

THE IMPORTANCE OF E-LEARNING FOR MANUFACTURING TECHNOLOGIES STUDENTS

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The pandemic situation in Slovakia has shown that e-learning teaching within educational institutions has not received sufficient attention so far. The purpose of the paper is to stress the importance of e-learning application in foreign language teaching as well as show the possibilities of creating new educational portals for university students using professional foreign language texts. The KEGA project “Innovative Methods and Forms of Education for Needs and Development of Language and Communication Skills within Technical Professional Foreign Language Study Material” is still ongoing at the Department of Social Sciences and Humanities. The aim is to emphasise the importance of foreign language training for future engineers, and at the same time to look for modern and innovative mixed methods of education, which includes the use of e-learning. The paper compares the study results of more than 200 students in different study programmes at the Faculty of Manufacturing Technologies in Prešov Technical University of Košice achieved during the academic year 2020/2021. The research findings prove that the experimental group of students from different study programmes achieved the best study results in those manufacturing technologies e-tests which are closely connected with their study programme. The results confirm that English teaching focused on tailor-made professional texts and topics within the engineering levels of studies was effective. Teachers also identified the strengths and weaknesses of students within tasks to practice language competencies. By applying e-tests students were able to improve their language skills, which can be practised in selected foreign companies or in their future careers as engineers, technicians, managers or computer programmers.

Keywords: online education; e-learning; e-assessment; e-testing; professional technical texts.

Introduction

Almost all over the world, the coronavirus has changed people's lives. This applies to both the personal and work side of individuals and at the same time almost all spheres of social life. Education is no exception. For this reason, school facilities headed by teachers had to move to virtual communication with their students and colleagues. During this exceptional regime, according to the conditions and possibilities of schools and universities, the self-study of pupils and students is introduced. Several educational portals were established in Slovakia as a tool for official communication during the crisis situation caused by interrupted teaching at schools and full-time teaching at universities during the coronavirus epidemic. The primary purpose of the *Distance Learning* portal is to help pupils, students and teachers to orientate themselves in all information, or to find specific solutions or methodological support in a specific situation. Similarly, it is helpful for the management of schools and universities, professional staff and parents.

Other institutions serve to support science, research, development, innovation, as well as education. There are ways to provide education for students through electronic communication with their teachers. In general, if students have access to the Internet, then communication can be easier. In 2020, the latest research of the *Slovak Centre for Scientific and Technical Information* on the use of the Internet at home was published, according to which up to 96.6% of students have secure access to the Internet at home and 93.6% of students use a mobile phone with the Internet. The *Centre* helps schools to cope with emergencies and publishes an overview of distance learning opportunities. In order to help schools and universities to cope with the current situation, several distance learning options are currently available through educational portals.

Interactive education in Slovakia is supported by the *Viki* portal, which currently contains publicly available educational content. In addition, a comprehensive tool for schools and their teachers - the educational portal *Planet of Knowledge* is used to prepare teaching materials, to work with pupils during the lesson and subsequently to check homework prepared by pupils. Educational materials consist of multimedia processed content in the form of various presentations, interesting illustrations, educational videos, various simulations or animations, 3D models, quality photographs and images, as well as a number of interactive exercises and lessons. The role of the *IT Academy* national project is to help teachers to organise the education of students at a distance. They also conduct webinars (online workshops) for teachers focused on consultations (i.e. how to use new innovative methodologies), on recommendations for online education in schools, on the exchange of experiences in the use of appropriate technologies.

The key goal of the *National Institute for Certified Educational Measurements* project is to create suitable conditions for the gradual involvement of target groups in electronic testing, i.e. students and teachers of primary and secondary schools in Slovakia. The activities of the project can include the creation of tasks and tests in a new electronic database. The aim is to ensure modern and software-safe processing and evaluation of tests and assignments, which actually relieves teachers from quite demanding work. The result should be a streamlining and acceleration of the comparison of achieved results in the field of education. The benefit for schools should be a modern way of testing and professional training of school staff. For the student, it is a more attractive form of assessment through the use of modern technology and at the same time quick feedback when verifying his knowledge. It is also gratifying that in the current situation with the provision of distance education in Slovakia, many IT companies have also offered their help.

I state that e-learning in Slovakia is not highly appreciated despite the mentioned efforts connected with the creation of suitable educational portals and the preparation of e-testing for the evaluation of pupils and students. We are witnessing this fact, because the current so-called "covid" situation shows how important and necessary can be e-learning, currently teaching at a distance, via the Internet and modern technology. If I compare the past with today, I believe that the current e-learning or so-called online education was created by the convergence (gradual convergence) of two educational trends: distance learning and the use of technology in the classroom. However, unlike previous technologies, creating web-based teaching and learning materials is much easier and cheaper. I would argue that the mere use of computers in teaching began to change the approach to learning. With the advent of the Internet, the interaction between teacher and student develops more significantly and takes on new forms. Teachers also appreciate the fact that electronic materials developed for students in the classroom can also be used by external students at universities (Gluchmanova, 2019; Urbikain and López de Lacalle, 2021). This applies to the whole teaching process, including student assessment (Redecker, 2013).

Literature review

The university-wide Moodle system at The Technical university of Košice is the most widely used for many technical subjects as well as foreign language teaching. There are many useful activities not only for students but also for teachers. The online test is the most used activity for evaluating the results of students' work within the Moodle for language teachers. This is evidenced by the contributions of several authors who pointed to the growing popularity of the use of e-tests also in the teaching of English for specific purposes (ESP), universities, technical universities with a different focus. They state the 21st century is characterised by many technological developments and innovations. This has an impact on all aspects of life including education. At this time, technology is one component in education that cannot be ignored. Putri et al. (2020), study show that students have a good response to e-learning and also their attitude to study when using ICT. I have a similar experience with my students because some of them prefer online lessons and they achieve quite good marks from individual tests.

Kotlyarova and Chuvashova (2021) explored that English for specific purposes is very effective in studying technical subjects. It is very helpful for students to have related skills in their future profession. I share the same opinion and agree with the authors. I argue that students will acquire language skills by studying foreign language professional texts. Then they can consolidate them in e-tests. After graduation, they apply their language skills in their future profession or jobs.

The distributed Moodle course platform, a teaching platform of computer technology, has a positive driving force for the improvement of teaching efficiency. Ma et al. (2020) summarised "the theory of building a Moodle course platform at Chinese colleges and universities. Then teaching effectiveness showed that students' performance was significantly improved after using the Moodle course platform, so the learning mode based on the Moodle course learning platform has strong feasibility" (p. 1061). I can confirm their claim because the same is true for the Technical university in Košice.

Many authors state that the result of the expansion of the informatics era is a noticeable focus on the development and application of Information and Communication Technology (ICT) in education. Thanks to its rapid development they mark the era of electronic education. According to Stanojević et al. (2017), the goal of electronic education is actually a modernization of the teaching process, which enable teachers the reduction of teaching duties, simplify preparation and teaching and testing students' knowledge, which with the electronic platform is becoming an important component of a multimedia approach to teaching.

Tomašegović et al. (2011) stressed that "E-learning enhances the quality of the educational process by enabling the practice of new roles in the process of learning. The student role is no longer passive and the communication within the system occurs in both ways" (p. 1155). My opinion is that the student becomes an active participant in the teaching process through the active use of e-learning.

Some authors review the use of ICT for assessment and evaluation in educational settings in terms of shifting from paper-based assessment to e-assessment. According to them, there are opportunities and challenges for this shift and future inculcation of assessment and evaluation in the educational settings (Shaheen, Shah and Naqeeb, 2019). I suppose that using of ICT play an important role in e-learning education and preparing e-tests. If ICT is a part of their study, it is much more interesting for every student.

The study of Erarслан and Şeker (2021) “specifically geared towards finding out the level of motivational self-regulated strategies, including volition and goal commitment strategies, employed against online distractors during e-learning” (p. 262). I agree with the authors that motivation and goal strategies are very important, especially in technical education. Motivational strategies should be included in creating very interesting professional e-tests and choosing suitable foreign language study material.

Several authors dealt with the issue of evaluation of students with a technical focus and language teaching for specific purposes. Alenazi (2020) stresses that education is a significant input within any country and e-learning has become a fundamental tool within the education sector. His study assesses how the existence and use of e-learning materials within educational environments affects the teaching and learning behaviours of teachers and students respectively. He found that “the greater the use of e-learning materials and tools within an educational context, the higher the performance of the students and the efficiency of teaching practices” (p. 48).

According to Isoc and Surubaru (2020), the Engineering School is a set of broad-based activities designed to build an individual who, beyond knowledge, is also endowed with a particular way of thinking. Many other presented e-learning training courses are innovative tools that provide a study of educational material in the mode of independent work with a computer as well as regulate the interaction of students with a teacher.

Bilotserkovets and Gubina (2019) argue that “online collaboration contributes to the improvement of the efficiency of target language knowledge formation” (p. 17). They paid particular attention to the characteristics of the content, structure and tasks of the electronic training course in foreign languages learning - English, German, Ukrainian and Russian as target languages for distance learning students of Sumy National Agrarian University. I also claim that upgraded teaching educational materials stimulate interest in the study of target languages using innovative information and communication technologies. Similarly, the feedback and the possibility of direct consultation with the teacher can be applied in the educational environment in the Moodle platform.

I agree with many authors (Ramos Serpa and López Falcón, 2020; Suseno and Zuliyanti, 2020; Robroo 2021, 2019) and I am of the opinion that each student should be educated and tested within his/her study programme. The use of e-learning should lead to an increase in active learning, which should lead to improved student outcomes.

At many universities, including Slovak universities, there is no suitable foreign language study material for the specific study programmes to improve students' language skills within e-learning and e-assessment through e-tests (Hrdličková, 2021). I fully agree with the author's statement. This was also one of the reasons why the language teachers at the Faculty of Manufacturing Technologies started to create their own language educational portal. There are new and innovative tailor-made e-tests.

Nowadays, a part of e-learning courses at the Faculty of Manufacturing Technologies combined all available means, personal meetings with online discussions, study materials, synchronous or asynchronous means. I state that until the pre-lockdown period, pen and paper were the most frequent methods of testing. Students either ticked the correct answers, wrote short answers, or wrote essays. Then they were evaluated by teachers. Later, some teachers have gradually moved to a more modern way of computer-assisted testing. In that case, it's not just about replacing the pen and paper with a keyboard and monitor. In this way, audio or video can be integrated into test items, expanding the testing capabilities of the test. At present, at a time of pandemics and lockdowns, it seems necessary to be prepared for such a situation. The similar examples can be seen at the Department of Social Sciences and Humanities, where for the fourth semester the educational process takes place with the active use of information and communication technologies. The priority is to lead teaching in the form of e-learning and active use, especially the university-wide Moodle platform, as well as other forms of communication, such as emails, Webex, MS Team and others. For this reason, language teachers aimed to prepare suitable foreign professional study material for the bachelor and engineering study levels within the following study programmes: Automotive Production Technologies, Computer-Aided Manufacturing Technologies, Industrial Management, Renewable Energy Sources and Smart & Intelligent Technologies in Industry. From a wide range of created e-tests, I will focus on a sample of e-tests that are related to manufacturing technologies. Due to the fact that my Faculty focuses on manufacturing technologies study, all students complete e-tests as part of

their study programmes. The aim of the study is to find out whether students achieve better results in those tests that are more related to their study programmes. It proves that such professional foreign language texts are more comprehensible to them. E-tests are designed to cover all language skills. At the same time, the teacher can identify strengths and weaknesses within the language competences. These findings will be useful for teachers in selecting more suitable professional foreign language study material as well as in creating new e-tests and assignments. E-tests are tailor-made for each study programme. Despite the fact that all examined e-tests are focused on manufacturing technology, I hypothesise that the results of e-tests will vary and students achieve better results in those tests that include tasks more closely related to their study programme. I consider that this is also related to the study of their professional subjects in mother language as well as the international vocabulary or terminology within their specialization.

Research design

The research using mixed methods was chosen to meet the stated goal of the study. Quantitative and qualitative data were obtained from selected e-tests performed by students of manufacturing technologies. The analysis and evaluation of the identified e-tests and their feedback provided sufficient data needed to compare the results within the individual study programmes – Computer-Aided Manufacturing Technologies, Automotive Production Technologies, Smart & Intelligent Technologies in Industry, Industrial Management and Renewable Energy Sources.

Participants

205 first-year engineering students at the Faculty of Manufacturing Technologies in Prešov Technical University of Košic participated in the experiment. The research took place in the academic year 2020/2021 in the winter semester (WS) within the compulsory subject English Language in Technical Practice I (ELiTP I) and in the summer semester (SS) within the subject English Language in Technical Practice II (ELiTP II). Due to the pandemic situation in Slovakia, the testing took place through e-tests prepared by 3 foreign language teachers from the Department of Social Sciences and Humanities. The tests included the issue of manufacturing technologies.

Procedure

At our Faculty, online tests are used in the Moodle system continuously during the semester to check students' knowledge. Language teachers use e-tests to get feedback from their students. They will find out how students understood the studied issues. They can also compare the results of students in different study programmes. Computer-controlled tests allow teachers to partially relieve themselves of manual and repetitive activities. Although these tests are not a "panacea", teachers can use them to improve students' knowledge through the so-called self-test (whether evaluated or not), or they can simply verify their knowledge. This activity within Moodle allows the teacher to create and set up tests, which can consist of several types of tasks. The tasks are stored in a database and can be used in various e-courses.

At the Faculty of Manufacturing Technologies, as part of engineering studies, all students must complete English Language in Technical Practice I, II during two semesters. The compulsory subject is completed by a graded credit. I believe that two lessons per week during each semester, whether as an optional (in the first year of bachelor's study) or compulsory subject, is sufficient to complete the subject at level B2 of the Common European Framework of Reference (CEFR) for languages issued by the Council of Europe (Gavora, et al., 2010; Chen and Han, 2021; CEFR, 2020).

Several types of online tests are developed at the Faculty of Manufacturing Technologies within two completed projects (Gluchmanova, 2016) and one ongoing project for new technologies, methods and forms in teaching for the needs and development of language communication skills within the technical professional foreign language study material. They are available to students throughout the academic year. Database of 110 e-tests is created on the website focusing for different study programmes and different language levels. They are formed on the university-wide Moodle platform, as part of the newly created EnGeRu educational portal for foreign languages teaching (Figure 1). Teachers update and supplement the tasks and assignments in e-tests as needed.

Teachers practice a hybrid way of teaching during the semester. One lesson is face-to-face and the next one is online. One group of e-tests consist of online ones which students must take during the semester through designated online lessons. Students are assigned two attempts for this type of e-test. The tests are not limited in time and after passing the student has the opportunity for immediate feedback. It is basically a self-education and consolidation of the curriculum, because the content of the e-tests follows on from the taken and studied curriculum from the face-to-face lesson.



Figure 1. Sample of professional topics in Moodle.

<http://web.tuke.sk/fvt-engeru/eng7-e.html>

Students also take the second group of online tests at the end of each semester. It is actually a summary of the curriculum for the whole semester with several tasks and assignments. The result of this test affects its final evaluation in order to obtain a graded credit. They have only one attempt, each test has a certain time limit. The student has only the number of points or a percentage evaluation of the success of their own test after finishing and sending their test to a teacher.

The content of the online test is based on the target requirements for the knowledge and skills of a graduate of a technical university. The level of difficulty corresponds to level B2 of the CEFR. The exact time is set for the administration of the final test and the elaboration of the assignment. Teachers try to incorporate tasks and assignments into the test. They include the following parts: listening to the professional text and its understanding (overall listening to the professional text with comprehension, comprehension of spoken announcements and professional instructions), professional terminology and grammar (using professional language) as well as reading and understanding the professional text (general reading comprehension text, oriented reading of technical study material, reading for obtaining professional information, reading instructions from different professional study material). The online test uses short-answer tasks, completion tasks, assignment tasks, tasks focused on the formation of technical words, multiple-choice tasks and True/False tasks. The topics are based on professional thematic areas, which are specified in the target requirements for knowledge and skills of technical university graduates in English for the B2 level. The individual parts of the test contain different types of tasks focused on different professional topics, which vary in the individual parts of the test. Instructions for completing tasks in online tests are formulated in English. If the type of test task requires it, teachers will also present a sample solution.

I would like to present reading and understanding a professional text (Figure 2) that can be suitable for each study programme. The aim of these e-tests is to verify the student's ability to accurately and effectively read professional texts in English, understand them and obtain the information from them, which is needed to complete the task. Teachers recommend a professional text of approximately 200 - 300 words. A characteristic feature of these e-tests is that the texts are taken by the teacher from authentic materials. If necessary, the teacher can partially didactically adjust them. The content of the tests is focused on topics from the study branch of students, but they can also be focused on scientific professional terminology and popular scientific literature. Slang expressions and dialectisms in texts are not allowed. The texts also contain a certain percentage of unknown vocabulary, so that the teacher can check whether the student can estimate the meaning of unknown professional vocabulary from the context. Sometimes the texts can be supplemented by visual material, such as diagrams of the described problem, tables with calculations, pictures of machines or diagrams of equipment (Gluchmanova, 2017). Types of texts include a memo to employs, job interview questions, leaflets, professional brochures, scientific manuals, marketing advertisements, descriptions of machines and components, assembly manuals, professional instructions, procedure at work or in the manufacture of the product, etc.

The texts are written for the professional public. Teachers can include, for example, work diaries, management, professional journals, market research and popular scientific texts. Thematic areas contain texts with professional issues and topics that are within the scope of knowledge and experience of students and they are in accordance with the target requirements of the English language. The tested knowledge and

skills have the task of monitoring global comprehension, selective comprehension, detailed comprehension of the text, estimation of unknown technical words from the context, recognition of the communicative function of utterances, etc.

Otázka 2
Neukončený
Max. hodnotenie: 10,00
Označiť otázku
Upraviť otázku

Read the text and match the Slovak equivalents with their English ones.

The process of **blow moulding**¹ involves **melting**² plastic pellets and **extruding**³ them through a **die**⁴ forming a round hollow tube called a **parison**⁵ (starting tube, pre-form). The parison is placed in a **mould cavity**⁶ and inflated to take the shape of the mould. Blow moulding is used to make **hollow**⁷ plastic containers such as bottles, jars and containers. Blow moulding has both advantages and disadvantages⁸. The advantages are that **tooling**⁹ is low in cost, production times are quick, **complex parts**¹⁰ can be manufactured, and products can be recycled. The **down side**¹⁰ is that parts made this way must always be hollow and controlling wall thickness is difficult.

10. down side
8. tooling
2. Melting
9. complex parts
4. die

Vybrať ...
vyfukovanie
dutina formy
forma
pretlačovanie
dutý
nevýhoda
komplexné súčiastky
roztopenie
nástrojové vybavenie
predtvar, polotovar
Vybrať ...

Figure 2. Reading comprehension task used in e-test.

Data analysis

The analysis of experimental research data was based on statistical and mathematical methods - for quantitative and qualitative analysis of experimental results. The data for individual e-tests were evaluated in the Moodle system at the end of the winter semester in 2020 and at the end of the summer semester in 2021. The results and marks of all e-tests focused on manufacturing technologies for the academic year 2020/2021 from students of the 1st year of engineering studies were separately summarised for individual study programmes.

Results

At The Faculty of Manufacturing Technologies, all students who complete compulsory subject English Language in Technical Practice I and English Language in Technical Practice II in the 1st year of engineering study were included in e-courses and e-testing in 2020/2021. It should be emphasised that experimental groups of students involved in e-testing complete the following study programmes (SP): Automotive Production Technologies (APT) – 42 students, Computer-Aided Manufacturing Technologies (CAMT) – 41 students, Industrial Management (IM) – 40 students, Smart & Intelligent Technologies in Industry (S&ITiI) – 42 students and Renewable Energy Sources (RES) – 40 students. In our research, a group of e-tests focused on manufacturing technologies was selected for an experimental group of 205 students - future engineers in the academic year 2020/2021. Depending on the focus of e-tests, the results of students in individual study programmes were monitored. The results of students of individual study programmes were summarised in the tables below. Faculty of Manufacturing Technologies in Prešov Technical University of Košice uses the European Credit Transfer System (ECTS). An evaluation procedure concludes each test. ECTS definition and criteria of performance are set up in the Moodle system as follows: A (100%-91%), EXCELLENT, able achievements = 1, an excellent piece of work, only marginal mistakes; B (90%-81%), VERY GOOD, above-average achievements = 1,5, some mistakes, but overall still outstanding work; C (80%-71%), GOOD, average achievements = 2, good and sound understanding, but some basic mistake; D (70%-61%), SATISFACTORY, acceptable achievements = 2,5, an average piece of work, clearly showing some deficiencies; E (60%-51%), SUFFICIENT, achievements fulfil only the minimum criteria = 3, the work fulfils the requirements; FX (50%-0%), UNSATISFACTORY, achievements do not fulfil even the minimum criteria = 4, considerable further work is required. Since the e-tests are prepared in the Moodle system, all the necessary parameters are available to the teacher after the end of the testing.

The first group of e-tests (CIM – Computer Integrated Manufacturing, CAD – Computer Aided Design, CAM – Computer-Aided Manufacture, CNC – Computer Numerical Control, CAM/CAD software) aimed to practice the expression of hardware and software functions as well as to provide language material and functional grammatical structures for practising and mastering the necessary communicative situations on the Internet. Texts are focused on the vocabulary needed to define the key terms of hardware and software.

Table 1. The grades achieved in the manufacturing technologies English tests in 2020/2021

study programme	A (100-91%)	B (90-81%)	C (80-71%)	D (70-61%)	E (60-51%)	FX (50-0%)
APT	5	7	16	11	3	0
CAMT	21	10	5	3	2	0
IM	6	8	15	5	5	1
SaITiI	8	9	11	8	4	2
RES	4	8	12	9	6	1

The grades shown in Table 1 indicate that students of the Computer-Aided Manufacturing Technologies study programme achieved the best results. Our finding that students achieve better results in those e-tests that have a closer connection with their study programme has been confirmed. Students are familiar with CA systems & CA technologies used in the preparation and management of production.

The second group of e-tests (traditional manufacturing processes – Drilling, Milling & milling cutters, Turning, Shaping, Cutting, Grinding as well as advanced or progressive manufacturing processes - Electrical discharge machining, Laser-beam machining, Electron-beam machining, Water jet machining, Abrasive jet machining, Hydroforming, Blow moulding, Injection moulding and Plasma cutting) contain language material needed for each sequence of operations in manufacturing processes. Texts have been designed to develop receptive language skills - listening and reading comprehension.

Table 2. The grades achieved in the manufacturing technologies English tests in 2020/2021

study programme	A (100-91%)	B (90-81%)	C (80-71%)	D (70-61%)	E (60-51%)	FX (50-0%)
APT	7	9	15	7	4	0
CAMT	10	12	9	6	3	1
IM	6	8	15	5	5	1
SaITiI	19	11	7	3	2	0
RES	5	11	12	8	4	0

Table 2 shows that most students who achieved 100%-91% success rate were from the Smart and Intelligent Technologies in Industry study programme. Future computer experts are second. This is related to the use of computers, especially in progressive production processes. Students are able to apply methods and techniques of process digitization in all branches of production. We can see that the manufacturing processes are the closest in content to the S&ITiI study programme.

The third group of e-tests (Information about a company, Company structure & ethics, Knowledge, Change & Financial managements, How leadership and management differ, Customer service, Marketing strategy, Direct marketing, Market research, How is sale different from marketing, Basic concepts of lean production) select the essential vocabulary for naming the various operations within the manufacturing enterprise. The aim is to manage essential vocabulary on industrial management. Texts have been designed to develop receptive language skills - listening and reading comprehension.

Table 3. The grades achieved in the manufacturing technologies English tests in 2020/2021

study programme	A (100-91%)	B (90-81%)	C (80-71%)	D (70-61%)	E (60-51%)	FX (50-0%)
APT	6	12	14	9	1	0
CAMT	10	9	16	3	2	1
IM	21	7	11	1	0	0
SaITiI	9	9	11	10	2	1
RES	5	9	12	10	4	0

Students of Industrial Management study programme should be able to independently manage a company in all industrial sectors. The e-tests developed in this group prove that the students who have mastered them should not have a problem with the English professional text in the future (see Table 3). They possess knowledge of the newest management control methods, therefore they can flexibly respond to changes in the economy and the market.

The fourth group of e-tests (The Three Rs, Recycling materials, Incineration plant, Types of renewable energy sources) aimed to control the necessary vocabulary related to global environmental issues in terms of functional structures. Texts were aimed at indicating cause and effect.

Table 4. The grades achieved in the manufacturing technologies English tests in 2020/2021

study programme	A (100-91%)	B (90-81%)	C (80-71%)	D (70-61%)	E (60-51%)	FX (50-0%)
APT	15	10	7	7	3	0
CAMT	12	8	14	6	1	0
IM	13	12	8	5	2	0
SaITiI	12	11	9	8	2	0
RES	19	10	7	3	1	0

Table 4 shows that students have the most balanced results in global environmental issues. This can also be explained by the fact that in today's society and mass media this issue is often discussed. Nevertheless, the questions concerning renewable energy sources are the closest to the students from study programme RES, maybe future environmental protection and monitoring managers are among them.

The fifth group of e-tests (How gears work, Joining parts together, The automobile industry: the engine of Europe, Audi, Engines, Basic safety rules) are aimed to describe the dynamic and static process of machinery and equipment. The aim is to manage essential vocabulary on automotive industry. Texts have been designed to develop receptive language skills - listening and reading comprehension. Texts also contain basic safety rules for manufacturing technologies operation.

Table 5. The grades achieved in the manufacturing technologies English tests in 2020/2021

study programme	A (100-91%)	B (90-81%)	C (80-71%)	D (70-61%)	E (60-51%)	FX (50-0%)
APT	21	10	5	5	1	0
CAMT	14	9	10	4	3	1
IM	7	11	13	5	4	0
SaITiI	11	10	8	9	3	1
RES	5	12	11	7	5	0

The last group of e-test in Table 5 shows students' interest in the Automotive Production Technology study programme. Students of Computer-Aided Manufacturing Technologies and Smart & Intelligent Technologies in Industry also achieved good results in this group of e-tests. A close link can be observed here, as digitization and the smart industry play an important role in the automotive industry.

Another factor is the fact that many of the students (especially foreign students from Ukraine) would like to find employment in the automotive industry. They would like to work in the automotive industry in Slovakia and the Czech Republic. Their advantage is that they possess the necessary knowledge in the area of technical materials used in automotive technology, automobile components inspection as well as final sub-assembly and assembly. Table 5 also confirmed the hypothesis that students achieved better results in those tests that are most closely related to their study programme.

The teacher has the opportunity to make insight into each task and find out which task was the most difficult for the student. In this case, it was listening and writing the words correctly. The students had to write correct technical words from listening text. This fact and the result of the test means that it will be necessary to strengthen listening with understanding and correct writing of the listened text, especially professional terminology in the next semester.

Discussion

A group of 205 students from the Faculty of Manufacturing Technologies in the 1st year of engineering studies was an experimental sample of our research in the academic year 2020/2021. The experimental sample consisted of students of the following study programmes: Automotive Production Technologies (APT) – 42 students, Computer-Aided Manufacturing Technologies (CAMT) – 41 students, Industrial Management (IM) – 40 students, Smart & Intelligent Technologies in Industry (S&ITiI) – 42 students and Renewable Energy Sources (RES) – 40 students. During the academic year (part in the winter semester 2020 and part in the summer semester 2021), they were included in e-testing with a focus on manufacturing technologies.

The process of creating a language e-test is not as simple as it might seem at first sight. It is a highly structured process, so its compilation is very time-consuming. Unlike primary and secondary schools, where the creation of e-tests is offered by the above-mentioned educational portals, there is no uniform procedure at Slovak universities due to the diversity of study programmes offered by universities of humanities or technical universities. So this created a call for foreign language teachers to work on a suitable foreign language professional text. They processed each e-test so that students could practise all language skills in it. As there is no comprehensive English textbook for students of manufacturing technologies, foreign language teachers decided to process e-tests so that students of each study programme could in the e-test: practice vocabulary from their field, listen to a suitable foreign language professional text, be able to work with professional text, they could read with understanding and the like.

The e-tests that were selected for the experimental group of students in our research were in the field of manufacturing technologies. Therefore, they are completed by students of all study programmes. However, their content differs in professional orientation. The aim of our research was to find out whether the specification of the e-test has an impact on the success of students in individual study programmes. Our hypothesis that students achieved better results in those tests that were closer to their study programme was confirmed. This was most strongly confirmed at CAMT, which is proof that students of Computer-Aided Manufacturing Technologies are the most interested in their field and professional terminology does not cause them problems. They are skilled in working with ICT, which was reflected in the results of e-tests. Their advantage is also international vocabulary in their study branch. The most balanced results were recorded in e-tests with global environmental issues, which shows that it is an almost everyday topic. Young people are more interested in their future, so tests on recycling, reuse, types of renewable energy were not difficult for them.

Sometimes, it was difficult to choose a suitable methodology that would be applicable to all students due to the diversity of study programmes at the Faculty as well as their different language levels. Similarly, Dževerdanović Pejović (2020) states that, regardless of the number of recommended methods and approaches, there is no methodology that would generally prove successful, also due to the different profiles of students, language competences and educational environment. I am of the opinion that teachers should also be made aware that e-testing is precisely designed for individual study programmes. It was found that students whose content did not correspond to their study programme had worse results.

The main advantage of online education and testing is that the student can study and take tests at a prestigious study programme from the comfort of home. It can be said that such education is flexible, that is, it allows everyone to easily adapt their schedule to the educational process (Yumnam, 2021). This type of education and e-testing uses the latest technologies that are still being introduced in many universities. Several modern firms and companies value employees with a university degree obtained at a distance. An experienced employer knows that a person who spends time in self-study and is interested in such studies is a much more experienced professional than the one who enters the university on the recommendation of his parents.

Positive but also negative aspects are shown in e-learning and e-testing, as well as in other activities. This is pointed out by many authors in their studies (Shaheen et al. 2019; Putri et al. 2020). Online education also has its shortcomings, which sometimes overlap its positive aspects. One of them is that in the process of such learning, the possibility of interaction between the student and the teacher is significantly reduced. In language training, this is not very favourable for students, especially when it comes to working with professional English study texts. In addition, this type of study is not for everyone, especially not for students who lack self-discipline. This is a very important feature during both e-learning and e-testing.

Conclusions

I am of the opinion that every student should be able to work with a professional foreign language text. It is very important for every student and graduate of a technical university for his future career as an engineer, a programmer, a technician, a manager and the like. As part of the e-tests of the KEGA project,

students have the opportunity to improve their professional knowledge in working with selected foreign language professional texts. Professional textbooks do not contain enough suitable study material for all study programmes at The Faculty of Manufacturing Technologies – Computer-Aided Manufacturing Technologies, Automotive Production Technologies, Smart & Intelligent Technologies in Industry, Industrial Management and Renewable Energy Sources. Due to this fact, it was necessary to prepare more suitable foreign language professional study material tailored to individual study programmes. It is a very time-consuming task, especially for a teacher who also has to consult topics with teachers of professional subjects, etc. In order to make the teaching process more attractive, teachers have decided to support traditional face-to-face teaching with online teaching and e-testing in the Moodle system. The hybrid form of teaching shows that such a form is much more interesting for students compared to the traditional form of teaching. Teachers try to get as many incentives from their students as possible to make this teaching more effective.

A lot of hard work still awaits in the started work of foreign language teachers at the Faculty of Manufacturing Technologies. The good news is that language teachers have started to make more use of ICT in the teaching process and the university-wide Moodle system. Every year, new, up-to-date study materials and e-tests, which are very necessary for students, are added to the created EnGeRu faculty educational portal. The activities provided by Moodle will need to be further improved in the future so that teachers can improve students' skills and expand their expertise.

In addition, to create the right content for online education and e-tests with a quality technical background, there are several other factors associated with the topic of distance education. Students, as well as teachers, need to be taught this way of teaching. The current variant was not taken into account in the Slovak school system. It requires a certain amount of creativity and gradual implementation of changes, much greater responsibility, self-study and wider use of more technologies. All of this must be responded to as soon as possible, not to allow the situation to be ignored.

I believe that a study with online learning and evaluation will also be aided by a survey on the impact of the Covid-19 pandemic on education in Europe, which took place during February 2021. The European Centre for Education has focused on key issues in the field of education, promoting excellence, innovation and efficiency in different teaching and learning contexts. Its task will be to effectively implement the findings into practice. I expect that in the future, the results of the survey could further help teachers, students and school management in advancing and improving the conditions with online education and electronic assessment of students not only in Slovakia but also in other European countries.

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References:

- Alenezi, A. (2020). The Role of e-Learning Materials in Enhancing Teaching and Learning Behaviours. *International Journal of Information and Education Technology*, 10(1), 48-56. <https://10.18178/ijiet.2020.10.1.1338>
- Bilotserkovets, M., & Gubina, O. (2019). Target Language Teaching by Means of E-Learning: A Case Study. *Revista Romaneasca Petru Educatie Multimensionala*, 11(4), 17-29. <https://doi.org/10.18662/rrem/154>
- Chen, J., & Han, C. (Eds.). (2021). *Testing and Assessment of Interpreting: Recent Developments in China*. Singapore, China: Springer Nature. <https://doi.org/10.1007/978-981-15-8554-8>
- Dževerdanović Pejović, M. (2020). Learning Technical Genres – a Blended Learning Approach. *Scientific Journal of Maritime Research*, 34, 212-222. <https://doi.org/10.31217/p.34.2.2>
- Erarslan, A., & Şeker, M. (2021). Investigating e-Learning Motivational Strategies of Higher Education Learners Against Online Distractors. *Online Learning*, 25(2), 262-279. <https://doi.org/10.24059/olj.v25i2.2252>
- Gavora, P., Koldeová, L., Dvorská, D., Pekárová, J., & Moravčík, M. (2010). *Elektronická učebnica pedagogického výskumu*. Electronic textbook of pedagogical research. Bratislava, Slovakia: Comenius University.
- Gluchmanova, M. (2017). Creation of e-Courses in English for Students of Production Technology. *TEM Journal*, 6(3), 613-617. <https://doi.org/10.18421/TEM63-25>
- Gluchmanova, M. (2019). Innovative Forms of Education in Technical Study Material. *TEM Journal*, 8(2), 604-609. <https://doi.org/10.18421/TEM82-38>
- Gluchmanova, M. (2016). Using the Moodle Platform in English Teaching. *TEM Journal*, 5(4), 492-497. <https://doi.org/10.18421/TEM54-13>
- Hrdličková, Z. (2021). Improving Students' Language Skills in Business English Course: Experimental Study. *Advanced Education*, 8(17), 46-56. <https://doi.org/10.20535/2410-8286.226493>

- Isoc, D., & Surubaru, T. (2020). Engineering Education Using Professional Activity Simulators. In: Auer M., Tsiatsos T. (eds), *Advances in Intelligent Systems and Computing*, 916 (pp.520-531). Springer, Cham. <https://doi.org/10.1007/978-3-030-11932-4-50>
- Kotlyarova, I., & Chuvashova, A. (2021). Educational Imitation of Basic Job Function Using the Knowledge of English among Technical Major Students. *International Journal of Instruction*, 14(1), 303-324. <https://doi.org/10.29333/iji.2021.14118a>
- Ma, Y., Wang, S., Sun, W., Yu, Y., & Bian, J. (2020). Research on the construction and optimization of distributed Moodle course platform. *Computer Applications in Engineering Education*, 1061–3773. <https://doi.org/10.1002/cae.22276>
- Putri, R. Z., Jumadi, J., & Ariswan, A. (2020). Moodle as e-Learning Media in Physics Class. *Journal of Physics: Conference Series 6th International Conference on Mathematics, Science, and Education*, 1567(1), 1-7. <https://doi.org/10.1088/1742-6596/1567/3/032075>
- Redecker, Ch. (2013). *The Use of ICT for the Assessment of Key Competences*. Seville, Spain: Institute for Prospective Technological Studies.
- Robroo, I. (2021). Development of the e-Collaborative Learning Model to Enhance the Teamwork of Preservice Teachers. *Elementary Education Online*, 20(4), 1971-1979. <http://ilkogretim-online.org/?mno=67074>
- Robroo, I. (2019). The Effect of Using E-learning for Enhancing Active Learning of Pre-service Teachers. *International Journal of Information and Education Technology*, 9(1), 799-804. <https://doi.org/10.18178/ijiet.2019.9.11.130>
- Ramos Serpa, G., & López Falcón, A. (2020). Professional's Ethical Formation and Professional Ethics of the Professor. *Estudios Pedagogicos*, 45(3), 185-199. <https://doi.org/10.4067/S0718-07052019000300185>
- Shaheen, M.N.K., Shah, N.H., & Naqeeb, H. (2019). The Use of ICT for Assessment and Evaluation. *International Journal of Distance Education and E-Learning (IJDEEL)*, 5(1), 17-28. <https://doi.org/10.36261/ijdeel.v5i1.790>
- Spoločný európsky referenčný rámec pre jazyky (SERR): učenie, vyučovanie, hodnotenie, Rada Európy, 2020. Common European Framework of Reference for Languages (CEFR): Learning, Teaching, Assessment, Council of Europe, 2020. <https://www.coe.int/en/web/common-european-framework-reference-languages/level-descriptions>
- Stanojević, D., Stanković, Z., & Maksimović, J. (2017). Electronic Evaluation in Teaching Class: Assessment Value of Educational Software. *Teaching, Learning and Teacher Education*, 1(2), 185-197. <https://doi.org/10.22190/FUTLTE1702185S>
- Suseno, S., & Zulyanti, Z. (2020). Moral Value of Holy Stories in the Kudus as Teaching Material in Literature Learning. *International Journal of Innovation, Creativity and Change*, 11(4), 492-501. https://www.ijicc.net/images/vol11iss4/11440_Suseno_2020_E_R.pdf
- Urbikain, G., & López de Lacalle, L.N. (2021). Bridging the Gap between Student Instruction and Advanced Research: Educational Software Tool for Manufacturing Learning. *Comput Appl Eng Educ.*, 29(1), 274-286. <https://doi.org/10.1002/cae.22305>
- Yumnam, R. (2021). E-learning: An effective Mode of Teaching English as a Second Language. *Journal of Translation and Language Studies*, 2(2), 1-9. <https://doi.org/10.48185/jtls.v2i2.275>
- Tomašegović, T., Žitinski E., Paula Y., Baračić, M., Mrvac, N. (2011). E-learning and Evaluation in Modern Educational System. *US-China Education Review*, 8(2), 198-203. <https://www.bib.irb.hr/509731>

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