Being Scared is not Enough! Motivators for Education for Sustainable Development

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Abstract This chapter presents an overview of positive motivators for students, lecturers, and educational managers to prioritize Sustainable Development in education. Very often, we implicitly assume that students and colleagues should all be motivated by the great challenges that the world faces. And if they appear not to react sufficiently to these challenges, we sometimes tend to give these challenges an apocalyptic character. But is this the right motivator for students and colleagues to work on Sustainable Development? We all know that if you only use a stick and no carrot… So why don't we use more carrots? The bureaucracy that comes with tools for checking/auditing/evaluating the (SD content of) programs/curricula is not particularly a strong motivator for university lecturers. And building courses that add another subject to the erudition of the graduate might not be the right motivators for students that want to make a difference. We are often still in the process of convincing university managers to add SD to the curriculum, convincing colleagues to address SD, and convincing students to pick SD electives

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and address SD in their projects. How to motivate them to do this when this gives them no direct personal reward and even might increase their workload? The paper will explore options to develop motivating educating by reviewing case studies on educational renewal in four universities. It concludes that there are various options for more motivating education. However, to fully utilize these options, more priority should be given to education.

Keywords SD motivators · Humor · Curriculum development

Introduction

Although the need for Sustainable Development is widely accepted, and education is often addressed as the main driver of change for Sustainable Development, the results are still rather poor (Pandey 2003, p. 95). Many universities signed one of the SD charters (Copernicus, Talloires, Halifax, Barcelona….) but the vast majority of the 14,000 universities in the world did not sign any SD Charter (Lozano et al. 2013). Even the ones that did sign, sometimes forgot that fact or fell back after various promising efforts. Around the world sustainable development still appears as add-on modules in the curriculum (Desha et al. 2009). Rarely has Sustainable Development become the red line for the development of a whole program (Cf. Corcoran/Wals 2004). There are several examples of new M.Sc. programs that aim for SD, but hardly any pre-existing program achieved a transition to a sustainable curriculum. It is our impression that in the vast majority of higher education programs, SD is sometimes addressed in a specific course, and perhaps touched upon by motivated individual lecturers. But the step beyond, to restructure existing curricula, and make SD its leading principle, is rare (Cf., Thomas 2004). Curriculum renewal is generally an extremely slow process (Desha 2010).

A number of new M.Sc. curricula for SD have been developed (Salcedo-Rahola and Mulder 2008; Salcedo-Rahola and Mulder 2010). Of course the lecturers of these programs are teaching with great enthusiasm. But at the university management level, it is our impression that this is mainly a strategic reaction in regard to the uncertainties that the appeal for SD creates for universities: will SD programs really attract more students? And will the graduates be able to get jobs? In this way, higher education institutions seem to keep track of this "new development in the education market," i.e., they create options not to miss the boat. As a result, some universities are now training SD specialists, but the specialists (and generalists) of other disciplines still do not embrace the SD concept significantly.

This is a worrying development. SD is not an issue to be left to SD specialists. It should be a leading principle for managers, civil engineers, economists, chemists, architects, and sociologists… Why is there so much reluctance to restructure the curricula in order to contribute to Sustainable Development? It is our conviction

that hardly anyone is opposed to Sustainable Development (Mulder 2010). Some are strongly motivated by it, others only marginally support it. But for many, this is insufficient to start restructuring education in order to educate graduates that are able to make a difference. *"The world has problems while universities have disciplines"* (Wilson 2009). This denotes that there is a strong force driving research into disciplines, and prohibiting taking up the real world challenges as subjects for scientific research.

Fear as Motivator

Fear is a strong motivator. During life threatening events, people can carry out actions that they are normally incapable of. But also when threats to life are less imminent, fear can be a strong motivator too. Marketers know that a threat or a fear which is solved by their product is a strong motivator for sales (cf. e.g., Moinpour 1972). In the case of Sustainable Development the sense of threat is less imminent, and generally there is no easy solution that leaves the customer nothing to worry about. If the customer does not want to worry continuously, denial of the threat is rather tempting: *a state of denial*. The cognitive dissonance theory provides a good explanation for this phenomenon (Cooper 2007).

There appear to be two conditions for threats leading to action:

- The credibility of the threat for specific persons is considered real.
- The options to do something about it are available.

The fact that threats will take a large number of victims does not automatically lead to (more) action if there is no clear option to do something about it. For instance, there are about 30,000 annual fatalities in EU road traffic (European Commission no date) but this does not create a sense of urgency. It leads to some investment in traffic safety though, but much smaller risks can create far more action as they are often more easily solvable.

The credibility of threats is related to their imminence: that our sun will die in a couple of billion years is no threat to anybody, a next ice age in 1,500 years[1] becomes some closer but is still not worrying. Even risks that become real in a couple of decades leave the subject ample cause for denial: this problem is *not real*, or it is *still not real*, or it might *never become real* because of some solution that will surely emerge. Al Gore's "Inconvenient Truth" did a lot to depict the realism of a climate crisis, although his arguments were sometimes rightfully criticized.[2] But it also became clear that although many people were willing to

[1] http://www.reuters.com/article/2012/01/09/us-ice-age-emissions-idUSTRE80814T20120109

[2] Wikipedia presents a thorough overview of the discussions that were triggered by this documentary: http://en.wikipedia.org/wiki/An_Inconvenient_Truth (February 11th, 2013).

take action regarding climate change, most of them were not willing to give up their lifestyles (Cf. Jacobsen 2011).

Lifestyle changes need positive choices: choices for a better life that gives more fulfillments (Hartig et al. 2001). In the consumption society, lifestyle choice often involves a choice for having a lifestyle that involves a higher level of consumption, provided that one can afford it. But positive choices for a richer life are possible without more consumption. Most middle class young kids make such a positive choice when they leave their parents' home: giving up wealth for having more autonomy. But it is not the 'giving up wealth' part that motivates; it is the "more autonomy" part that motivates.

Positive Motivators in Higher Education

Lifestyle changes that do not involve more consumption can frequently be observed. Besides having more autonomy, one can observe other motives like having more "quality" time to interact with each other, with nature, having time for learning, for creativity and self-growth or for contemplation. In educational psychology, the learner's autonomy or 'self-determination' has been identified as an important developmental goal and as an avenue to attaining outcomes such as creativity, cognitive flexibility, and self-esteem (Deci et al. 1991). Educational psychologists discern intrinsic and extrinsic motivation: the former arises from curiosity while the latter arises for the sake of the external rewards for achieving a result.

Given that autonomy is so important in the learning process, it is remarkable that the dominant system in higher education is based on a complete lack of autonomy. Students are supposed to spend their student lives in a largely pre-arranged way, in which the autonomy is generally limited to the coffee break. Lectures are supposed to be one-way traffic of information, and in training sessions the students are supposed to work in a pre-determined manner with pre-determined problems. Motivation is often supposed to be extrinsic; the reward of university graduation. But in general, SD courses are not key courses for graduation… So is there a way to stimulate intrinsic motivation?

Often, education is claimed to be most effective means that society possesses for confronting the challenges of the future (UNESCO 2002). However, educational approaches which focus on the development of scientific and technical skills in an isolated way, and ignore matters of moral sensitivity are rather dominant, with an extrinsic motivation structure. So there is a necessity to utilize intrinsic motivators optimally.

New pedagogies have virtually all been based on increasing the level of autonomy of the student. For example *Project*-Based Learning renders the student more options to order his own learning process while *Problem*-Based Learning offers more options for the student to determine which aspects he/she would like to study. Hence, the question is what these methods could achieve for SD education.

But it is not only a matter of motivating students. There is also an issue of motivating lecturers. University lecturers are normally building their careers on their research track records. Teaching is usually an obligation that "comes with the job." Copying last years' lectures is just the least time-consuming teaching method. Moreover, using the "classic lecture" as teaching style might also feel good for the lecturer, as the lecturer is at least during the lecture the focal point of a large audience. How to motivate him/her to implement more motivating learning experiences?

These are crucial questions for Sustainable Development education. The extrinsic motivation will not work at least not until SD is far more accepted in the university. The intrinsic motivation is hard to achieve, as most students do not pick a university program for that reason. Hence, it is crucial to utilize every option that can be identified to educate leaders for a sustainable future.

Motivating Teachers for SD

University lecturers are in general not particularly stimulated to make investments in their educational efforts. As long as their courses fulfill the minimum requirements, the lecturer does not have to fear any trouble. At least not as long as there are sufficient students participating in his course. But here could be the focal point for action. The market mechanism plays an increasing role in higher education. The Bachelor–Master division has created an additional choice option for students. Even within B.Sc and M.Sc programs, more options for electives and "study abroad" have emerged. This forces even the larger traditional university programs to offer various elective options to students. As long as student numbers do not show a problem, courses are safe, and so the lecturers are at liberty to prioritize their research. But numbers can easily drop very fast as the larger number of choice options creates more variety in student cohorts. What happens if falling numbers endanger the existence of a course or a whole program?

There is a remarkable dilemma in Western Europe: many natural science areas are seen as key areas for Europe's future, but only few young Europeans are interested in pursuing careers in these areas. In some research areas, the majority of the young researchers are non-EU nationals. This is not a sustainable situation. PhD student exchange is a good thing, but here there is something wrong: if a field that is determined to be so crucial is unable to attract sufficiently new students, something is not working properly. Especially in natural science and engineering, more attractive education should be offered to guarantee a next generation. Motivators for teachers to invest in their education should therefore be in "selling" their specialty to attract more students, especially those with strong interest and competences for the field.

But how to sell such a specialty? There is a strong tendency among science and engineering specialties, to show off, i.e., to show how bright they are. This might impress the audience and contribute to the fame of the discipline, but it does not

bring more students. There is a growing tendency among students to aim at "making a difference." The way forward for lecturers to promote their scientific discipline is to show students how that discipline can contribute to important societal challenges (Peet et al. 2004). In fact one can argue that the efforts to integrate Sustainable Development into engineering education have contributed considerably to a more positive image for engineering.

Motivators for including SD in the courses of science and engineering lecturers could therefore be found in contributing to the societal legitimacy of the discipline and in creating student interest for that discipline. However, the disciplinary pride and culture might prohibit that these lecturers will implement these changes. ("Don't deal with these vague issues").

In general, we believe that the majority of lecturers are not opposed to deal with relevant SD topics in their courses. As we argued before, autonomy is important, also when dealing with lecturers. Autonomy in a course is a key issue for a lecturer. Attempts to interfere with that autonomy, for instance by introducing obligatory SD courses for lecturers, are bound to fail.

Therefore, instead of forcing a lecturer to adapt his course according to the will of what the lecturer regards as "non-experts," he/she should be triggered to move in that direction by him/herself. Quite a successful method has been developed, that aims at triggering the lecturers' disciplinary pride:

> Lecturers are interviewed regarding the issue what their discipline might contribute to SD. By putting the issue in this way, they are in control; it is their field of expertise that counts. They do not need to react to all kind of SD issues; they are responsible for raising the issues. This triggers their disciplinary pride, and might easily lead to long and extensive discussions (Peet et al. 2004).

However, experience shows that this is a slow process and it needs a lot of resources. Could we find easier and less resource-intensive strategies?

SD as Curriculum Integrator

Program directors are often faced with the problem that the curriculum is a collection of rather incoherent courses: the lecturers hardly know what their colleagues are teaching and students complain about gaps, overlaps, or even contradictions between courses. Especially in interdisciplinary programs, it often occurs that every lecturer is teaching his own disciplinary subject and the student is required to integrate them on his own. Such a fragmented curriculum, especially if aiming at interdisciplinarity, is hardly able to meet its learning objectives. SD is ideal for problem-based learning and could thereby have a profound role in integrating and strengthening such a curriculum.

A relevant—and maybe undervalued—reason for integrating SD into a curriculum is that it allows the student to develop innovation skills. The challenge of a sustainable society is so large that only radical and encompassing socio-technical

innovation might help to fulfill the goal (Weaver et al. 2000). Situated in a transdisciplinary approach, the students see what it takes for their ideas to be realized. Cross-disciplinary interactions allow them to look at a problem with another perspective. More complex problems can be addressed. Taking SD as a red line for curriculum development allows the student to widen his perspective and the range of his skills, which is relevant for a wider range of situations. Communication and interaction with different publics for example, which is a relevant need for many graduates, and required by various accreditation frameworks (such as ABET, EUR-ACE or CDIO), can be developed through SD challenges.

Motivating Students for SD

How to motivate students for SD in a positive way? SD can be (and quite frequently is) taught in the traditional mode of the university: the traditional course based on lectures, a syllabus, and an exam. As was explained before, this is certainly not a positive motivator, but the institutional arrangements of the academy often leave no other option.

SD is seen as "a serious issue." Hearing all the stories about the threats to our societies, and our moral obligations to do something about it, is not really a cheerful event. This only 'resonates' with the already interested students. And for the others, it creates quite a contrast with the bright prospects that some colleagues might paint for their students. In other words, SD can be quite depressing, and this will not help the field forward, as a depression mainly leads to a neglect of the issue: the students turn to something else.

We identify four main factors for motivating students through SD:

- Humor
- Autonomy
- Innovation and creativity
- Solving real-life problems.

Humor

Humor might help in motivating students. There is a clear relation between humor of a teacher and learning achievements of students. However, it should be well dosed, should not be overdone, and not be inappropriate (Chesebro and Wanzer 2006). SD problems often emerge from rather weird situations if you perceive them from another perspective. Mankind is in many respects behaving like the man cutting of the branch of the tree where he is sitting at (Fig. 1).

"We've put the exhaust pipe on the inside!"

Fig. 1 Cartoon showing the dominant anthropogenic perception

But humor is not added to help SD teachers win a popularity contest among their students. Humor is a good motivator in classrooms. Complex—and often dramatic—issues can be treated with humor, which helps to develop lateral thinking and creativity, two fundamental skills for our students which are also required officially. And one can wonder where else they are developed in the curriculum. Applying humor in engineering can relativize the great global threats to a size that they can become a challenge for focusing action instead of being of completely apocalyptic dimensions. Naturally, humor should not lead to a trivialization of important topics.

With an understanding of basic humor theory and training, both psychological and medical research indicates people can increase their overall health and well-being as well **as improve lateral thinking skills and creativity**. Humor provides tools for developing resilience and maintaining a positive outlook, in times of rapid workplace change and debilitating stress. There is a large amount of scientific evidence which proves **humor** is a vital element of learning. (Wanzera and Bainbridge 1999).

Recently, we organized a workshop with experts in Engineering Education in Sustainable Development. The participants mentioned various effects of using humor to teach SD in class (Table 1).

Table 1 Results of the engineering education in sustainable development (Gothenburg 2010) workshop on humor and sustainability

Stimulates creativity and shift of perspective (needed for SD)
Changing paradigms/brings you into paradoxes
Open minds, challenges assumptions, disruptive thinking
Unsafe situations, stimulates doubt
Happiness makes easier to dream
Has proven useful for difficult times (Groucho Marx, C. Chaplin)
Simplifies complexity without reductionism (makes it accessible)
Reduces resistance to change, creates interest and positive attention
SD is too serious/Engineering is boring
Reduce pressure on serious topics
Have fun
Creates empathy
Team building, trust,
Creates energy!
Double edged sword
Cultural differences/politically incorrect/power structures (risks)
Breaks or creates barriers
Role modeling tool for the teacher
Shows you enjoy your vision
Keeps you "humble" with your knowledge

Answers to the question: Why humor can be a good tool for sustainability education?

Autonomy

Autonomy is also an important issue for students. Being able to organize your learning by yourself is a responsibility, but also an important motivator. An Individual Study System as a web of knowledge that the student could traverse by itself, at his own speed is attractive as it creates autonomy. Such a system might be enabled by modern software, and supported by web-based systems, recorded lectures and on line aid. The big advantage is that this system can easily be used for distance learning. It can also make the curriculum more flexible (as the students do not need to be in the lecture hall at fixed times). Curriculum flexibility allows special activities that require full working days or even a full-week program (Fig. 2).

A disadvantage of an individual study system is that it tends to individualize students; students hardly interact with each other, and with lecturers. Such electronic learning systems should therefore not dominate a curriculum, unless they are carefully designed to stimulate interaction. For lecturers, only communicating with students by exams and perhaps an e-mail question in preparing the exam can be quite alienating. For this reason, individual study systems should be accompanied by interactive forms of education (Fig. 3).

Fig. 2 Cartoon showing that human interference with the environment always has various negative and positive, long- and short-term effects

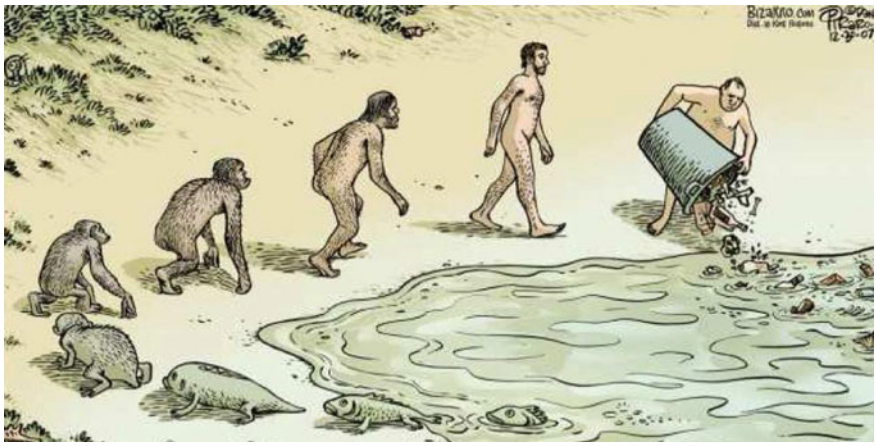

Fig. 3 Cartoon pointing toward long-term mankind-nature relation

Innovation and Creativity

The real challenges of SD will not be solved by optimizing our current system. Therefore, in an SD course, approaches related to innovation and creativity make total sense. Even, the combination creates synergy: much innovation education is done without the purpose of a grand goal and tends to pursue more consumption of a product, or solving a problem by creating a new need. Innovation oriented to SD supports societal grand challenges.

In addition, introducing innovation processes and creativity techniques and approaches in the curriculum connects education to a rising demand for entrepreneurship. With the current economic crisis, policymakers emphasize that students should acquire entrepreneurial skills. Giving them the capacity to create their own jobs, businesses, and opportunities, seems a clear motivation factor. More specifically oriented toward SD emerges the topic of social entrepreneurship or social innovation. The interest for that field is increasing rapidly and could attract more students to sustainability.

Solving Real Problems

Showing the students that they can participate in real challenges, local or global, helps to reduce the distance between theory and practice. This is frequently a criticism we hear from students. "The world has problems, the university has departments…". Significant learning tends to be much more effective in order to create interest because it shows the purpose of learning. The challenges of SD are rooted in the current development model that can be seen in almost any piece of reality we take. Naturally, not all real-life problems are suited for every part of the curriculum. Problem-based learning has often been analyzed as creating the ideal conditions for the learner (Segalas-Coral 2009).

How to Teach This?

Problem-based learning as group projects can have various motivating elements:

- It creates scope for students to determine their own path of addressing the problem.
- It creates a direct link between education and the societal application.
- If an unsolved real-life problem is the subject: it can create a sense of helping others.

In the remaining part of this paper, we will sketch some examples of motivating educational efforts.

UPC-Barcelona Tech: Bachelor Level—European Project Semester

The School of Engineering of Vilanova i la Geltrú at UPC Barcelona Tech (EPSEVG) has designed and coordinated the European Project Semester (EPS), an innovative learning program which responds to the challenges of society and the European Higher Education Area.

The EPS trains engineering students by applying Project-Based Learning in intercultural and multidisciplinary groups. The working language is English, and the program is designed for Bachelor degree students. The EPS program offered at EPSEVG emphasizes the introduction of competences in sustainability and human technology (Segalàs et al. 2011).

The main objective of the EPS is to improve the learning outcomes and competences of engineering students in relation to sustainability, communication and teamwork skills, the ability to work in intercultural settings, and the ability to work in real multidisciplinary projects with students from different backgrounds.

The EPS is divided into seminars (worth 10 ECTS) and a project (worth 20 ECTS). The seminars include courses in Sustainable Technologies, Business and Sustainability and Human Technology, among others. The projects are proposed by local companies and research groups. Since 2008 the number of participants has increased from 9 in 2008 to 30 in 2011. The students, who have participated in 15 projects, have come from 16 different European and North American universities and from over 18 different academic disciplines (http://www.epsevg.upc.edu/eps/).

UPC-Barcelona Tech: International Seminar on Sustainable Technology Innovation

The International Seminar on Sustainable Technology Innovation is a course offered within the framework of the Master of Sustainability of UPC-Barcelona Tech.

The main goals of the course are: to connect students with experts, futures researchers, and policymakers on real topics where long-term technological system renewal is needed in order to fulfill sustainability requirements:

- to increase the understanding of sustainable development in the long term and the role of technology embedded in systems;
- to increase the capability to apply foresighting, forecasting, and backcasting;
- to contribute to the development of the scientific work competences of students;
- to increase the ability of teachers to teach the approach of future imaging, foresighting, forecasting, and backcasting;
- to become an experts' meeting point;
- and to create networking activities among different groups and institutions (Segalàs and Tejedor 2012).

The course introduces the methodology of backcasting in real sustainability problems. The learning environment is international, transdisciplinary, intergenerational, and intercultural. It includes stakeholder dialogs and discussions. It is organized around current sustainability-relevant topics, which are analyzed in case studies based on different contexts: going from developed to developing countries and from local to global cases. Students apply scenario methodologies to the case studies in order to create the most contextualized sustainability strategies. Since 2012, the course is organized within the Erasmus Intensive Program framework financed by the EU. Students and lecturers from six European universities and with different backgrounds are participating in the course. The course is divided into four phases:

1. Local situation analysis. From March to May students analyze the topic in their own countries/regions.
2. Case study analysis. In May, students are grouped into international, multidisciplinary teams and define the current state of the case studies, as well as the questions and challenges that they pose.
3. Seminar at UPC. In June, students, lecturers, and stakeholders meet in Barcelona, where the two-week course takes place.
4. Evaluation of the course. Students analyze their learning experience in terms of acquisition of new competences.

So far more than 170 students, 30 lecturers, and 50 stakeholders have participated in the course.

The topics analyzed in the course vary each year and are related to relevant sustainability challenges; the topics elaborated so far have been: urban solid waste management; food and drinks packaging waste; overfishing and marine ecosystem degradation; sustainable mobility, agro-ecology, and community energy systems. (https://is.upc.edu/seminaris-i-jornades/seminaris/std-2013).

UPC-BarcelonaTech: SolarDecathlon

At UPC-BarcelonaTech, the recent experience of the SolarDecathlon contest has been very valuable.[3] In the first European edition (2010), a group of 20 architecture students coordinated by a lecturer worked during 16 months in order to design and build a passive sustainable house (LOW3). The experience was unique for the students who, apart from learning sustainable architecture, learned teamwork, project management, interdisciplinarity, fund-raising… so a wide range of

[3] http://www.youtube.com/watch?v=-2JXsONKlUU, http://www.youtube.com/watch?v=GeHMGAha1eY

interpersonal and entrepreneurial skills. In the following edition (2012), no teacher wanted to accept the heavy task of coordinating the project. Instead of abandoning the project, the students took the responsibility of carrying it out, and conducted successfully all project phases, acquiring not only all the competences mentioned earlier, but also the full responsibility of their project and learning activity. Fundamental in these experiences was the level of freedom and autonomy they had been conferred by the school, which triggered their responsibility and innovative solutions. As an example for the second edition, where funding was really a problem, they organized a crowd-funding project in a social innovation platform,[4] which would have been unimaginable if the school had provided the funding. This is today a key skill and experience for social entrepreneurship (http://www.low3.upc.edu/).

Delft University of Technology: The "Boat Week" Course

Since 2000, Delft University of Technology provides an option to all students to specialize in SD, within the context of their normal engineering curriculum. Students have to participate in a number of optional SD courses, carry out a graduation project that is SD relevant, and participate in the "boat week" course to obtain a special SD annotation with their engineering master's degree.

The "boat week" course aims at preparing students for an SD graduation project. The first week of the course is at a boat. The boat sails the inland waterways of the West part of The Netherlands. The students do not know each other before. They sleep, eat, and work on the boat. During the week, various sites are visited such as urban projects, landscape sites, waste or energy companies, special buildings, or infrastructures that are interesting for SD. During transport, presentations and discussions take place on board (De Werk/Kamp 2008). The students get a wide overview of the variety of SD challenges and solutions. After the week on the boat, the students do a backcasting exercise in groups:

- They should analyze the sustainability of a sector/function and the demands of all stakeholders.
- They should analyze trends in society that are relevant for that sector/function
- Based on that, consensus with stakeholders should be sought on an attractive future vision (long term, 10–50 years)
- The vision should be widely discussed with stakeholders and translated into pathways and milestones

Initially, the students took only long-term SD challenges (50 years). Nowadays, the students work on more short-term challenges (10–20 years) as that fits better to the time frame of partners (companies, municipalities, etc.). Working with these

[4] http://www.verkami.com/projects/2758-lleva-e-co-a-madrid

partners is extra motivating for students (http://www.tbm.tudelft.nl/en/about-faculty/departments/values-and-technology/tdsd-section/education/annotation-tisd/boatweek/).

Kyiv Polytechnic Institute: Summer School by Student Science Association

The annual Summer School was introduced at Kiev Polytechnic Institute (KPI) by its Student Science Association in 2006. The aim of this project is to facilitate internationalization at KPI and to provide students from all over the world with an opportunity to learn contemporary subjects in a friendly and motivating atmosphere during 2 weeks in summer. Every year the Summer School program focuses on several topics chosen by students-volunteer organizers of the project. These topics are organized into several separate streams which consist of lectures, workshops, discussions, group work, and study visits to companies and research institutions.

Sustainable Development has been integrated in the Summer School's program since 2008, after a group of students from the organizing committee took part in a course on Sustainable Development conducted at KPI in the framework of the Erasmus-Mundus SDPROMO project. Teachers from KTH, TU Delft, UPC Barcelona-Tech and KPI designed the first course in Sustainable Development for students, teachers, and researchers at KPI using active learning methods, including role plays, case studies, project work, films, and debates during 2 weeks in February 2007. An active group of students from the Student Science Association became inspired by the course. Therefore, they introduced SD as an important part of the Summer School program: from a block of lectures in 2008 and 2009, to a separate stream in 2010, a main topic of Science of Global Challenges stream in 2011 and a baseline of Advanced Energy stream in 2012. As a result, SD is playing the role of interdisciplinary pillar connecting different topics of the Summer School at KPI, where students motivate their fellows and guest speakers to reflect on how subjects of their study and research shall add to the progress toward SD (http://summerschool.ssa.org.ua/).

Conclusion

In order to successfully implement SD in education, the university should leave the established ways of teaching. Such a change might not only motivate students and lecturers, it might also serve the quality of education in general. This paper has presented a number of options that can achieve this educational reform. The main motivators are:

- Strengthening the autonomy of students in their own learning process;
- Connecting learning to real-life problems to strengthen self-confidence and transdisciplinary skills;
- Using humor to stimulate relativism and critical thinking;
- Invite colleagues to join, do not force them to change by new regulation.

Although sometimes such education can take place without much extra costs, it will probably be hard to get the new options accepted. One of the main problems is that although education might become more effective and efficient, as we have shown in the cases, changes take time and resources, and resources are scarce. Moreover, the university culture prioritizes investments in research, and careers are built on research achievements. Sometimes, good education can even be "undesired," as it clearly exposes low performance in education due to the research prioritization of most universities. For this reason, all the examples in this paper sometimes suffered from internal criticism, mainly not by a lack of success in educational performance, but more or less by too much educational performance…. Even if courses took no more resources than average courses, sometimes the large student efforts for the course (voluntarily by their high motivation) could lead to criticism. Hence, it takes convinced and committed lecturers to create some change.

Change is required, and the options are there: attractive SD education that motivates students is a viable option. Let us start the effort to implement it!

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