Evaluating the Efficiency of Online English Course for First-Year Engineering Students

Valentyna LUKIANENKO¹,
Svitlana VADASKA²

¹ PhD, Associate Professor, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine, vv.lukian@gmail.com

² National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine, vadaskaya@ukr.net

Abstract: This research aims to prove the effectiveness of the distant course "Engineering. General introduction" developed for the first-year engineering students of the Institute of Aerospace Technologies on the Moodle platform and used as the main online learning tool during the quarantine, caused by the COVID-19 pandemic. The course comprises the following topics: Engineering, Robotics, Smart Materials, Technology, History of Flight, Igor Sikorsky. The students' activity in the course has been analyzed and compared with the survey results. To evaluate the students' (N=34) perceptions towards the course, its benefits and drawbacks, as well as the possibility of using additional educational technologies, we have designed the questionnaire which includes 12 closed and open questions. The results show that 73,5% students think that Moodle platform is a good decision to provide e-learning education, which is consistent with the students grading history: 46,1% of students had 60-80% progress; 53,9% coped at 80-100%. The interactive modules "Forum" and "Glossary" promote developing students' collaborative skills. The drawbacks mentioned by respondents are the problems with the Internet connection and lack of face-to-face communication. The conclusion is made to implement video conferencing tools in the learning process. Based on the research findings, the recommendations for educators regarding remote learning process optimization have been proposed.

Keywords: *Digital coaching; disruptive event; digitalisation; pandemic; scenario analysis; correlation analysis.*

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1. Introduction

Education, as any other branch of human society, has to adapt to the new conditions caused by the spread of COVID-19. It means that teachers use modern technical and information resources to create an attractive learning environment, whereas students acquire knowledge anywhere and anytime using their gadgets. Innovative technologies give the possibility to provide individual or group work, train competences, develop skills, and diversify content. However, a number of factors concerning the Internet connection, access to different applications, technical support should be taken into account.

Facing the problem to organize effectively students' self-directed work during the quarantine period at Igor Sikorsky Kyiv Polytechnic Institute, most foreign language teachers solved the problem by creating distance courses based on Moodle platform. This form of study can help teachers to provide the students with the necessary materials and encourage their study. Adaptability and availability of Moodle platform promote its introduction into educational process. This virtual environment is widely used for English teaching since it can combine different types of information text, audio, video, and graphics for presenting in Moodle elements and resources (Colorado & Eberle, 2010). Moreover, activities created in Moodle environment are supplemented by the qualitative and quantitative feedback process (Brandle, 2005). Moodle is a software package that enables teachers to create distance courses considering the needs, requirements and preferences of their students (Matijašević-Obradović et al., 2017). Online learning helps teachers to engage all the students in the studying process, to ensure the interactive nature of learning increasing student motivation and satisfaction (Garrison, 2011). The learning environment created on the basis of Moodle platform is enhanced by the number of features such as: it is an open and free resource; the content of the course can be updated and replaced; some activities promote students' collaborative work; the immediate assessment.

In this paper, we aim to analyze the effectiveness of the distant course "Engineering. General introduction" developed for the first-year engineering students on the Moodle platform. For this purpose, we will analyze the students' activity in the course and compare it with the survey results. Based on the research findings, we will draw recommendations for educators regarding remote learning process optimization.

2. Methodology

2.1. Course description

The distance learning course “Engineering. General introduction” is proposed for the first-year students of the Institute of Aerospace Technologies, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Vadaska & Lukianenko, 2020). It is aimed at developing self-directed learning skills, improving reading, writing, listening and speaking, collaborative learning skills. This course was developed in accordance with the requirements of studying program (number of hours, credit module purpose and objectives, structure, students' abilities). The role of the tasks and activities in the distance course is to motivate students and to involve them in the learning process.

The course includes six units and embraces the most common topics of General Engineering taking into account the technical branches studied by the students of the Institute of Aerospace Technologies: Engineering, Robotics, Smart Materials, Technology, History of Flight, Igor Sikorsky. We support the interdisciplinary links and introduce the basic vocabulary of special terms, main principles and explanations of technical phenomena, historical facts and innovative achievements. Each unit has reading, vocabulary and grammar, listening (video watching), writing and translation sections. Students are offered to discuss topics in forums and chats.

2.2. Participants

The participants are first-year students of the Institute of Aerospace Technologies. Four academic groups (76 students) studied English as a foreign language (credit “Introduction to English for General Engineering”) in the remote mode for the period from 11 March 2020 till April, 5, 2020. 34 first-year students volunteered to participate in a survey regarding the effectiveness of the proposed online course.

2.3. Materials and Procedure

To evaluate the students' perceptions towards the proposed Moodle course, its advantages and drawbacks, as well as the possibility of using additional educational technologies, we have designed a questionnaire which included 12 questions, closed and open ones (mixed methods research). The data analysis was conducted with the help of Google Forms service and the answers were automatically systematized, analyzed and graphically presented.

3. Results and Discussion

3.1. Analysis of students' activity in the course.

The research was aimed at evaluating the effectiveness of the designed Moodle-based course in English for Technology as well as at collecting students' opinions on additional educational technologies to be used in the conditions of remote learning.

Generally, the students are active participants of the course. According to the grade history, all students have access to the course and they cope with the work. Even the students with a low level of English get more than 60%. There are two broad grade categories: 60-80% - 35 students (46,1%); 80-100% - 41 students (53,9%). As we can see, the results are positive which can be explained by system flexibility (students can access the course at any convenient time), high digital literacy of engineering students, course structure and content.

Each unit in the course "Introduction to English for General Engineering" starts with the warming-up section which aims at attracting students' interest and introducing the topic. The activities contain a lot of pictures, interesting facts and controversial questions for discussions. All lessons contain reading section. Students are proposed the tasks aimed at assessing comprehension, new vocabulary training, grammar revision, improving skimming and scanning skills.

Students are allowed to have several attempts while doing the most difficult or the most important tasks concerning the use of special terms, description of complicated technical phenomena, order of stages or events in engineering processes. It should be noted that almost all students use the chance to improve their results. Thus, they revise the material, look through the text as much time as they need memorizing necessary information and high grades promote motivation. Reading is supplemented by the additional resources from the listening section.

Mostly, video materials are used for the first-year students. Combining visual information with its verbal presentation helps to expand students' knowledge, improve the insight of the topic and train their attention and memory. Listening comprehension tasks encourage students to argue, to develop critical thinking and problem-solving skills. Students are asked to comment on the ideas presented in the video or to propose their own solutions. Most students like this activity and they consider it as a challenge. All these facts influence the successful accomplishing of the task.

The challenging task in the conditions of quarantine is to develop students' collaborative skills – the ability of to interact and to work in teams.

The distance course element “Forum” helps to implement teamwork (Vadaska & Drozdovych, 2019). Since the students in one group have different levels of foreign language proficiency, the assignments are developed in the following way: the purpose of the forum is strictly indicated (e.g. to prove the urgency, to give the arguments in favor or against, to contrast etc.) in the assignment; students are proposed to use some commonly spoken phrases; the list of terms and notions related to the discussed topic is given.

Students’ participation in discussion forums is evaluated taking into account several criteria: activity, comprehension of the topic, language accuracy. It is important to mention “Glossary” - the element that promotes interaction and students’ teamwork. The first-year students are proposed to create short encyclopedic resource concerning interesting facts about early aviation, development of materials, robots evolution etc. But this activity does not attract students’ interest. This situation can be explained by the fact that students need to study much information to find something interesting. In this case, the list of references composed by the teacher can be proposed.

3.2. Survey results

The analysis of survey results has shown a positive correlation with the students’ activities in the course. The 12-item scale was proposed to students, including closed and open questions. 34 students volunteered to take part in a survey. 25 students (73,5%) think that the Moodle platform is a good decision to provide e-learning education. At the same time, 20 students (58,8%) consider this course of the same effectiveness as face-to-face learning, but one-third of respondents evaluate online learning as less effective than classroom learning.

The next group of questions dealt with students’ evaluation of course efficiency regarding the four main types of speech activities as well as grammar and vocabulary, compared with classroom learning (see Table 1).

Table 1. Students’ evaluation of the Moodle course effectiveness in obtaining language skills compared to classroom lessons (N=34)

Source: authors’ own conception

	Reading	Writing and Translation	Listening	Speaking	Grammar and vocabulary
More effective	6 (17,6%)	7 (20,6 %)	8 (23 %)	3 (8,8)	4 (12,1 %)

Of the same effectiveness	23 (70,6%)	21 (61,8 %)	24 (7,1 %)	9 (26,5 %)	20 (58,5 %)
Less effective	5 (14,7%)	6 (17,6 %)	2 (5,9 %)	22 (64,7 %)	10 (30,3 %)

As we can see from the results, most students evaluate online form of language learning as of the same effectiveness or even more efficient than face-to-face classes in reading, listening, writing, grammar and vocabulary. The positive perceptions can be explained by the fact that students can read texts or watch the videos several times, as well as use three attempts to complete the tasks. Taking into account the restricted classroom hours and the number of students in the classroom, this is the considerable advantage of online learning. These results are supported by other studies (Akıllı et al., 2019; Bihych & Okopna, 2018; Yurzhenko, 2019).

At the same time, two-thirds of respondents think that online learning is less effective in obtaining speaking skills than traditional classes. Although Moodle has such interactive modules as forum, chat, and glossary, students admit lack of live interaction, which is supported by their answers to open-ended questions on the drawbacks: absence of face-to-face communication with the teacher (40,5 %); no real communication necessary for language learning (36%); lack of individual approach regarding student's learning style (20,4 %). We think that using additional learning tools such as video conferencing would be a solution. It gives the opportunity to communicate in real time.

Some students, answering open questions, mention that they would like to know, why the particular answer is incorrect. In this case, we advise course developers to add comments to each incorrect item, so that students can read them and analyze the mistakes.

One-third of respondents had problems with the Internet connection. This is a real problem, students learn from home, and many of them live in the rural areas. But we try to be flexible and do not set time limits for activities.

At the same time, most of the students mentioned the advantages of the Moodle platform, including flexibility (84,4%) and ease of use (65,5%). The success of online learning is influenced by the following aspects: students can choose their own pace of study, their interest is supported due to the use of computer technology, learners know immediately the results of their work, and they can contribute to the creation of some resources.

Based on the results obtained, we would like to draw some recommendations for educators to realize the successful implementation of e-learning on LMS Moodle.

1. Discussions in forums, to be productive, should be supported by clear instructions and sample phrases.

2. To provide real-time communication, it is necessary to use video conferencing tools (for example, Zoom) in addition to the online course.

3. While designing tests, we recommend adding comments to each incorrect answer in order students can learn from their mistakes.

4. To organize the productive activity in the glossary module, teachers may add some links to useful resources.

4. Conclusions

The research has shown students' progress in the course "Engineering. General introduction", as well as positive perceptions of the course in developing reading, writing, listening comprehension, grammar and vocabulary skills. The course has proved to be interactive, developing collaborative learning and teamwork skills, which is realized due to forums, chat rooms and glossary activities. The drawbacks students mentioned are the problems with the Internet connection and the lack of face-to-face communication. To successfully develop speaking skills and organize live interaction, teachers should use additional e-learning video conferencing tools. The results of this research can be used by educators and course developers in Ukraine and abroad. In our future research, we will concentrate on implementing video conferencing in teaching English to future engineers and on collecting students' feedback on the proposed activity.

References

- Akilli, E., Konoplianyk, L., & Pryshupa, Y. (2019). ICT in teaching ESP to future civil engineers at technical university. *Advanced Education*, 11, 93-99. <https://doi.org/10.20535/2410-8286.148507>
- Bihych, O., & Okopna, Y. (2018). E-learning in professionally oriented German communicative competence formation of students majoring in tourism management. *Advanced Education*, 9, 126-131. <https://doi.org/10.20535/2410-8286.132499>
- Brandle, K. (2005). Are you ready to "moodle"? *Language Learning and Technology*, 9(2), 16-23. <https://www.lltjournal.org/>

- Colorado, J. T., & Eberle, J. (2010). Student demographics and success in online learning environments. *Emporia State Research Studies*, 46(1), 4-10.
<https://esirc.emporia.edu/>
- Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and practice* (2nd ed.). Routledge.
- Matijašević-Obradović, J., Dragojlović, J., & Babović, S. (2017). The importance of distance learning and the use of Moodle educational platform in education. In M. Stanišić (Ed.), *Sinteza 2017 - International Scientific Conference on Information Technology and Data Related Research* (pp. 236-241).
<https://doi.org/10.15308/Sinteza-2017-236-241>
- Vadaska, S. V., & Drozdovych, N. J. (2019). Advanced MOODLE tools in teaching English for specific purposes. *Science and Education a New Dimension. Pedagogy and Psychology*, VII(77), 188, 18–20. <https://doi.org/10.31174/SEND-PP2019-188VII77-03>
- Vadaska, S. V., & Lukianenko, V. V. (2020). *Engineering. General introduction. Distance course for the first-year students*. Igor Sikorsky Kyiv Polytechnic Institute.
- Yurzhenko, A. (2019). An e-course based on the LMS MOODLE to teach "Maritime English for professional purpose". *Information Technologies and Learning Tools*, 71 (3), 92. <https://doi.org/10.33407/itlt.v71i3.2512>