
The Breakthrough of the Internet to Empower ESP Teaching and Learning at Tomsk Polytechnic University*

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This article is focused on the strategy of engaging engineering students into rich academic learning content, and therefore enhancing the appropriate practical knowledge and substantial employability skills. Rationally balanced, this combination is considered to be a functional model for training the 21st Century engineer. Nowadays, English for Specific Purposes (ESP) stands in line with other professionally significant subjects. In the article, the authors reveal the involvement of the repertoire of Internet-based ideas, projects and Web-based tasks for the teaching of ESP in an efficient, rewarding and motivating manner, stimulating the *greyer*, creative level of student mentality. This seems to be a successful attempt to combine ESP learning *routines* with interest and creativity based on Internet resources and services that are shaped to fit effective ESP teaching. In the article, the authors detail the implementation of the *teaching SMART* technique, plus examples of Web-based tasks for ESP training, different ways to integrate the Internet with teaching practices, as well as other fruitful pedagogical suggestions that seek to enhance the qualities and skills of a modern professional engineer.

INTRODUCTION

The value of English for Specific Purposes (ESP) in modern engineering education cannot be over-estimated. The rapid changes in industrial processes, connected with rapidly developing Information and Communication Technologies (ICT), have caused the need for improved communication between the developed and developing countries of the world. The developing countries are hungry for ... *the explosion of technical information ... which has caused English to become the lingua franca of the international community* [1].

What concerns the developed nations is that they are eager to provide appropriate aids, but this also requires the means to communicate their thoughts and ideas. Today, the Bologna Process has added much to

the popularity of ESP, as far as it targets making higher education degrees *readable and comparable*, thus improving quality and providing for the mobility of education. The top priorities are given to ESP because they serve as

... a natural link within multi-cultural, multi-lingual societies, as a vehicle for international communication, as a global career-wave for news, information, administration, and as the language in which has taken place the genesis of the second industrial and scientific revolution [2].

THE ROLE OF ESP AT TOMSK POLYTECHNIC UNIVERSITY (TPU)

Unlike many other universities in Russia, Tomsk Polytechnic University (TPU), Tomsk, Russia, acknowledges the importance of ESP teaching. In order to enhance students' knowledge and skills in English, a special programme has been developed that permits extending the total amount of class hours for ESP

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teaching [3][4]. Unfortunately, it has not proved to be a panacea to improve the quality of knowledge and skills obtained by students. Nowadays, ESP teaching is based on the concept that students should learn English by practicing scientific tasks that are already familiar to them in their native language. Different research has revealed that learning language through a specific content is a fruitful way to increase language proficiency.

However, a teacher of English cannot be equally professional in linguistics and technical areas, and this is why it was accepted that ESP should be taught by a subject expert and an ESP instructor in alliance. This adjunct model could guarantee that an ESP instructor helps with language issues in a language-content dichotomy, while a subject expert delivers the technical content of a course [5]. These two specialists should remain on the same wavelength, ie a mutual synergy.

Further, the alliance will not be successful and productive if an ESP instructor has no genuine interest in science and technology and a subject expert does nothing to keep his/her knowledge of English at a proper level. Moreover, to be a good ESP instructor, a language teacher should have a natural desire to keep abreast of the latest findings in science and technology by reading, watching and listening to science news.

This brings to light a new paradigm and a new motivation for students to learn English, not *as it is*, but to learn it in order to manipulate different intellectual material in a professional area.

WHY THE INTERNET?

In order to find an efficient and rewarding means to teach ESP at the TPU, the preferred option was to use the Internet, as it is the most efficient medium. Moreover, the prevailing reason for this choice is that it is an inexhaustible source of comprehensive information that can be used to encourage and motivate students to learn English.

The following statement was recently made:

Just as the development of the printing press 500 years ago dramatically expanded the information available to individuals and society, the development of the Internet is doing so today. With a single computer and a phone line ... anyone ... can access more information today than it was available by any means to the greatest scientists of the world a century ago [6].

The Internet is changing and influencing nearly all aspects of the society and all spheres of personal and professional life. Why not take advantage of this information technology, which can be a good means for encouraging and motivating students? The Internet helps an ESP classroom come *ALIVE* because of its *Authenticity, Literacy, Interaction, Vitality and Empowerment*. These notions can be further defined:

1. *Authenticity* is very important because language learning is most successful when it takes place in an authentic, meaningful context. The Internet gives students access to vast amounts of authentic material on any topic. It also allows opportunities for authentic communication and publishing, which is rewarding, motivating and rather easy to arrange. ESP should not be taught in a vacuum, but rather should prepare students for the content and tasks to which they will be exposed. The authors are against taking material and adapting (simplifying) it, because the technical prose that students are going to read professionally will not be any easier than already written. Students are allowed to utilise all appropriate Internet resources, such as online dictionaries, encyclopaedias and terminology reference books and other helpful materials, as presented in Figure 1.
2. *Literacy*: The ability to read, write, communicate, research and publish on the Internet represents important new forms of literacy that are needed in the 21st Century. By combining English teaching and technology, the TPU helps students master the skills they need for academic success and professional achievements.
3. *Interaction* is the major means of acquiring a language and gaining fluency. Effective language teaching incorporates the development of oral and written communication skills as one of the ESP objectives. The Internet provides students with the



Figure 1: Sites offering relevant reference materials.

opportunity to interact 24/7 with native and non-native speakers all over the globe.

4. **Vitality:** Too often, ESP classrooms are reflective of teaching English for no obvious reason (TENOR), as students get bogged down in memorising grammatical rules or decontextualised vocabulary. The Internet can inject an element of vitality into teaching and motivate students as they communicate in a medium that is flexible, multimodal, constantly changing and connected to real life needs.
5. **Empowerment** of the Internet's mastery helps to increase the personal power of teachers and students. It allows them to experience the attractiveness of life-long learning. Students learn efficient searching techniques that are required when they need to find something to satisfy their personal interest or professional demands. It also teaches them collaboration with others and develops their teamworking skills [6].

Although the Internet is a vivid and helpful medium to make language learning more efficient, a successful result depends on how well a teacher implements and integrates it into classroom instruction. It is only due to the teacher's clear understanding of objectives, planning of coherent activities, searching for relevant resources, creativity and perseverance that make the Internet-based classes stimulating and valuable. The ESP course that the TPU is developing for engineering students is not purely Web-based. It can be called *blended*, as it combines traditional teaching with IT technologies. In order to integrate the suggested resources that form the ESP content being utilised, a free Web board is being engaged that allows not only classroom interaction to be arranged, but also the regulation of in-class and out-of-class activities; this is shown in Figure 2.

The Nicenet sever provides the Internet Classroom

The screenshot shows the Nicenet website interface. At the top, there is a header with the Nicenet logo and a navigation menu. The main content area is divided into several sections:

- Current News:** A list of news items with dates ranging from Dec 1st, 2004 to June 5th, 2004. The most recent news item is dated June 5th, 2004, and mentions that Nicenet now has 501(c)(3) status.
- Internet Classroom Assistant Traffic Report:** A section providing statistics on user activity, such as "In the last 10 minutes, 44 users have used the ICA." and "In the last 24 hours, 10,155 users have signed on."
- New Users Start Here:** A sidebar section with links for "Students" and "Teachers" to create or join a class. It also includes a "Current Users Log In" section with fields for Username, Password, and a "Log In" button.

At the bottom of the page, there is a footer with contact information and a copyright notice for 1996, 1997, 1998, and 2003.

Figure 2: A free Web board for arranging ESP classes.

Assistant (ICA), a sophisticated communication tool that brings powerful World Wide Web-based conferencing, personal messaging, document sharing, scheduling and link/resource sharing to a variety of learning environments. This system was designed not as a replacement for the classroom, but as a supplement allowing greater communication and sharing of information among students and between teachers and their students. It is very attractive, not only because it is absolutely free of charge, but also because it does not host any advertising. Moreover, a classroom can be set up in a few minutes (the registration process is not tiresome). Another technological feature is the low graphics environment that allows for pages to be loaded quickly and does not divert students' attention away from the main objective, which is studying.

The ICA is a learning environment that includes the following features:

- **Conferencing** allows for the creation of private, threaded conferencing on topics that are made for the class. Optionally, students can be allowed to create their own topics.
- **Scheduling** helps to put the class schedule online. With a seven-day advance view on the class homepage, students have a heads-up display of upcoming assignments and class events.
- **Document sharing** gives the opportunity for students and professors to publish their documents on the site using simple Web-based forms. No knowledge of HTML is needed. Automatically integrated with scheduling, students are one click away from turning in their assignments online, giving their peers feedback on published papers and receiving professors' comments.
- **Personal Messaging** is very similar to traditional e-mail, but fully integrated with document sharing and conferencing. This feature is a great way to communicate with, and between, individuals in the class, comment privately on conferencing postings or to give private feedback on published papers.
- **Link Sharing** allows for the exchange of links to pertinent Internet resources sorted by created topics [7].

There is also a list of class members, which is available to all the registered members, and it includes external e-mail addresses so that classmates are able to keep in touch after the course is over. The class administration is designed for non-specialists in programming. It is really user-friendly, very easy to operate and lets the professor change the type of users (giving them another status), allows for the deletion of

users and for defining preferences in conferencing and link-sharing options. This dynamic platform is utilised to integrate resources and organise computer-mediated communication effectively.

The key problem for ESP lecturers is involving engineering students to use English in class, especially in a meaningful way and more so orally. Although the ICA is not the tool to solve all the problems, it does give another chance to promote the use of written and oral language to communicate in an authentic way, as it allows for different types of interaction to be maintained, namely:

- Student-to-student (to generate richer exchanges of experiences, viewpoints, ways of life, cultural traditions and customs, and peer correction);
- Student-to-lecturer (to allow for individual or group help and guidance, and to foster peer or self-correction);
- Student-to-expert (to open up contact with the outside world, encourage discussion of real-world situations with professionals, and to broaden horizons through qualified knowledge and know-how);
- Student-to-online-resource (to encourage timely analysis and discussion of materials available online).

Activities developed for ESP classes have the objective of encouraging collaborative learning and teamwork. By working on joint projects, students learn to be determined, concentrated, responsible, supportive and guiding. All these features are essential for specialists in engineering. Another advantage to be obtained from computer-mediated communication is that it increases computer literacy, such as students learn keyboarding and net-surfing skills, as well as effectively utilising search engines, sorting information, brainstorming, discussing up-to-date issues and negotiating solutions.

Today's students belong to the *Generation Text*, meaning that they actively use the Internet and mobile instant messaging, quickly developing their own *lingua franca* [8]. Indeed, Lee has stated the following:

Now teenagers are taking charge and pushing the boundaries of written language. For them, expressions like "oic" (oh I see), "nm" (not much), "jk" (just kidding) and "lol" (laughing out loud), "brb" (be right back), "tyl" (talk to you later) are as standard as conventional English [8].

It is important to consider that the social life of young people relies on written communication as equally as on the spoken word. Thus, they should also be taught to draw the line between formal and informal ways of communication, practice etiquette in corresponding with other people and, in this sense, computer-mediated communication is the right choice.

The main principle of instruction for the TPU's ESP classes is based on the SMART teaching technique, first introduced by Prof. Krauss from Lewis and Clark College, Oregon, USA. According to Krauss' definition, SMART teaching is nothing but looking for available Web resources and (creating supporting materials) to ensure that lessons include as many of the following characteristics as possible:

- Synthesis of language and thinking skills;
- Motivating content and meaningful communication;
- Appropriate for culture, age and language ability of students;
- Relevant to curriculum and students lives;
- Tangible product with evaluation and feedback.

Internet resources are being combined in order to create different Web-based tasks, and to enhance all types of language skills, such as reading, writing, listening and speaking. Keeping in mind that about 80% of all information comes through the eye channel, Internet resources are being searched that not only reveal the required content, but also serve as substantial visual aids to increase the quality and quantity of understanding for memorisation, as shown in Figure 3.

This is a process-oriented approach and it helps to activate strategies for learning (*when they do, they understand*). For example, by changing the parameters of input voltage and the number of windings in a Java tutorial open for usage on one of the servers

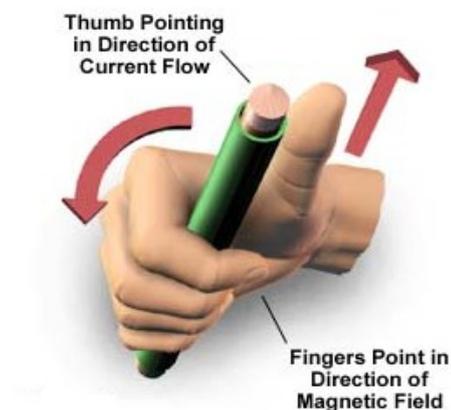


Figure 3: Visualisation of polarity of coils cutting through lines of force.

(<http://micro.magnet.fsu.edu>), students can visualise the changes in voltage output and have a better understanding of how a transformer works, as shown in Figure 4. By implementing these types of resources in the classroom, students are helped to gain the necessary content depth right to the core of a phenomenon, process or dependence. As far as it is presented and described in authentic language, it also teaches students the language simultaneously. ESP turns into a means, a tool that can be utilised to solve or further understand something.

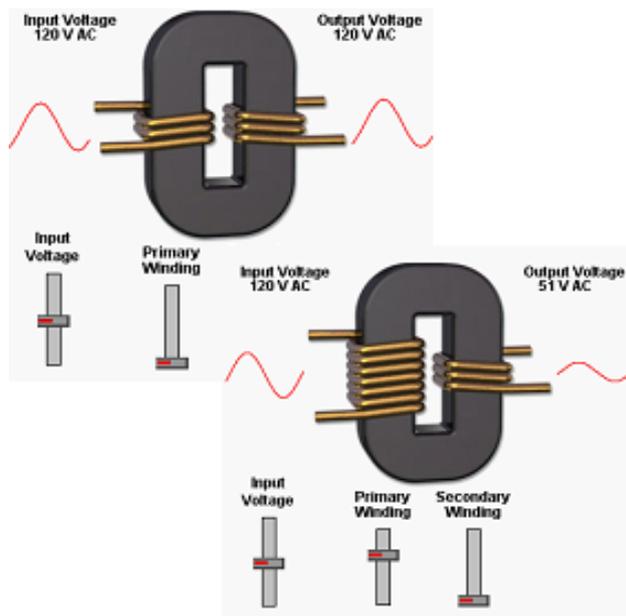


Figure 4: Java tutorial revealing the principles of transformer work.

Such a shift in language application refines students' abilities to learn English, as they overcome the psychological barrier to deal with a foreign language. It is no longer learned as a subject, but rather utilised as a tool to deal with professional tasks.

The TPU constantly involves its students in projects that are either performed individually or in a team, where they are assigned to investigate different sites, compile data and write reports concerning existing and potential engineering studies and explorations. The report is introduced orally in a class presentation that incorporates *PowerPoint*.

It is very important for engineers to be able to communicate information and ideas when speaking so that others can understand. Some things are supposed to be published online and it makes students feel more responsible and creative because it can be viewed by anyone who has Internet access. Teamwork and presentations before an audience also develops and hones skills to create and foster positive

and productive relationships in schools, homes and organisations all around the world.

Different Web-based activity formats are used at the TPU to teach ESP. Among them are well known topic hot lists, multimedia scrapbooks, treasure hunts, subject samplers, Web quests and scenarios. The chart in Figure 5 outlines the decisions that lead to choosing different Web-based formats.

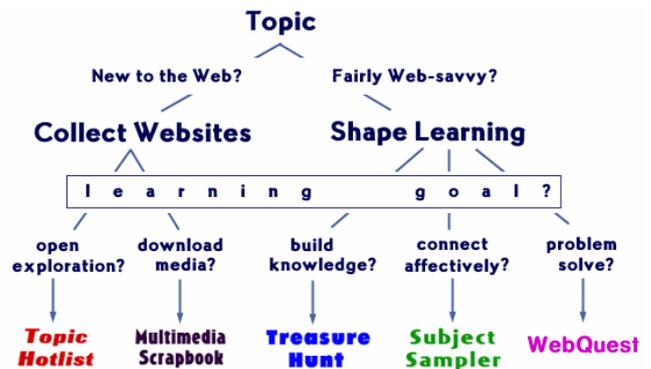


Figure 5: A screenshot from the ozline.com site.

This Web-based activity formats can be briefly described as follows:

- *Topic Hotlist* is a collection of sites that are considered to be most useful/interesting/peculiar on a certain topic. Compiling this will save learners hours of aimless surfing, but provide them with breadth of materials on the topic that they are studying. Having compiled the topic hot list, a lecturer can simply add Web resources to an activity or unit that is already prepared, with the only aim to extend or detail the information.
- *Multimedia Scrapbook* is utilised when students generate multimedia products as part of the learning process. Outcomes include the creation of newsletters, desktop slide presentations, HyperStudio stacks, etc. The Scrapbook focuses on providing links to a variety of media and content types (photographs, maps, stories, facts, quotations, sound clips, videos, virtual reality tours, etc). Learners use the Scrapbook links to explore aspects of the topic that they feel are important.
- *Treasure hunt* activities target the development of some solid knowledge on a subject. Gathering the sites should be crowned with a question that seeks to prompt students to look for information that teachers feel is critical to developing a body of knowledge in the topic. All the topic categories should be linked with the so-called culminating question that may lead to a discussion or an essay. This helps students to set their point of view forth forcefully.

- *Subject sampler* is an activity that provides learners with a smaller number (maybe half a dozen) of intriguing Web sites that are organised around a main topic. Students are asked about their perspectives on topics, comparisons to experiences that they have had, personal interpretations of artworks or data, etc. Thus, the right answer is considered not to be as important as getting students to be invited to join the community of learners surrounding the topic, for students to see that their views are valued in this context.
- *WebQuest* goes beyond learning facts and gets into *greyer* matter in a topic that students are dealing with. WebQuest is an inquiry activity that presents student groups with a challenging task, provides access to an abundance of usually online resources and scaffolds the learning process to prompt higher order thinking. The products of WebQuests are usually then put out to the world for some real feedback [9].

One example how the TPU incorporates the method of scenarios into ESP teaching is presented below.

ACTIVITY TITLE: Electricity

SUBJECT AREAS: Electromagnetism and Electrochemistry

YOUR INVESTIGATION:

Imagine that you are a great scientist who is living at the beginning of the 19th Century. Let's say that today is the 22nd of September, 1841. Moreover, today is your 50th birthday and you received a letter from a student studying at the Royal Institution. Apart from kind wishes and congratulatory words, he asks you several questions and expects your reply.

Give your reply to the young man.
(Before your giving a reply, learn how to write informal letters (<http://www1.oup.co.uk/elt/oald/pdfs/letters.pdf>).

Do some practical exercises (http://www.parapal-online.co.uk/exercises/infml_letter_t.html).

SITE TO SEARCH:
<http://www.ieee-virtual-museum.org/exhibit/exhibit.php?id=159249&lid=1> when looking through the site, be sure to find the answers to the following questions:

1. Guess which scientist you are representing?
2. What are you going to discover 2 years from now?
3. What scientific interests do you have?
4. What was named in your honour?
5. What is done each year to commemorate you?

An imaginary letter that students really receive is given below.

12 Amberley St
Newington, Butts
B14 9WK UK

16 September 1841

Dear Michael,

I know that your birthday is coming and feel happy to congratulate you on this occasion. I wish you to have a long and a happy life full of new inventions and discoveries! Your contribution to our science is truly great and I am proud to have you as our lecturer at the Royal Institution.

Recently, I've learned that you have invented a tiny electric motor. I am sorry to hear that you were to withdraw from electromagnetic research for several years just for the reason that you failed to acknowledge Wollaston and Davy's attempts to design an electric motor. It's great that the truth came out to the daylight and you are appreciated and recognized as one of the greatest scientists!!! I still can't find any good resource to learn how a magnet makes a DC motor work. Could you explain the main principles to me? I would be grateful if you explain in simple words what an induction and electromagnetic generator mean.

Thank you in advance.

Best wishes,

John Brewley

By completing the task, students learn how to scan read, sort and analyse the information that they are dealing with. They learn to activate their logic and creative thinking, because they are supposed to find out that they are representing Michael Faraday, who gave lectures at the Royal Institution and celebrated his 50th birthday on 22 September.

Students gain some cultural and historical information about the epoch of the great scientific inventions and further develop their background knowledge. Additionally, students learn how to write informal letters and how to explain in simple words some fundamental theoretical and practical scientific questions. All these objectives are achieved in such an activity format and there is only one site for thorough investigation: a Virtual Museum of Electricity.

CONCLUSIONS

Arranging effective ESP teaching is a serious and current task for engineering education institutions. Learning ESP should be based on a rich and authentic content. Only then will it prepare students for tackling professional problems in real life.

The Internet is a means by which, if implemented in a creative way, students can develop personal features, professional knowledge and soft skills that are vitally important for modern engineers. By implementing Web-based activities, ESP teachers may proverbially *kill three birds with one stone*, as follows:

- Develop knowledge and skills in English for Specific Purposes (ESP);
- Revise a major subject that they have learned in their native language;
- Inculcate in students the taste for life-long learning.

The Internet provides an abundance of ideas and offers many means (tools) on how to realise them. The Internet helps to make ESP lessons more rewarding and encourages opening the way to bring about creativity and enthusiasm for learning, but it also demands new ways of organising classrooms, and this seems to be quite challenging.

The Internet is quite vast and complex and it continues to change quickly, altering people's lives and activities. That is why working the Web for teaching has been compared to *...trying to get a drink of water from a gushing fire hydrant!* [6].

Nevertheless, it is believed that the Internet can be subjugated to main pedagogical principles and integrated effectively into ESP classes.

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BIOGRAPHIES



Prof. Alexander I. Chuchalin is Vice Rector for Strategic Management at Tomsk Polytechnic University (TPU), Tomsk, Russia. He is an active member of the International Academy of Science in Higher Education, Member of the International Energy Academy, and a fully-fledged member

of the Quality Assurance Academy.

Prof. Chuchalin received his engineering degree and PhD from Tomsk Polytechnic Institute, and the DSc Degree from VNIIElectromash (St Petersburg) in 1974, 1979 and 1991, respectively, all in electrical engineering. From 1974 to the present moment, Prof. Chuchalin has progressed through various positions, including postgraduate; engineer; Assistant Lecturer, Associate Professor; Professor; Vice Rector for Academic Affairs; the First Vice Rector; and Vice Rector for Strategic Management of TPU.

Prof. Chuchalin has completed many professional development programmes. Here are just a few: English language enhancement (TPU, 1992-1993 and Warwick University, 1997), Principles of Scientific Management (Training Center for Managers, St Petersburg, 1995), Management for the Higher Educational Institution (Ohio State University, 1996 and 2000), British Council Programme, *Enhancing the Student Experience* (Bath, 2005), etc.

He is the head and a manager of the comprehensive programme, *Enhancement of Educational Activities at the TPU* (from 1994) and *Development of TPU Management* (from 2001). Prof. Chuchalin is an expert of the Russian Fund of Attestation, Accreditation and Scientific Expertise (Moscow) (from 1996), is the Head of the Methodic Committee at the Foundation for International Accreditation and Certification Assistance from 2003, and the chairman of the Seminar series for Russian Rectors and Vice-Rectors, *Higher Educational Institutions Development and Quality of Education Enhancement in New Social and Economical Conditions* from 1996-2004.

He is also the Head of Siberian Branch of Independent Accreditation Center (Moscow) from 1997 and Chairman of the Accreditation Center of the Russian Association for Engineering Education (RAEE) since 2002.

Further, since 1998, he has been the Governor of the International Accreditation Programme at the TPU: OUVS (UK), ABET (USA), GATE (USA), CEAB (Canada). He is also the Coordinator of the British Council programme, *REAP*, from 1998, a member of the Steering Committee Project, EUR-ACE, from 2004, a member of the Capacity Building Committee World Federation of Engineering Organizations since 2004, and a chief of the *Management of Educational Services and Specialist Training Quality in TPU* project from 1999.

Prof. Chuchalin has developed and has been successfully delivering the course, *Mathematical Simulation in Electromechanics*. His research interests include pulsed power electromechanical converters, mathematical simulation in electrical engineering, computer-aided teaching and training systems in education, IT technologies in education, problems in engineering education, distance learning and higher education institution management. His responsibilities cover managerial activities at the TPU, governance of innovation projects, and the integration of the TPU into the global education area.

Prof. Chuchalin is also the Director of the *Central Asia Centre for Engineering Education* (CACEE), a satellite centre of the UICEE based at the TPU, which is a Partner institution of the UICEE. In 2000, at the *1st Russian Seminar on Engineering Education*, staged at the TPU, Prof. Chuchalin received the prestigious UICEE Silver Badge of Honour for his outstanding contributions to global engineering education and the achievements of the UICEE.

Prof. Chuchalin has had over 100 scientific papers published, as well as one monograph and two textbooks, and has obtained 22 patents.



Mrs Elena A. Danilova is a lecturer in English for Specific Purposes (ESP) at Tomsk Polytechnic University (TPU), Tomsk, Russia. In 1998, she was awarded an honours diploma from Tomsk State Pedagogical University (TSPU) in the field of linguistics and teaching foreign languages (English and German).

In 2002, she obtained her Certificate in Advanced English (CAE), which is the second highest level Cambridge ESOL examination, at level C1 of the Council of Europe's Common European Framework of Reference for Languages. In 2004, she became an alumnus of the professional development programme when she completed the online course, *Integrating the Internet into the Classroom*.

Her teaching experience started two years before her graduation from the TSPU. When she was still a student, she began to seek for, and implement, methods for teaching English to 4-6 year olds in the nursery school. This experience was very rewarding because if a teacher succeeds in coping with infants, then he/she will be able to deal with students of any age group.

In 1998, she obtained a lecturer position at Tomsk State University in the Department of Roman-Germanic Philology. Since 2002, she has been teaching languages at Tomsk Polytechnic University in the Institute of Foreign Languages, Department of Linguistics and Cross-cultural Communication and Institute for International Education. She has enriched her teaching experience by tutoring international students for PET, KET and FCE at Solihull College, West Midlands, UK and Harvest English Institute, Newark, USA.

Elena Danilova finds her teaching profession very noble and responsible, in accordance with the words of Henry Adams: *a teacher affects eternity; he can never tell where his influence stops*. To make her influence the most efficient, she began a research project on using IT technologies for ESP teaching. The field of her scientific endeavour includes the following areas: developing new methods for teaching English to engineers using IT technologies; teaching English online and/or using Internet resources and technologies; implementing a process-oriented approach, and motivating and rewarding learning styles; researching and learning how to design courses on the basis of learning management systems like *WebCT*, *Learning Space*, etc; and developing self-study activities for engineering students.