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## **SUSTAINABILITY AS A CORE COMPONENT OF ENGINEERING ENGLISH COURSE AT TECHNICAL UNIVERSITY**

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## INTRODUCTION

Education for responsible living provides opportunities for learning about the systems and processes connected to consumption. It involves relearning and reorganizing information in wider contexts. An attempt was undertaken to rethink and restructure the Engineering English course and some majors in the light of the international PERL (Partnership for Education and Research about Responsible Living”) project assumptions. The practical involvement in the PERL project, its valuable methodological and strategic materials provided a hands-on experience and initiated conceptual changes in selecting the study content of Engineering English, both in its online and offline studies. The notion of dynamic and sustainable development was integrated into the English course at various faculties of RTU. What are the most significant gains and reflections in the light of the above mentioned attempts?

Each of the subject areas approach ‘sustainable development” differently, but it serves the common purpose of educating highly professional, creative personalities. The most commonly used definition of sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Our Common Future, 1987 in [www.perlprojects.org](http://www.perlprojects.org) ).

AIMS of the research were as follows:

- 1.To study the notion of sustainability in the context of research and education for responsible living;
- 2.To design the (online and offline) course content in Engineering English in the light of sustainable education, in cooperation with the experts of the majoring areas (namely, Environmental Science)
- 3.to integrate sustainability and creativity into the online and offline modes of Engineering English .

## METHODOLOGY

The aim of the Education for Sustainable Development (ESD, especially in the interrelated areas of technical disciplines (e.g. Environmental Science, faculty of Power and Electrical Engineering) and a foreign language at university, is to empower individuals to actively participate in shaping an ecologically sustainable, economically efficient and socially just environment, while remaining mindful of the interconnectedness of the local and global dimensions” (O’Donoghue, Cusak 2008). “The relationship between education and sustainable development is complex. Sustainable development is generally thought to have three components: environment, society, and economy (Education for Sustainable Development Toolkit 2006: 10). Conceptually it is related to the UN proclaimed initiative to address the years 2005 to 2014 as a global “Decade for Sustainable Development”.

Sustainable Development is a trans-disciplinary area requiring interactive, participative and reflective approaches. “Learners need to be able to construct their own understanding, meaning and values, as a step to the collective search for a sustainable future” (O’Donoghue, Cusak 2008). The Rio Declaration on Environment and Development suggests 18 principles of sustainability (Ibid., 10), among them:

- Development today must not undermine the development and environmental needs of present and future generations;
- Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies
- Sustainable development requires better scientific understanding of the problems;
- In order to achieve sustainable development, environmental protection should be constitute an integral part of the developmental process, and cannot be considered in isolation from it. (In Education for Sustainable Development Toolkit 2006: 10, 11).

The content of the Engineering English course is aimed at mastering the language for both professional and research needs, as well as fulfilment of academic goals. In all these areas the

central component is sustainability: a constant development with positive implications for the future. It is a multidisciplinary course at Riga Technical University (RTU) which correlates with other courses such as the ‘Introduction into Specialty’ and partly - technical disciplines. It is included in the online and offline course of Engineering English at the faculties of Riga Technical University (RTU) (computer engineering, architecture and urban planning; civil engineering, power and electrical engineering, etc.). In all these sections of Engineering English sustainability is being embodied and finds its specific implications and solutions. Thus, the integral notion for the course is sustainability, which is closely related to “Research and Education for Responsible Living’ (PERL project).

What learning patterns are important in building up a competitive, but also sustainable knowledge? The language instructors acquainted with the philosophy of the PERL project, closely cooperate with the colleagues of majoring disciplines. Sharing the approaches and ideas of the project, the work is also going on about rethinking the content of the related major discipline and English, for example, in the field of “Environmental Science”(Fig. 1).

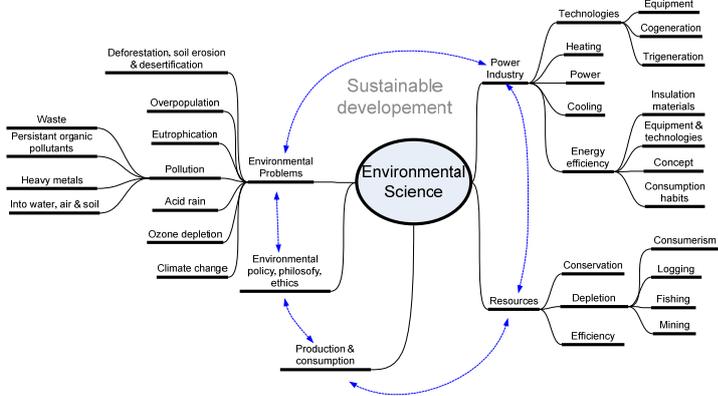


Figure 1 The core components of the major “Environmental Science”, and Engineering English in the light of a sustainable development

According to the above approach, the content of the course material corresponds to the most essential, generalized (‘core’) concepts and situations. It significantly eliminates fragmentation of the study material and resulted in a smaller number of texts and learning

tasks, as they corresponded to the generalized and most essential ('core') concepts and situations which may help to transfer the acquired knowledge and skills flexibly to new professional situations in the future. A related objective was to help the students follow the lectures of visiting lecturers in English, as part of the curriculum.

The concept of renewable versus non-renewable resources provides the cornerstone of sustainability (Maczulak 2010: 8) "Do people have any real chance to affect the entire planet and preserve the natural wealth? Environmentalists think everyone can indeed make a difference in building sustainability by following three 'rs' – reduce, reuse, and recycle. Energy companies would be wise not to deplete resources faster than the Earth replaces them, a process known as recharging (Ibid.) (Fig. 2).

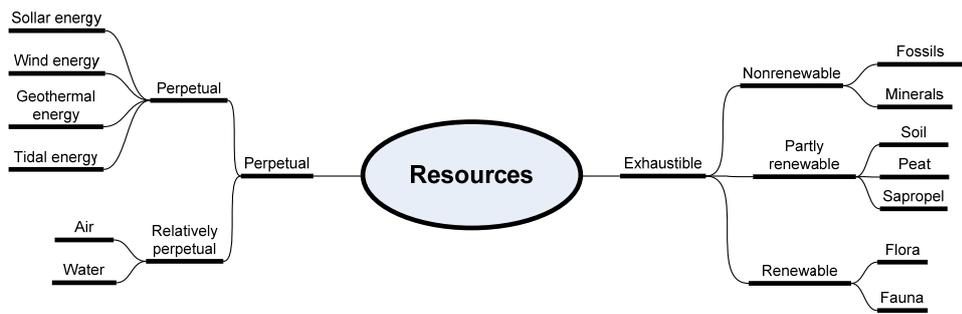


Figure 2. The basic components of the module "Resources" in Engineering English

In pointing out the core components in cooperation with the field experts, the language instructors are aware of the interconnectedness of the course materials to avoid duplication. The approach about pointing out the (invariant) core components has been characterized by some of the leading researchers (Galperin, 2000; Davidov, 1999; Lompsher, 2000, etc.). This approach was practically implemented as part of the English course design for the Environmental Science students.

## **Sustainability and creativity**

In designing the course, its developers also took into account the ‘zone of proximal development’ (ZPD of the learners; the term introduced by Vygotsky. When explaining the developmental function of the ‘zone of proximal development’, Vygotsky pointed to the ‘actual development as determined by independent problem solving ..(and)...potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’ (Vygotsky, 1978:86). In a Vygotskian framework, we speak of a lifelong “zone of proximal development” as “past acts, current experiences, and future plans expand and mobilize the resources of creative individuals” (Ibid.). “Creativity forms lifelong zone of proximal development that contributes to the sustained development of creative personality” (Moran & John-Steiner, 2003:78).. It is also stressed that students’ creativity is connected with their ability to see the whole earlier than its separate parts (Davydov, 1999; Galperin, 2000; Lompscher, 2000, etc.). The conceptual interpretation of the role of the social-cultural context in the development of creativity (Vygotsky,1978; Leontyev, 1966 ), the inherent relationship between the external and internal activity, and the hierarchic and dynamic structure of the activity components laid at the basis of the methodological approach in designing the course in Engineering English..

The concept of sustainability and its practical implications are closely related to creative thinking and the ability to make responsible, flexible and creative decisions. Edward de Bono, the originator of lateral thinking and an acknowledged international authority in the field of lateral thinking, writes that ‘creativity need no longer be a mystery or a special gift – it is a skill that can be learned and applied ‘(deBono, 1995). He underlines the importance of escaping traditional stereotype approaches and solutions and developing the ability of seeing and making new connections which might lead to unordinary and efficient ideas and solutions. An attempt has been made to implement it practically in the context of a blended

learning of Engineering English (active methodology in class, e-studies, independent and team work when integrating both) ((Rumpite, 2008).

In analyzing the concept of sustainability in their major and dealing with certain energy sources, the 1st and 2nd year students pointed to four basic criteria of a sustainable energy source: 1. the impact on the future generations; 2. energy efficiency; 3. environmental impact; 4. energy independence. On the basis of the above criteria, students highlighted their vision of an energy source. For example, “Is nuclear power sustainable”? “Are renewable energy sources sustainable”? “What could make them sustainable?”, etc.). Students applied such creative thinking techniques as “Consider All Factors”(CAF); “First Important Priorities”(FIP); “Plus, Minus, Interesting”(PMI); “Other People’s Views”(OPV); “Stepping Stone”; “Concept Challenge”; “Remove Faults”; “Combination”. The ‘classical’ thinking techniques – brainstorming, metaphors and analogies, visualization and imagination, inquiry technique, etc, were used. To understand the logic of any technical text students applied drawing mind maps (Buzan 2005). Thus, the aim was to promote efficient, deductive thinking, pointing out graphically the interlinked basic components and supporting details. It also trained the students’ skill to quick reading and perception of the interconnectedness of the information. Mind maps turned to be an effective thinking tool.

The above creative techniques were also applied when supplementing the Engineering English course with advanced teamwork technologies Think Tank (GroupSystems company), and Zing (Zing Technologies Pty, Ltd). (Elliot, Findlay, Fitzgerald, Forster 2004). The e-course pursued the goal of integrating creative learning methodology with e-learning in the online course of English. Creative e-learning, was defined as the integration of creative learning methodology with e-learning facilities to enhance the creative abilities of the target audience (Rumpite, Zuga, Ritins, 2007).

20 first year and 26 second year students wrote an essay to share their understanding of the state-of-the-art and future vision of the interpretation of sustainability globally and

specifically regarding the choice of the energy sources. The suggested goal was not only to cope with the existing ways of environmental pollution, but also to point out the causes and project the ways how to avoid polluting the environment. The problem situation included the following description:

“Four realities suggest that the current energy economy is not sustainable: 1. The demand for energy is growing and the raw materials for the fossil fuel economy are diminishing; Oil, coal, and natural gas supplies are not replenished as it is consumed, so an alternative must be found; 2. Most of the people who consume fossil fuels don't live where fuels are extracted. This situation creates enormous economic motivation for the consuming nations to try to exert control over the regions that supply fuels; 3. Emissions from fossil fuel usage significantly degrade air quality . The resulting carbon byproducts are substantially changing the world's climate. For many people and governments in the world the resulting health and climate impacts are unacceptable; 4. The fossil fuel economy puts people and nations under undue influence of energy suppliers. This lack of economic independence is unacceptable to many businesses and governments' . .

In the debate with the students the following basic criteria of classifying an energy source as sustainable were pointed out:

whether or not the current use of the energy and the methods of obtaining it is something which could potentially permit into the future (for use of future generations); 2. energy efficiency. So far as much energy goes into the production of energy from the existing sources as the sources themselves generate; 3. the environmental impact; energy independence – some critics argue that energy is not sustainable if a nation is forced to rely on another nation to meet energy needs, even if the energy is renewable, non-polluting and energy efficient.

The students approaches were personal and well-thought-over, often providing fresh and unconventional arguments. Thus, K.L. has called his essay figuratively “The Age of Loans”.

He writes that “.. we live in the age of loans. Nowadays, it seems that anything can be taken

on credit – lands, houses, cars, money, and lifestyle. The problem is that people tend to enjoy these goods without realizing how hard it will actually be to repay them later. We can still see the consequences of the recent collapse of financial credit markets. However, few people understand that another, much more serious credit crash is getting closer – we are running out of loaned energy”. He suggests “.. a straightforward solution – if we want to maintain our comfortable lifestyle, we have to work extremely hard on finding new ways how to power it with sustainable and renewable energy. The Earth is kind enough not to ask back the energy that we have taken from it; but we should hurry growing up and getting on our own feet, and producing as much as we consume”. L.A. argues that “sustainable energy is about using energy wisely and using the energy from clean resources and clean technologies”. She thinks that “we should use more alternative energy sources, because they are sustainable, self-sufficient and renewable. They are also better for nature”. K.K. shares her vision – “.. as scientists say, fossil fuels are running out and we need to find new, efficient sources. To my mind, it means that we need to change our attitude, habits, and thinking to reach a sustainable quality of life”. J.Z. points out that we should also think on a wider scope about “Sustainable energy for Europe” which sets goals for the energy policy – the use of renewable energy, clean transport and alternative fuels. He is for the use of biofuel as a way of sustainable energy. J.B. claims that “.. an efficient energy source should be cheap to produce, clean and safe to use”. I.M. provides her arguments why solar power could be considered sustainable. She believes that scientists will find a way how to improve our planet by introducing sustainable energy technologies which we will be able to use also in the future”. A.L. states that “.. we should get rid of polluting energy sources and substitute them with cleaner alternatives. If we can do it, we will solve two major problems at the same time – considerable depletion of fossil fuel and drastic reduction of CO<sub>2</sub> and other greenhouse gases”. I.G. concludes that “.. I really hope that we will be that generation which will seriously think about global problems and will introduce changes in the energy production”.

The essays provided the individual vision and care of each of the student of the energy sources and their impact locally and globally. Most of the students expressed their concern about the current situation in the energy production and use, and suggest that we should not struggle so much with the consequences, as to try to develop new technologies and approaches, especially, in the use of renewable energy sources, to avoid the further damage to the Earth and humankind.

**Integrating mass media.** The students were also invited to watch the popular TV show – debate, on crucial issues in the life of Latvia. One of the recent topics of discussion was the energy policy in Latvia – what it is now and what it should be. It was considered in the context/ within the framework of Latvia, the Baltic region and Europe. Later in class the available data were analyzed, the situation characterized, solutions discussed. Thus, the focus is not only on understanding a certain technical text, but to view it from the point of view of the possible decisions students will have to make in their professional life, their values and attitudes regarding sustainable development of the power sector in this country, which needs innovative, constructive and professional decisions. The role play based on the problem situation dealing with the constraints of the budget was conducted including different roles – stakeholders, customers (entrepreneurs, households), a leading power utility.

Integration of the new technologies into the learning process of a foreign language (FL) (additional CD-ROMs with the texts and different tasks in a FL in students' specialty). At the same time there is also an e-course with the online tests available, as well as the translation of the terms and other vocabulary (Word Assistant tool). The e-course comprises six flexible modules (“Amazing Achievements in Science”; “Our Changing World” (part of it in Fig. 3); “Live and Learn”; “My Chosen Field of Studies”; “Energy as the Driving Force of Sustainable Development”; “Born to Win”). It is an open e-course which the language instructors may adopt to the language proficiency level of the group, the chosen subject

matter and the online activities. The module “Born to Win” includes description of creativity techniques and case studies.

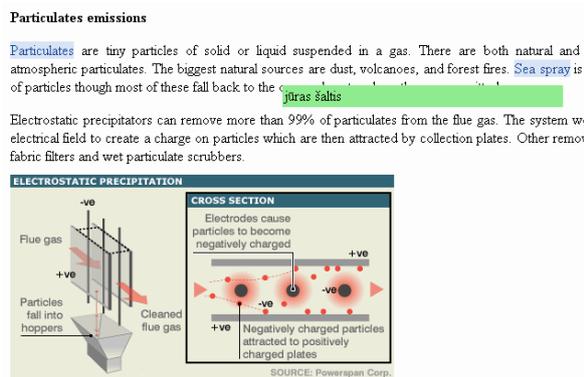


Figure 3. The use of Word Assistant tool in mastering terminology online

Another goal was to select a terminology which would constitute the ‘core’ terms of the power engineering field, integrating, first of all, the vocabulary dealing with the types and applications of renewable energy (Fig. 3).

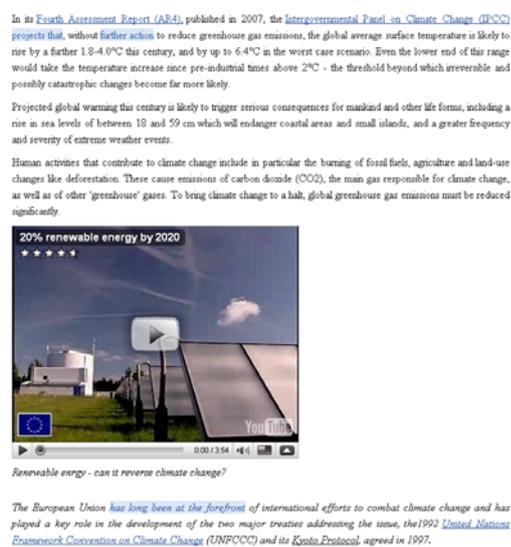


Figure 4. Visual and audio material of the online course on the present and future use of renewable energy. Word Assistant tool is being implemented.

The Practical Guide to Developing Creative Thinking Skills (Rumpite, Surkova, 2010) available to the course participants, served as a means in implementing sustainability and creativity in the Engineering English course. It combines the explanation of the Creative Problem Solving (CPS) stages, corresponding creative thinking techniques (de Bono, 1996;

Buzan, 2005, etc.) and various CPS situations. One of its aims is to help educators select the most appropriate creative thinking techniques and learn to work out new or adapt CPSs. It is one more step towards a purposeful integration of creativity and sustainability in the Engineering English course.

Research is integrated into the English language studies from the very first semester at the university. Again it is based on the motivation and disposition of the students, their individual features and their attitude. Very much depends on the personality of the teacher – whether he or she is creative, knows the subject matter of the chosen technical/engineering material, i.e. has the background knowledge of the field, and works in close cooperation with the experts of the field.

## **CONCLUSION AND DISCUSSION**

The introduction of the concept of sustainability in the Engineering English course followed the principle of multidisciplinary approach, thus achieving integration of the foreign language studies and major technical subjects. In collaboration with the technical experts the core concepts were pointed out both in the subject area and Engineering English. The selected study content corresponds to the most essential, generalized concepts and situations. It results in a smaller number of texts and learning tasks.

The methodological approach adapted, included the selection of a challenging, motivating and meaningful study content corresponding to the professional needs and interests of the students taking into account the dynamic development of the professional area of the students, as well as the student age specifics and their individual peculiarities.

The students showed much more concern and understanding of the environmental processes. Apparently, it was due to the interdisciplinary approach when the subject matter in the course „Resources and materials” were enriched by the selection of the corresponding study materials and involving activities during the Engineering English course. Their values were

reflected in the classroom discussion, as well as in their essays and powerpoint presentations. It might be assumed that the students were internally motivated to take responsible solutions and promote an active attitude towards an irresponsible behaviour regarding the major issues in their field – to eliminate the causes and not so much the consequences of such a behaviour. Another important point is that the academic work of the students from the very first days at the university was combined with the research work. The tools here were the (English) language, the computer technology, including highly advanced team learning software. It was observed that a stimulating and supportive environment in class helped the students come forward with new solutions unleashing their creative potential, creative thinking abilities which permit to reach much more flexible and efficient solutions in the academic, research and professional area.

### **References:**

- Bono, E. (1996). *Serious Creativity: Using the Power of Lateral Thinking to Create New Ideas*. New York : HarperCollins Publishers Ltd.
- Buzan, T. (2005) *The Ultimate Book of Mind Maps*. London: HarperCollinsPublishers.
- Davydov, V.V. (1999) A New Approach to the Interpretation of Activity Structure and Content. In *Activity Theory and Social Practice: Cultural – Historical Approaches*. Aarhus: Aarhus University Press, .39 – 50.
- Education for Sustainable Development in Action. *Education for Sustainable Development Toolkit*. (2006). UNESCO.
- Elliot, A., Findlay, J., Fitzgerald, R., Forster, A. (2004) Transforming Pedagogies Using Collaborative Tools. In L.Cantoni & C.McLoughlin (Eds.) *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2004*. Chatsapeake, VA:AACE, 2565-2569.
- Galperin, P. (2000) *Introduction into Psychology*. Moscow: Moscow Sate University. [ in Russian]
- Maczulak, A. (2010) *Renewable Energy: Sources and Methods*. N.Y.: Facts on File, Inc.
- Moran, S., John-Steiner, V. (2003) Creativity in the Making. Vygotsky's Contemporary Contribution to the Dialectic of Development and Creativity. In R.K.Sawyer, V.J.Steiner, et.al. (Eds.) *Creativity and Development*. Oxford University Press, 61-91.
- Leont'ev, A.N. (1978) *Activity, Consciousness, and Personality*. Englewood Cliffs: Prentice Hall
- Muirhead, B. (2007) Integrating Creativity into Online University Classes. In *Educational Psychology & Society*, 10 (1), 1-13.

- O'Donoghue, M., Cusak, M. (Eds) (2008) Images and Objects. Active Methodology Toolkit. Hedmark
- Rumpite, D., Zuga, B., Ritins, G. (2007) Development of Online Course Design and Development Approach in Creative Learning of English for Specific Purposes. D.Rumpite, D., Teresa Siek-Piskozub, et.al. (Eds). Research papers of the International Nordic-Baltic conference of the World Federation of Language Teacher Associations (FIPLV). Riga: Izdevniecība "Izgl. Solī", 298 – 308.
- Rumpite, D. (2008) Implementation of the "Consumer Citizenship Education Guidelines" in the Online Studies of English for Engineering Students. Consumer Citizenship: Promoting New Responses. Vol. 4. Assessing Information as Consumer Citizens. (Eds) A.Klein, V.W.Thoresen. Hedmark: Grafisk Partner Hamar, Norway, 139-157
- Vygotsky, (1978) Mind in Society. The Development of Higher Psychological Processes. Cambridge: Harvard University Press.