EXPERIMENTAL VERIFICATION OF TEACHING SPEAKING EFFICIENCY USING BUSINESS GAME IN THE FIELD OF INFORMATION SECURITY

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Abstract. Applying business games has proved to be effective in different fields of education. This paper is devoted to the results of an experiment conducted in the National Technical University of Ukraine ‘Kyiv Polytechnic Institute’ (NTUU ‘KPI’), where business game was used to teach students whose future occupation will be connected with information security and who will work in the information technology (IT) sector. Stages of experiment are described and statistical data proving the efficiency of using business game in teaching English for specific purposes is presented.

Key words: business game, higher education, information security, pedagogical experiment, assessment criteria, mathematical methods for data processing, skills-oriented model.

Introduction

Teaching English for specific purposes in the university requires constant search for new ways to improve it due to limited time that is given for the discipline. Taking into account that focus in educational process in general and language teaching itself is shifted from classroom work to self-study, methods used in technical universities should be reconsidered.

It is important to note that there are various terms used by the teachers to talk about business games. Analysis of literature showed that there are such major categories as role-play, simulation and business game. We believe that all the educational games are based on simulation, whereas in professional education terminology role-plays focus on social roles that are played in everyday life; simulations are used to model the environment (as computer simulations) or model economic relations (as business simulations). Some authors, as L. Ananieva (2002), think that business game is a situational exercise; L. Volkova (2006) considers it to be a method of teaching. E. Zeyer (2006, p. 152) applies it as a way of testing. We agree with M. Domozhировa (2002) who defined business game as a technology and method of vocational training that is implemented by designing a set of communicative situations and is used to teach and control group interaction.

In the previous works (Konoplenko (1-3) (2014)) we dealt with certain questions connected with business games. This problem is not new in teaching methodology, to demonstrate the topicality let us mention just several names of scientists who contributed to development of business games in higher educational institutions of Post-Soviet states in the twenty-first century: in economics these are L. Volkova (2006), M. Domozhirova (2002), J. Druz (2000), in pedagogy - L. Ananieva (2002), J. Budas (2010), M. Vorovka (2007), in training interpreters and translators - N. Herasimova (2011), in jurisprudence - T. Bocharova (2006), L. Ievdokimova (2007), in tourism – M. Bochkareva (2007), N. Bokareva (2011). Unfortunately we could not find any business games that would address the needs of information security experts being not connected to military and intelligence affairs; that is why business game based on the curriculum of the third-year students of the Institute of physics and technology of NTUU ‘KPI’ and Agile methodology used in the IT was developed by L. Konoplenko and E. Korobov (2014).

Method

After designing the game, a pedagogical experiment checking its efficiency was conducted. We relied on the propositions of P. Gurvich (1980) concerning the type, stages of experimental work and on E. Sidorenko (2007) for gathering and processing mathematical and statistical data.
The hypothesis was the following: speaking skills of the students, whose speciality is information security, can be improved with the help of a business game. For the game to be successful, professional experience, individual psychological characteristics of students and aforementioned interdisciplinary aspects should be taken into account. The main tasks for the experiment were to define the target group of students, design two models of the game, define assessment criteria, prepare all the necessary materials and conduct the experiment.

It is a debatable question if the results of the experiment are more reliable if the students know they are a part of the experiment or not. In our case students (two academic groups of the third-year students) were informed that they were going to participate in a business game, though we did not emphasize that it was an experiment.

As it was mentioned before, two models of the game were designed. The game lasted three months, and students simulated different amount of business meetings. According to the first variant we focused on simulating meetings of the same type (refer to Konoplenko and Korobov (2014) for details) several times: the first month was devoted to preparation; during the following two months the students simulated business meetings in every lesson. In another variant we followed the presentation – practice - production approach: more time was spent on preparation for the meetings, every meeting was simulated just once.

Before the experiment students had a placement testing to check their language knowledge and skills. They were asked to produce dialogues in pairs, then in teams of three - four students (a polylogue) on the given topics using the scheme and to complete a multiple choice test (individually). Below are fragments of two tasks. Please, note that not the full scheme of the dialogue is provided.

### Table 1

Fragments of placement test tasks.

<table>
<thead>
<tr>
<th>Task 1. Work in pairs. You work in the IT department of a newly opened bank. Discuss authorization methods that should be implemented: tokens (ID cards, smart cards), biometrics (iris texture, face/fingerprint recognition). Use the following scheme.</th>
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<tbody>
<tr>
<td><strong>Student A.</strong> Propose methods.</td>
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<td>Task 2. Choose the correct answer. The message can be encrypted <em>a mathematical procedure called an encryption algorithm.</em></td>
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<td>A used</td>
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</table>

Criteria of speaking assessment included profession-related and language/skills-related ones. The first group meant producing content appropriate to the situation: following the professional role, not monopolizing discussion and using proper register and terminology. The criteria in this group are reaching communicative goal (CG), showing sufficient level of professional relevance (PR) and turn-taking or interaction (I). Language/skills-related criteria were accuracy (grammar and lexical correctness) and fluency (pace and hesitation pauses). Students could score 100 points for the test where 90 points were given for speaking and 10 – for a multiple-choice test. In our research we apply content-based approach; that is why maximum score for different criteria was 60 for reaching communicative goal and being professionally relevant and 30 for being accurate and fluent in both dialogues.

In order for the speaking test to be more objective, we used ‘activity coefficient’. It is obvious that every person produces different amount of phrases in the dialogue, it influences the amount of mistakes that can be made. This coefficient can be calculated the following way. First, group activity coefficient is calculated by the formula: \(CA_g = \frac{A_1 + A_2 + \ldots + A_n}{n}\), where \(A_1, A_2, A_n\) are the amount of phrases of students, \(n\) is number of students in the group.

After that individual activity coefficient depending on the group coefficient is calculated by the formula: \(CA_i = \frac{A_i}{CA_g}\).

And final score is calculated by the formula: \(S = P \times CA_i\), where \(P\) is number of points before calculating the coefficient.

After the experiment the same type of a test to check the progress was set.
Results

As it was mentioned before, there were two test groups where amount of students was 34 (17 persons in each group). The average result of the placement test in experimental group 1 (EGL1) was 3, and in experimental group 2 (EGL2) – 4,5. Table 2 contains the results for speaking tasks according to the criteria.

<table>
<thead>
<tr>
<th>Average results of the placement test</th>
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<tbody>
<tr>
<td>CG</td>
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<tr>
<td>EG-1</td>
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<td>EG-2</td>
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A typical stage in pedagogical experiment is defining the learning coefficient that shows the language proficiency and is calculated by V. Bespalko’s (1968) formula K= Q/N, where Q is student’s score and N is maximum score. In experimental group 1 average learning coefficient before the experiment was 0,4, in EGL2 – 0,5.

After the experiment the average result of the final test in both groups was 6. Table 3 contains the results for speaking tasks according to the criteria.

<table>
<thead>
<tr>
<th>Average results of the final test</th>
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<tr>
<td>CG</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>EG-1</td>
</tr>
<tr>
<td>EG-2</td>
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</tbody>
</table>

The results of calculating the average learning coefficient at this stage were the following: in EG-1 it was 0,67, in another group it was 0,7. These results indicate the positive dynamics in both groups.

The results of the experiment were further analysed using mathematical methods for data processing (Sidorenko (2007, p.162)). F-distribution (or F-test) made evaluation of two samplings (EG-1 and EG-2) possible. The hypotheses for this test were the following. Н₀: A number of persons whose learning coefficient increased in EG-1 is less than in EG-2; whereas Н₁ states the opposite: number of such people is greater in EG-1. It was assumed that 2 point increase (e.g. from 0,3 to 0,5) would be considered as ‘effect’. In EG-1 there were 14 successful persons (or 82%), whereas in EG-2 there were 7 (or 41%) of them.

Angle φ can be defined with the help of the table available in the work of E. Sidorenko (2007, p.332). In our case angles of EG-1 and EG-2 were φ₁=2,265, φ₂=1,390.

F-distribution (φ *) was calculated by the formula:

\[
φ^* = (\frac{φ_1 - φ_2}{\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}), \text{ where } n_1 \text{ and } n_2 \text{ are a number of students in EG-1 and EG-2. So:}
\]

\[
φ^* = (2,265 - 1,390) - \sqrt{\frac{1}{7} + \frac{1}{17}} = 0,875 - \sqrt{\frac{20}{84}} = 2,551.
\]

According to the levels of statistical significance (1,64 ≤ φ* ≤ 2,31), φ* exceeds the critical. The diagram below shows the results of calculations.

Fig. 1. Axis of significance.

So hypothesis Н₀ is refuted and Н₁ is accepted.
Based on the results of the experiment we can make a conclusion that the first model of the business game proved to be more effective in teaching speaking to students whose future profession will be connected with information security. This model is more skills-oriented than the second one which is more knowledge-oriented, so we can assume that the modern paradigm of education proves itself.

The research one more time emphasized that using active methods such as business games in the lessons of English for specific purposes is effective and thus important. Relevance of the designed business game was due to the close-to-real context provided in it; the game helped to stimulate students’ interest in the discipline and showed them the application of their knowledge and skills. Nevertheless, the model created is basic for further development of other (probably more complex) business games not only for information security students, but for a wider range of IT specialities.

References


