

# 42

## THE MOTIVATION OF MASTER'S STUDENTS WITH THE USE OF ONLINE COURSES

### LA MOTIVACIÓN DE ESTUDIANTES DE MAESTRÍA CON EL USO DE CURSOS ON-LINE

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#### ABSTRACT

Currently, the number of online courses and the demand for e-learning are growing, which is often due to the flexibility this training format provides and the relatively low cost of training. At the same time, only 10-15% of students successfully complete the course. There are a number of external and internal factors that influence the successful completion of an online course. We have developed 3 online ESP courses for graduate students (majoring in Industrial Pharmacy, Psychology, Public Health and Healthcare) and an online ESP course for undergraduate students of clinical faculties. Courses for graduate students were implemented as part of their major for master's programs while the course for undergraduate students was offered as a minor. All courses were developed in accordance with the approved course outline, hosted on the Moodle platform, contained elements of interactivity (interactive lectures, interactive simulator), control was carried out using MCQ tests, and students were also offered creative assignments (they were checked manually

by teachers). All online courses have undergone a three-stage examination, which guarantees the quality of the course in terms of content and technical implementation. Despite a number of similarities between these courses (from the point of view of organization), performance in the courses for graduate students and the course for undergraduates was significantly different (95.5% of graduate students and 13% of undergraduates successfully completed their studies). Mastering an online course requires a high degree of self-organization, so this format of work is most likely appropriate for graduates and PhD students. In this study, a mathematical model was built that makes it possible to predict with a high degree of confidence (96%) whether a student will successfully complete the online course.

#### Keywords:

Online course, English for specific purposes, medical university, academic performance, e-learning.

## RESUMEN

Actualmente, el número de cursos en línea y la demanda de e-learning están creciendo, lo que a menudo se debe a la flexibilidad que ofrece este formato de formación y al coste relativamente bajo de la formación. Al mismo tiempo, solo entre el 10 y el 15% de los estudiantes completan con éxito el curso. Hay una serie de factores externos e internos que influyen en la finalización exitosa de un curso en línea. Hemos desarrollado 3 cursos de ESP en línea para estudiantes de posgrado (con mención en Farmacia Industrial, Psicología, Salud Pública y Salud) y un curso de ESP en línea para estudiantes de pregrado de facultades clínicas. Los cursos para estudiantes de posgrado se implementaron como parte de su especialización para programas de maestría, mientras que el curso para estudiantes de pregrado se ofreció como menor. Todos los cursos se desarrollaron de acuerdo con el esquema del curso aprobado, se alojaron en la plataforma Moodle, contenían elementos de interactividad (conferencias interactivas, simulador interactivo), el control se llevó a cabo mediante pruebas MCQ y a los estudiantes también se les ofrecieron tareas creativas (se verificaron manualmente por los profesores). Todos los cursos en línea se han sometido a un examen de tres etapas, lo que garantiza la calidad del curso en términos de contenido e implementación técnica. A pesar de una serie de similitudes entre estos cursos (desde el punto de vista de la organización), el desempeño en los cursos para estudiantes de posgrado y en el curso para estudiantes universitarios fue significativamente diferente (95,5% de los estudiantes de posgrado y 13% de los estudiantes universitarios completaron con éxito sus estudios). Dominar un curso en línea requiere un alto grado de autoorganización, por lo que este formato de trabajo probablemente sea apropiado para graduados y estudiantes de doctorado. En este estudio se construyó un modelo matemático que permite predecir con un alto grado de confianza (96%) si un estudiante completará exitosamente el curso en línea.

### Palabras clave:

Curso en línea, inglés para fines específicos, universidad médica, rendimiento académico, e-learning.

## INTRODUCTION

Online courses are being actively introduced in higher education (Seaman et al., 2018; Johnson et al., 2019), which is due, on the one hand, to the demand of students, and on the other hand, to economic factors (Limperos et al., 2015). Over the past two decades, there has been a steady increase in the number of online courses offered

by universities around the world by at least 10% (Shaikh & Asif, 2022).

At the same time, a number of studies (Kumar et al., 2019; Shaikh & Asif, 2022) emphasize that the effectiveness of face-to-face and online classes is at the same level. The popularity of online courses is explained by a high degree of flexibility and access to large amounts of information (Sitzmann et al., 2006; Zimmerman, 2012), as well as the ability to combine training with work and family responsibilities (Lee, 2017).

Despite the growing popularity of online courses, a relatively small number of students complete their studies (Xavier & Meneses, 2020) compared to courses implemented in full-time format (Muljana & Luo, 2019; Delnoij et al., 2020). Only 15% of online students complete their degree studies at Open Universities (Mishra, 2017).

Shaikh & Asif (2022), offer a detailed classification of the factors that influence the completion of the online course by students. On the part of students, such factors as online and distance learning experience, the ability to plan and distribute workload and time, overall academic performance (the higher the academic performance, the higher the probability of successful completion of the course), the level of training (senior students are more likely to complete the course than first-year students), technical skills had a positive impact. Psychological factors such as motivation, self-confidence, psychological stability and self-regulation had a particular impact on the successful completion of online training. Onah et al. (2014), notes that paying for an online course is an external motivation for a number of students. At the same time, gender and age, according to the researchers, did not have a significant impact on the success of online learning.

The successful completion of the course is also influenced by the quality, content, structure and organization of the online course itself (the role of interactivity in the course is especially noted), the correspondence of the course content to the objectives and needs of students, the correspondence of the course to their learning style (Kamaeva et al., 2022; Polozhentseva et al., 2023). Negative factors are poor organization, illogical structure, lack of clear instructions, uninteresting and unrelated elements of the course, lack of support from teachers and / or administrators of the course (timely feedback and support of each student is important), inconsistency of the level of complexity with students' expectations (Tolmachev et al., 2022; Gabidullina et al., 2023).

In this article, we will consider the experience of implementing online courses in English for Specific Purposes for students of master's degree programs as a part of their

major and an online course “English for Scientists” for undergraduate students as part of a minor. The online course “English for Scientists” was developed last year due to increased demand from students for a minor in a foreign language.

## MATERIALS AND METHODS

The above-mentioned courses were hosted on the Moodle platform and implemented in an online course format (Allen & Seaman, 2013), in this case, 80-100% of the time students work in electronic information and educational environment). Before the start of training, a coordination meeting was held for both undergraduate and graduate students, where students got acquainted with the course, learned the requirements, and could ask questions to the teacher. Online courses were offered to graduates studying in 3 specialties: Psychology, Public Health, and Industrial Pharmacy.

All courses for graduates took into account the specifics of the chosen field of study, and along with a general scientific unit (how to write a scientific article), materials related to a specific major were presented (organization of work of medical institutions abroad for students majoring in “Public Health”, drug development and quality control for students majoring in “Industrial Pharmacy”, conversation with a patient and taking a history for students majoring in “Psychology”).

The course for undergraduate students also includes a general scientific unit, but, unlike courses for master’s programs, more attention is paid to the stylistic features of a scientific article, a section on the history of scientific publications has been added. The final part of the course is aimed at revising the grammar topics covered in the basic course. This online course includes video lectures. Each lecture is presented in 2 formats: as a video posted on RUTUBE, and as an interactive lectures prepared using the iSpring package. The interactive menu allows returning to the desired fragment of the lecture for re-viewing. The advantage of interactive lectures is the presence of check yourself questions on the lecture, which are presented in the middle and at the end of the lecture. At the same time (unlike the training MCQ test at the end of each unit), the student does not need to switch to another page of the course, but there is an opportunity to immediately check the understanding of the lecture material. To answer questions in the lecture, an unlimited number of attempts are provided with immediate feedback.

The interactive simulator, created using iSpring tools, allows not only to consolidate the studied material in an interactive form, but also explains possible errors, suggests which topics require revision and more in-depth study.

All the above-mentioned courses are accompanied with video materials, images, which makes the course more attractive for students. In addition, a link to the Quizlet simulator has been added to each course to work out vocabulary and grammar topics of the lesson and prepare for the control of its assimilation, which adds a game element to the training.

Unlike many online courses, where the form of control is a test which is checked automatically, these courses provide creative assignments (essays). Of course, this format requires a lot of effort on the part of the teachers accompanying the course, since the assignments are checked manually.

The students themselves, enrolling in the course “English for Scientists” as part of a minor, noted the convenience of the training format, since the work/ study schedule does not allow them to attend additional full-time classes in a foreign language. Graduates were also satisfied with the format of the course, as training was combined with work.

The courses for graduates were part of the major, while the final assessment (test / exam based on the results of mastering the course) was conducted off-line. Most graduates pay for their studies. Out of 22 graduates (in all three majors), only 1 person did not complete the course, so the effectiveness of courses for graduates was 95.5%.

The course “English for Scientists” is implemented as part of a minor and is free for students. 268 students were enrolled in the course “English for Scientists”, of which 36 people (13.4%) fully mastered the course.

The data obtained on the course “English for Scientists” do not contradict the previously mentioned research results (the effectiveness of online courses is on average 15%), while the courses for graduates showed significantly higher than average performance.

The described courses were developed by one team of authors and have a similar structure. All courses have passed a methodological and technological expert examination, which is mandatory for providing access to the course for students at the university (which indicates the quality of the courses offered). The content of the courses corresponds to the approved course outline. All students received timely answers to their questions about the course. Some of the issues were resolved at the initial stage during the coordination meeting, during which an introduction to the course was conducted.

When analyzing the results of mastering the course, the following factors were taken into account: the student’s age, the fact of joining the course, the completion of the course and the final grade for the course, the level of education

(undergraduate / graduate student), the fact that the course is compulsory, tuition fees, the major, the native language of the student, the experience of completing the online course, attending the coordination meeting where the course, the deadlines and forms of completing assignments were explained. Thus, 11 attributes were identified at the input.

The perceptron was chosen as a mathematical model being the simplest model of neural networks trained on the basis of an array of data.

Thus, a mathematical model (formula 1) was developed for the analysis:

$$K1*P1+K2*P2 \dots K11*P11=S$$

Where P is the parameter selected for analysis,

K is the coefficient, the contribution of each parameter to the formation of the sum (S).

To use the chosen mathematical model, the data obtained during the processing of mastering the course had to be transformed to the following form: each attribute (parameter) at the input had to be represented as 0 or 1. Then the attributes are multiplied by the weight and summed up.

The weighted average sum of attributes was calculated using the following formula (Formula 2):

$$z = \sum_{i=1}^n (x_i * w_i) \tag{F-2}$$

Using the sigmoid (activation function), the output values from 0 to 1 were obtained (Formula 3).

$$S(x) = \frac{1}{1+e^{-z}} \tag{F-3}$$

At this stage, our objective is to find weights for each feature that provide the most accurate prediction which students will successfully complete the online course, i.e. when entering all 11 parameters, the model should predict whether the student will successfully complete the course.

At the first stage, a table was created to search for the weights of each attribute. The function value (Bias) is calculated according to formula 1. Next, the sigmoid function (output, model prediction) is used, which is necessary for interpreting the bias value. The result is rounded (if the value is less than 0.5, the student will not complete the course, if it is equal to or greater than 0.5, the course will be completed successfully).

The following data were obtained (Table 1):

Table 1. Data processing.

Student ID	Age <24	Age >=25	Course accessed at least once	Tuition fee/ Free course	Level of education	Compulsory / Optional	Foreigner / Russian	Online course experience	Coordination meeting attendance	Major General Medicine	Major Public Health	Major Pharmacy	Course complete
1	1	0	1	0	0	0	1	0	1	1	0	0	1
2	1	0	1	0	0	0	1	0	1	1	0	0	1
3	1	0	1	0	0	0	1	0	1	1	0	0	1
4	1	0	1	0	0	0	1	0	1	1	0	0	1
5	1	0	1	0	0	0	1	0	1	1	0	0	1
6	1	0	1	0	0	0	1	0	1	1	0	0	1
7	1	0	1	0	0	0	1	0	1	1	0	0	1
8	1	0	1	0	0	0	1	0	1	1	0	0	1
9	1	0	1	0	0	0	1	0	1	1	0	0	1

Source: Preparation of authors

There data given in tables hereinafter are shown as an example for a limited number of students while all 11 parameters for all graduate and undergraduate students were analyzed within this research. At the next stage, the weights are adjusted. Next, it is necessary to check whether the model correctly determines the successful completion of the course (Table 2).

Table 2. Weights for each attribute.

Student ID	Weight 1	Weight 2	Weight 3	Weight 4	Weight 5	Weight 6	Weight 7	Weight 8	Weight 9	Weight 10	Weight 11	Bias	Output
1	0.458	0.507	0.269	0.576	0.06	0.826	0.027	0.247	0.574	0.0257	0.551	1.352	0.794
2	0.491	0.507	0.302	0.576	0.06	0.826	0.06	0.247	0.607	0.0592	0.551	1.520	0.820
3	0.518	0.507	0.329	0.576	0.06	0.826	0.087	0.247	0.634	0.0856	0.551	1.652	0.839
4	0.539	0.507	0.35	0.576	0.06	0.826	0.108	0.247	0.655	0.1074	0.551	1.760	0.853
5	0.558	0.507	0.369	0.576	0.06	0.826	0.127	0.247	0.674	0.1257	0.551	1.852	0.864
6	0.574	0.507	0.385	0.576	0.06	0.826	0.143	0.247	0.690	0.1416	0.551	1.931	0.873
7	0.588	0.507	0.399	0.576	0.06	0.826	0.157	0.247	0.704	0.1556	0.551	2.001	0.880
8	0.600	0.507	0.411	0.576	0.06	0.826	0.169	0.247	0.716	0.1681	0.551	2.064	0.887
9	0.611	0.507	0.422	0.576	0.06	0.826	0.180	0.247	0.727	0.1793	0.551	2.120	0.892

Source: Preparation of authors

Afterwards the model is trained and the weights are adjusted based on the data of the training sample (Table 3).

Table 3. Adjusted weights.

Student ID	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	Prediction	TP	TN
1	0.033	0	0.033	0	0	0	0.033	0	0.033	0.033	0	1	1	0
2	0.026	0	0.026	0	0	0	0.026	0	0.026	0.026	0	1	1	0
3	0.021	0	0.021	0	0	0	0.021	0	0.021	0.021	0	1	1	0
4	0.018	0	0.018	0	0	0	0.018	0	0.018	0.018	0	1	1	0
5	0.015	0	0.015	0	0	0	0.015	0	0.015	0.015	0	1	1	0
6	0.013	0	0.013	0	0	0	0.013	0	0.013	0.013	0	1	1	0
7	0.012	0	0.012	0	0	0	0.012	0	0.012	0.012	0	1	1	0
8	0.011	0	0.011	0	0	0	0.011	0	0.011	0.011	0	1	1	0
9	0.010	0	0.010	0	0	0	0.010	0	0.010	0.010	0	1	1	0

Source: Preparation of authors

## RESULTS AND DISCUSSION

21 graduates have successfully completed their studies on the online course, all the assignments were completed on time. Thus, the effectiveness of the course was 95.5%. The course for undergraduate students showed much lower

efficiency: only 36 students (13.4%) fully mastered the course and received a certificate. When analyzing the actions of students who did not complete the course, it was revealed that 90 people (33.6%) never joined the course, 35 people (12.2%) entered the course once during the coordination meeting, but did not try to complete any assignment. In the conversation, 43 students noted the advantages of the online course, since it is difficult to combine attending face-to-face classes with studies in the main course (the form of the course organization was the reason for enrolling in this course). At the same time, 15 students noted that they could not find time to master the course due to workload in the main subjects and during the exam session.

When using this model, we were able to obtain the following results. The model accurately predicted that the student would successfully master the course (100%), and determined with a probability of 96.14% that the course would not be completed successfully.

Consider the coefficients obtained for each parameter (Table 4).

Table 4. Coefficients for each parameter.

Student ID	W1	W2	W3	W4	W5	W6	W7	W8	W9	W14
280	-1.712	0.795	-0.497	0.864	0.348	1.114	-1.4	0.512	0.08	0.839
281	-1.712	0.824	-0.469	0.892	0.376	1.143	-1.37	0.512	0.109	0.839
282	-1.712	0.826	-0.467	0.894	0.378	1.145	-1.37	0.512	0.11	0.839
283	-1.712	0.834	-0.458	0.903	0.387	1.153	-1.37	0.521	0.119	0.839
284	-1.712	0.842	-0.451	0.91	0.394	1.161	-1.36	0.528	0.127	0.839
285	-1.712	0.85	-0.442	0.919	0.403	1.169	-1.35	0.537	0.127	0.839
286	-1.712	0.856	-0.436	0.924	0.409	1.175	-1.34	0.543	0.133	0.839
287	-1.712	0.87	-0.423	0.938	0.422	1.189	-1.33	0.543	0.146	0.839
288	-1.712	0.881	-0.411	0.95	0.434	1.2	-1.32	0.543	0.158	0.839
289	-1.712	0.887	-0.406	0.955	0.439	1.206	-1.31	0.543	0.163	0.839
290	-1.71	0.89	-0.4	0.96	0.441	1.208	-1.31	0.545	0.165	0.839

Source: Preparation of authors

In our model, the following factors were of the greatest importance: age (1.71 – age under 25, 0.89 – age over 25), tuition fees (0.96), the fact that the course was compulsory (1.208), native language (1.31) and major (0.839). These coefficients are taken into account in absolute value, not in sign: the larger the number, the greater the contribution of this parameter to the prediction of the result.

Using this mathematical model, we can predict with a certain probability at the beginning the success of mastering the course by one or another student.

We can add factors and adjust the model to improve the effectiveness of the model over time. It is possible to retrain the model and adjust the weights, introduce new parameters that will characterize the features of the course and students, which will increase the efficiency of calculations. Using this model, it is possible not only to tell at the beginning whether the student will successfully master this course (then the model can be used as an exclusion criterion at the enrolment), but also to use as a recommendation model to determine the relevant course for a particular student based on input parameters.

In our opinion, significant differences in academic performance and course development are associated with the following factors. Graduates are persons who have at least one completed higher education (sometimes two diplomas of higher education) and work experience. Many of them have previously taken online courses as part of professional development and possess the necessary skills. Students of master’s degree programs, as a rule, have a high degree of self-organization, are able to combine work with studies. An external motivating factor is the fact that this course is part of their major, which is mandatory for obtaining the desired degree (obtaining a diploma is important for further career growth). The economic component plays an important role: most of the graduates pay for their studies.

Unlike courses for graduates, the course “English for Scientists” is not included in the list of mandatory subjects for mastering within the framework of the major. Students enroll in the course at will, tuition is free. Students master a number



of subjects in accordance with the basic curriculum, pass midterm and final assessment simultaneously with the online course. The end of the online course coincides with a session when students spend more time preparing for exams, rather than mastering a minor. For most of the students, this was their first experience with an online course.

Understanding the factors that affect the effectiveness of online courses is important for improving the organization of students' work and the subsequent development of courses, because negative experience in mastering an online course often leads to the rejection of this form of training in the future (Tello, 2008; Johnson et al., 2019). Mastering an online course requires a high degree of self-organization, so this format of work is most likely appropriate for graduates and PhD students.

## CONCLUSIONS

We concluded that the class teacher's activities with the class staff require significant updating associated with a change in the socio-cultural environment in which children develop and a change from an authoritarian to a humanistic approach in interaction with children. It is necessary to introduce new content into the process of preparing class teachers for management activities on the personal development of students and to introduce the concept of classroom management.

The study results proved that classroom management is an innovative method of transforming the educational environment to achieve the effectiveness of the educational process. Classroom management planning should be based on a comprehensive analysis of the needs of children and the goals of their education and provide for the development of methods and means to meet these needs.

Updating the training of class teachers requires not only a more thorough presentation of the material in textbooks but also an analysis of the readiness of class teachers to make changes in management activities and the development of motivation for their implementation.

Prospects for further research lie in the creation of methodological recommendations to effectively use components of classroom management in the activities of teachers.

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