable IT refurbishing company for more information see http://www.compuritas.at/ [26.06.2015].

have reached a level of competence. Additionally, intrinsic motivation accompanied by a sense of empowerment, along with a belief in making a meaningful change. If young people feel that their own creativity and ideas can really have an impact, then this can also become an intrinsic motivator and driving force. As a consequence, the process of knowledge production would restart, promoting the aim of achieving a significant influence in lowering ICT related energy consumption.

Conclusion

The idea of useITsmartly is based on a participatory approach of involving young people in as many projects steps as possible. The method serves as a quality assurance measure, in not losing track of the target groups' needs, on the one hand nor, on the other hand, their perceptions on environment related topics. Focus groups demonstrated the great extent to which ICT is integrated into young people's lives, and that changing user habits leads to an anxiety of being isolated from communication among peers and permanently available information. The creativity workshops structured within the use ITsmartly project formed an approach to engaging young people with the topic of smart and energy-efficient ICT usage. It showed that participants were easily able to perform the task of developing ideas for promoting green IT use even without explicit knowledge. Their tacit knowledge, when catalyzed by short visual and written introductions to the topic, enabled them to think creatively "outside the box". It was especially the tacit knowledge of the young people, even though such skills are not often perceived as valuable and real proficiency, that constituted an important, if not the most important, factor in the successful implementation of the workshops. The youngsters were able to relate their everyday knowledge to pre-defined topics, which resulted in well-deliberated concepts, the majority of which were positively evaluated by experts from various fields. Some of the ideas developed had a novel status. This underscores the value of making use of non-expert knowledge for gaining new perspectives for solutions to existing societal challenges, as in our case with environmental issues, and as industry has been doing for quite a while through market research into customer's needs and preferences. With the development and implementation of the didactical concept for Green-IT-Peer training, the project has reached its climax and shifted from the theoretical preparatory groundwork to its core operational part.

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