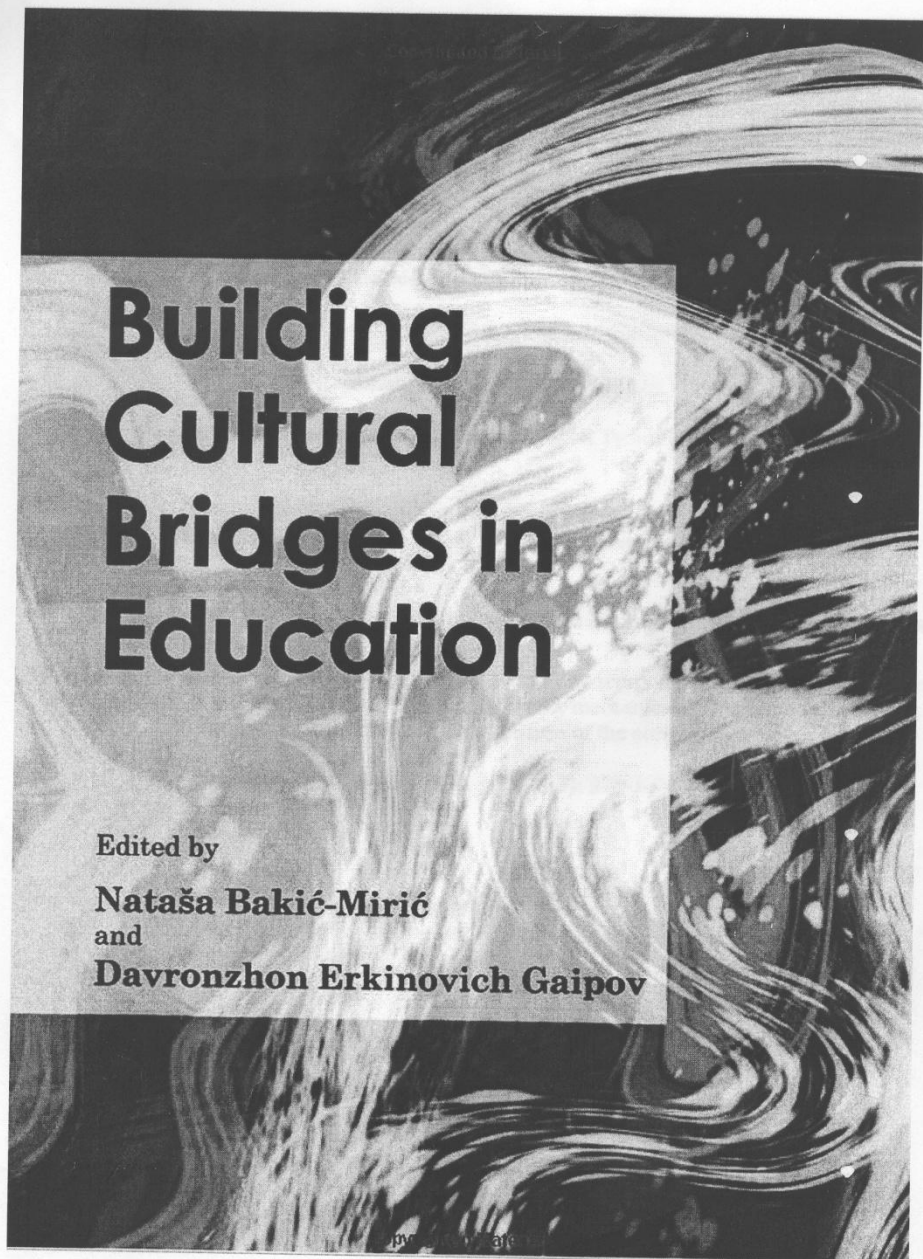


Erkinovich, Davronzhon



Building Cultural Bridges in Education

Edited by
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Nataša Bakić-Mirić introduces intercultural communication as a medium of cultural diplomacy. In her vivid discussion, she also focuses on how it helps people to foster mutual understanding when interacting with the culturally different others and how it reduces misunderstandings between cultures.

Madina Ashirimbetova and Shynar Baigozha cover an enlightening topic on how Kazakhs see Americans and how stereotypes influence the judgements we often have about other people.

Aliya Aimoldina and Sholpan Zharkynbekova investigate rhetorical features in business letter writing by Kazakhstani students taking the English for Business Purposes course as well as the current linguistic situation in Kazakhstan and a political directive on trilingual policy in Kazakhstani intercultural business communication.

Nadežda Stojković and Slađana Živković propose that today, English for Specific Purposes (ESP) is not just a language of professional and technical occupations but a medium of contemporary ideology of globalization that creates our reality. In the authors' opinion, ESP can be seen as a tool that enhances skills and knowledge attained for both professional development and career advancement to comply with the needs of the global economy.

Sholpan Gumarova and Lidiya Strautman discuss the invaluable benefits of using internet video lessons in the course English for Physics as one of the most successful methods of stimulating students' interest. Additionally, the paper considers the types of classroom activities based on internet video materials.

Reza Pishgadam and Bob Adamson give a new outlook on the applied ELT and textbooks used in the classroom. They suggest that ELT textbooks should be written to enhance both intelligence and language proficiency.

Damira Akunova, Sholpan Zharkynbekova and Atikul Agmanova present interesting research on the analysis of the current state of English in the educational space of Kazakhstan. Their paper also investigates the place, role and peculiarities of the function of the English language in the higher educational system. Additionally, they highlight the use of code switching as one of the main peculiarities of bilingualism among Kazakhstani university students.

Juldyz Smagulova and David Landis critically examine current school literacy teaching practices in Kazakhstan. They draw on ethnographic

CHAPTER EIGHT

INTERNET RESOURCES IN TEACHING ENGLISH FOR STUDENTS OF PHYSICS

SHOLPAN B. GUMAROVA,
LIDIYA E. STRAUTMAN

Outline

The usage of Internet resources has become an integral part of the course "English for Professional Purposes" at the faculty of technical physics, Al-Farabi Kazakh National University. One of the most successful methods arising students' interest is the usage of Internet video lessons. The paper considers the types of classroom activities based on the Internet video materials.

1. Introduction

The new educational environment requires the development of new approaches to teaching technical English. In order to maintain students' interest to studies it is necessary to introduce new types of activities. The usage of Internet resources has become an integral part of the course "English for Professional Purposes" at the faculty of technical physics, Al-Farabi Kazakh National University. A limited choice of ESP textbooks (more precisely, English for physicists) makes it necessary to search for more efficient methods in teaching technical English. One of the most successful methods arising students' interest is the usage of Internet video lessons.

The implementation of new technologies has become a reality not only in teaching natural sciences but also in teaching English. The table below shows the steps of implementation of new instruments in the English language classroom in Kazakhstan.

Time period Materials	The Soviet era	The era of the 1990s	The era of the 2000s
Textbooks	Soviet textbooks	Soviet textbooks	A wide range of textbooks written and published in Russia and Kazakhstan
		A limited range of British textbooks, no specialized textbooks in Technical English)	A wide range of British textbooks, however, still insufficient number of books on technical English
Audio materials	Difficult to find audio materials	A limited range of audio cassettes	A large variety of audio cassettes and CD disks
Video materials	Very difficult to find films (usually old films with very bad sound)	A limited number of video films	A large variety of video recordings, films, Internet videos
Computers + Internet	Not available	Very few computers A limited access to the Internet	Computers are available to all students All students have access to the Internet through computers and telephones

The scale presents the technologies used in teaching English in our country. In spite of a wide range of teaching materials in General and Business English, the situation with Technical English is quite different. However strange it may seem but textbooks on technical English are either not available or irrelevant. Why is relevance so important? Why, nowadays, having so many textbooks it is difficult to find a textbook that will suit your needs? For teaching General English different multi-level text-books have been developed. The task of the teacher is to determine the level of the students and to provide them with the text-books of the corresponding level. The above-described changes in the educational environment required changes in the methodology of teaching English. In this paper we will consider the usage of new technologies in teaching Technical English.

2. Current situation in teaching English for Physicists

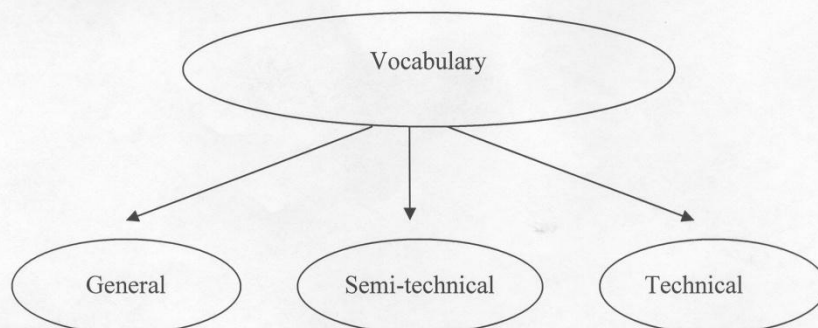
The situation in teaching technical English is not so simple. The limited number of hours makes it necessary to search for the most suitable material and new strategies which would improve the efficiency of its usage. The key factor is the response to the demands of the new educational environment when more and more English-speaking scientists reading lectures on physics in English come to the University and new disciplines in English are included in the curriculum. It should be noted that now the students are more interested in the subject of their study than in general English. Even the texts about film stars do not arouse such an interest as the texts on physics. The students are focused on their future needs which include listening to English-speaking reporters and reading scientific articles, journals, catalogues, books on subject matter and instruction manuals in English. The students are especially motivated by the lectures on special subjects in English. They not only motivate them to learn English but also to enrich their vocabulary. One of the approaches arising students' interest is the usage of the methods called "reading-to-do-skills", which means giving instructions to some practical applications. This method is especially useful in describing the steps in laboratory work done by the students. For example, a quick geometry lesson explains the use of Pythagoras's theorem in practice in plain English:

Measure a length of timber for one of the sides adjacent to the right **angle**. It is 3 feet long. **Square** that number - 3 **multiplied by** 3 equals 9. Do the same with the other side adjacent to the **right angle**. Work out the square of the number. Then calculate the **square root** of the sum of two numbers.

What we see here is a very simple text containing six technical or semi-technical words but no matter how simple it might seem at first, in fact, it elicits one of the main questions in teaching ESP: Which vocabulary type should the ESP teacher teach? In his research related to vocabulary learning Nation (2001) stated:

"It is wise to direct vocabulary learning to more specialized areas when a learner has mastered 2000-3000 words of general usefulness in English" (187).

Learners oriented on academic study in English must focus on academic vocabulary known as "general useful scientific vocabulary" or "semi-technical vocabulary" because they need to exhibit a wide range of academic skills like reading research papers in their own field, listening to lecturers, discussing and presenting their own methods and results. Therefore semi-technical vocabulary should be given priority by ESP teachers as this vocabulary is used in everyday life but has a frequent occurrence in academic descriptions and discussions (Dudley-Evans & Johns 1998, 87).



Let us consider a passage from the text taken from the book on solid state physics:

Adhesion strength was evaluated by tensile adhesion test by using a testing machine at a cross-head speed of 0.5 mm/min. Before measurements the specimens were filled with acrylic resin in a vacuum dryer and cured at 150^o for 1h to prevent adhesive penetration. After removing the protruded acrylic resin, the specimens were fixed with tensile jigs using epoxy adhesives and then cured at 150^o for 2 h. The tensile strength of the epoxy adhesive was only 60-70 Mpa.

The teachers, advocating the idea of using only authentic texts in the process of teaching, may applaud. It is an authentic text, but it can hardly be useful for students. What does the above example give us? The text contains too many specific words used only in a narrow field. In terms of relevancy or irrelevancy the text is irrelevant for Bachelor and Master Course students. Will this text be useful for the student if it is included in the textbook? The answer is "No."

A new generation of textbooks (such as, "English for Technical Universities" by Radovel (2010), "English for Physicists" by Kurashvili (2004) offer more varied exercises as compared with the textbooks of the Soviet period, which did not include any attention-grabbing exercises such as crosswords, and did not give much place for revision. For example, Radovel (2010) includes multiple-choice exercises, which was unusual for the textbooks of the Soviet period, and a section entitled "Enjoy Yourself" containing quiz-games, the type of activity gaining the highest score in students' questionnaires, crosswords and dominoes (matching of two parts of the card). An example of a quiz-game:

1. In which landing module did American astronauts descend on the Moon?

a) Apollo

b) Eagle

c) Explorer

d) Discovery

2. What process breaks unstable nuclei into smaller ones releasing a great amount of energy?

a) fusion

b) fraction

c) function

d) fission

However, the textbook does not contain either interactive exercises, which stimulate students' participation in the learning process, or "listening" exercises.

3. Development of task-based learning in English for Physicists

For many years ESP instruction was limited to training special lexis and translating numerous texts. Of course, such methods did not reflect students' interests and resulted in low learner motivation and poor participation. With the spread of the student-centered approach in Kazakhstan and the continued increase of international contacts in various spheres, much attention has been paid to the design of profession-oriented courses that can prepare students for professional communication. In some specific subjects (such as mechanics, molecular, atomic physics, etc) the students are given various interactive tasks. For example, in the nuclear physics course they simulate the operation of a nuclear power plant.

Therefore to make students more motivated we had to introduce new approaches in teaching Technical English. It had to be done because most textbooks and teaching aids in Technical English have no listening exercises. The situation with teaching Technical English is described by Martin Hewings in "A History of ESP through English for specific purposes" where he shows that 87% of ESP papers are devoted to reading and only 13% to speaking. The paper shows that listening and speaking skills get too little attention in the Technical English classes.

However, the textbooks available to teachers may be suitable only for the first purpose and even reading scientific texts is impossible without reading formulas and, hence, without knowing how to pronounce them. Let us take an extract from the text-book on reactors and accelerators. We see that the short text contains several formulas and if the students do not know how to pronounce them, they will not be able to read it. Very often the students just read the text and skip formulas as they do not know what to do with them.

SINUSOIDAL RF FIELD is an accelerating alternating field applied between the dees so that the half-period of sinusoidal oscillations was equal to the time of the ion motion inside the dees

$U = U_0 \cos(2\pi ft) = U_0 \cos(2\pi t / T) \rightarrow$ (U is equal to U(zero) times cosine of (2 pi f t) equal to U(zero) times cosine of (2 pi t over T)

Let us derive the formula of W dependence on H and r:

$W = mv^2/2 = |r=cvm/eH| = (e^2/2mc^2)(Hr)^2 \rightarrow$ W is equal to mv squared divided by 2 where r is equal to cvm divided by eH equal to e squared divided by 2mc squared times Hr squared.

And now let us read the following paragraph:

Thus, increasing the H 2-fold, the energy increases 4 times for the same r. Conversely, increasing the r 2 times in the same field, we obtain the same W.

We see that the short text contains several formulas and if the students do not know how to pronounce them, they will not be able to read it. Very often the students just read the text and skip formulas as they do not know what to do with them.

The only solution to the problem is to learn how to read formulas and even how to pronounce letters in them. We have to provide students with the ability to understand lectures and presentations in English and to make reports. To solve this problem it is necessary to have audio and video material that enables students to listen to the lectures. Nowadays the Internet provides an unlimited choice of such a material but the main problem is to find the material relevant for our classes.

We studied different sites and different materials and made a bank of YouTube videos suitable for our students. The main objective was to find the material containing formulas and their explanations because the most difficult thing is to teach reading formulas without listening to them. The students were given videos as their "self-study" tasks. Their home task was to watch the video (all the students have an access to the Internet through their computers or telephones) and to make written translations of the parts given by the teacher. The students had to learn how to read simple formulas, how to pronounce the units of measurement, how to read mathematical operations. And it is impossible to fulfill these tasks without video. Some materials were used in the classroom. Based on the computer presentations, the students made their own short presentations using mathematical formulas.

In our work we tried different video presentations but the most suitable for our purposes is the course APlusPhysics.com developed and presented by Dan Fullerton. It should be noted that all video courses used for teaching purposes are free Internet resources. The students learn how to read formulas, how to read mathematical calculations and, in general, listen to presentations of physical texts. A specific feature of Fullerton's lectures, making them especially useful for our students, is presenting of most of the definitions in a written form on the screen, so that the students can not only listen but also read definitions and formulas. For example, in the presentation "Wave Equations" we see on the screen "Electromagnetic waves moving through a vacuum travel at a speed 3×10^8 m/s." The phrase is highlighted when it is pronounced. This is an additional help. Being developed as a course of physics, it turns out to be extremely useful as a source of learning English for the students of the Physico-technical faculty. Here are two examples from the video lessons "Models of Atoms":

Problems with Rutherford Model
<ul style="list-style-type: none">• Electrons remain in orbit as opposed to deteriorating into nucleus• Atoms emit and absorb EM radiation only at specific frequencies

Sample Problem

Calculate the energy and the wavelength of the emitted photon when an electron moves from an energy level of -1.51 eV to -13.6 eV .

$$E_{\text{photon}} = E_i - E_f = (-1.5 \text{ eV}) - (-13.6 \text{ eV}) = 12.09 \text{ eV}$$

$$\frac{12.09 \text{ eV}}{1 \text{ eV}} \cdot 1.6 \cdot 10^{-19} \text{ J} = 1.93 \cdot 10^{-18} \text{ J}$$

$$E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{E} = (6.63 \cdot 10^{-34} \text{ J} \cdot \text{s}) (3 \cdot 10^8 \text{ m/s})$$

The students listen to the text, read the text on the screen, repeat pronunciation of formulae after the lecturer, then practice solving the problems on the screen of the computer. Then we show the image without sound and the students try to make presentations.

The special tasks were developed for the videos given to the students. For example, after watching video presentation the students had to fill in the gaps or to match the lines in the text related to the video. Here we present an example of the task the students had to do after watching the video "Models of Atoms":

Interactive tasks for physicists

Fill in the blanks with the appropriate words from the list given below.

1. Radioactive elements were found to ... off other types of radiation.
2. Atoms can be neutral and positively or negatively ...
3. If an atom ... one or more electrons, a negative ion is formed.
4. Antimatter is composed of antiatoms made of negative ... in their centres.
5. Because protons ... each other the nuclei must fly apart – but they don't.
6. If the earth's were iron, its total quantity within the earth would be at least 35%.

a) charged, b) nuclei, c) repel, d) give, e) core, f) gains

To check their answers the students clicked on the icon "Check" and so the result where incorrect answers were colored in red.

Interactive tasks for physicists

Fill in the blanks with the appropriate words from the list given below.

1. Radioactive elements were found to *gain* off other types of radiation.
2. Atoms can be neutral and positively or negatively *charged*.
3. If an atom *give* one or more electrons, a negative ion is formed.
4. Antimatter is composed of antiatoms made of negative *nuclei* in their centres.
5. Because protons *repel* each other the nuclei must fly apart – but they don't.
6. If the earth's *core* were iron, its total quantity within the earth would be at least 35%.

Conclusion

Teaching of English for Physics requires development of new approaches to teaching technical English. To be competitive in this field it is necessary to include into work with specialized texts not only reading, translation and memorizing words, but also watching video presentations, listening to oral explanations of formulas, learning of physical units of measurements and interactive activities arising more active students' participation in classroom activities.

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