

The Influence of Distance Learning on Vocational Subject of the First year Students at the University of Defence – Results of the Comparative study

Ludek Rak¹, Pavel Zahradnick¹, Jan Nohe¹, Ľudovít Hradský¹
University of Defence¹
ludek.rak@unob.cz

Abstract: The University of Defence students are ground “stones” for safety studies in future. Their education process is the basic step for ensuring security for the Czech Republic in the next decades. The article deals with the very current topic - the success rate of distance education of first-year students of the University of Defence in Bmo in vocational-oriented subjects in a long-term context. The article formulates the results of the study. The study is to focus on the first year of study that the students of both University faculties completed according to the currently valid study program.

By comparing the results achieved by students in all first years of study (the group consisted of more than 500 respondents), we have gained a relatively straightforward and objective answer to the question concerning the effectiveness of distance learning from a long-term perspective. The first semester of the university studies was realised in distance learning compared to the standard system dominated by full-time teaching joined with practices and seminars. The second semester was realized, as usual, students were returned to the standard study program.

Keywords: DISTANCE-STUDY, EDUCATION-PROCESS, RESULTS OF STUDY; SECURITY OF CZECH REPUBLIC IN FUTURE.

1. Introduction

The pandemic situation caused by COVID 19 was the reason why the Government of the Czech Republic gradually ordered distance teaching in all forms of studies and education, from primary schools to universities. This in turn affected the studies of security fields in the Czech Republic, the guarantors of which include the faculties and institutes of the University of Defence. More or less immediately, teachers had to familiarise themselves with online communication technologies they had never used before. It was necessary to give lessons through open, or only rudimentarily secured systems. This meant, with regard to the security of information, that it was only possible to provide non-classified information, so only lectures based on non-classified literary sources could be given. Teachers had to cope with a situation in which it was necessary to quickly gain the required professional competencies and insight, without face-to-face training or consultations, into all aspects of distance education. Owing to the substance of certain lectures that could not be given, the tuition sequence was disrupted. Another problem, in particular, that gradually became apparent was the impossibility of using practical education methods. Students could not verify their newly acquired knowledge in practice, the methodological “principle of illustration” [1] was considerably reduced, while the principle of “connection between school and life” [2] described by modern pedagogy was completely undermined. After the pandemic’s abatement and the return of students to schools it would be highly reassuring to report that almost a year (i.e. two semesters of university studies) of education with a high proportion of mainly distance learning had had no impact on the educational objectives of students; however, a number of studies regrettably argue that in certain aspects the very opposite is true. Although the mentioned studies, e.g. [3] [4], are focused on the education of pupils and students of primary and secondary schools, the study results can be analogically successfully applied to university education, specifically to the field of security.

2. Methodology

The educational process at universities is generally not given sufficient methodological attention in the Czech Republic (Šíma & Pabian, 2013). The Czech education system focuses on acquiring sufficiently qualified and professionally competent teachers, who engage in teaching with the opportunity to participate in designing the goals and contents of higher education in various forms, while using adequate methods for conducting each lesson. Cf. [5]. Such teachers should be able not only to improve their own skills in the course of improving their own qualifications in the given field to

a high level, but also to enhance their teaching competencies. In real life, however, it is very common that lecturers at universities are experts specialised in a certain field, but lack any deeper education. Students are perceived as active subjects of the educational process. Cf. [5]. They are required to apply acquired knowledge in practice; high demands and requirements are placed on them in terms of self-motivation and self-education. Where students can choose the educational content and, to a certain extent, the way they acquire it, such students must accordingly bear the necessary degree of responsibility for the results of their study activities. In addition, students are also allowed to evaluate subjects and teachers in accordance with the Methodology 17+ (Government Decree No. 107/2017 of 8 February 2017). On the other hand, it should be noted that, due to the pandemic, the research sample of the students of 2021, who are the subject of this research, had only one week to acclimatise and accept the university method of teaching and studying.

The case study takes the form of an independent comparison of two sets of respondents over the entire academic years 2019–2025.

The common feature of both groups was the fact that they tried to earn a credit on the course ‘Preparation in the Battlefield’ in the given academic year. The subject is a fixed part of several fields of study that are taught at two faculties of the University of Defence focused on security studies. In both years, students have to attend all the parts of the course – i.e. attendance at lectures, exercises, and seminars is compulsory. In the first case, i.e. in 2019, all teaching took place in classrooms and included a large (60%) unit of practical training. In the second case, distance education was predominant due to the pandemic. Practical training also took place through distance education.

Table 1. Plan of study: Preparation in the Battlefield

Academic year	Winter term			Summer term		
	Distance learning*	Lectures, Exercises	Practice	Distance learning*	Lectures, Exercises	Practice
2019–2020	0 hours	34 hours	34 hours	0 hours	34 hours	34 hours
2020–2021	70 hours	0 hours	0 hours	0 hours	34 hours	34 hours

*[6], [7], [8].

So compared to the total time allocated in 2019–2020, which was 136 hours, 1.5% more time was spent teaching in the subsequent year that was affected by the pandemic. In addition, students were given a two-hour lecture as a preparation for the credit test. Practical training did not take place; instead, students worked on projects which were discussed and presented by them

through [7]. During lectures, exercises, and seminars the following means were used for education purposes: software programmes [6] and [7], videos of practical trainings done by previous-year students by means of [8], escape game in the environment [7], supplementary lectures and consultations in various "rooms" [7].

None of the students was a member of both research samples. All students had finished secondary school education, were duly enrolled for studies, and met all the prerequisites for studying the subject. Only a small portion of students (up to 5%) had personal experience with the relevant subject due to previous practice in the Army of the Czech Republic. The research sample did not include students who finished their studies of the subject prematurely. In each year the course was taught in two cycles, depending on the given faculty. But the schedule of the course was identical for both faculties, there was no difference except for the size of student groups. The sizes of student groups are stated in Table 1. The education process was carried out by the same lecturer, who is also the guarantor of the course. In both semesters of each year, the course was completed by a credit test.

Table 2. Research sample

	Faculty of Military Leadership (FVL)	Faculty of Military Technologies (FVT)	Total per year (one set of respondents)
2020	156	90	246
2021	160	108	268
TOTAL	216	198	

In both years, students had at their disposal study texts covering the entire subject. In 2019–2020 they were given the texts in written form, and in 2021–2022 electronically. In addition, in 2022 they were given presentations for lectures and videos on the platform [8] in order to use them during their studies of the subject.

The benchmark of mastering the required amount of knowledge was the credit test. The credit test took place in the programme [8]. In both semesters of both academic years the test took place in the same manner, namely by answering 15 questions randomly selected from a battery of 120 questions. 50% of them were dichotomous. The remaining 50% of questions were polytomous. In all cases the author of the tests tried to ensure that it was not possible to easily use information available on the internet to answer the questions. In other words, the objective of the examination was to make students use the knowledge they had acquired. Moreover, the test was limited in time and the questions were selected randomly. The test contained 10 questions that required theoretical knowledge, while the remaining 5 questions involved the practical application of acquired knowledge in a particular case.

3. Results

The testing of students brought to light a number of interesting findings. This was also because tests were performed in the programme [6], which contains a relatively large number of evaluation features. This factor proved very important for the lecturer to obtain objective feedback, especially with certain kinds of questions. In particular, a difference could be clearly seen in the ability to apply acquired knowledge in those questions that required the students to show their skill at applying acquired knowledge in practice.

3.1. Results of the winter semester of 2020

In this year students achieved evaluation results corresponding to the difficulty of the test. The overall average for individual faculties was 12.64 for FVL and 12.58 for FVT. In other words, 143 students met the success criterion (which was 13 correct answers in the test), i.e. 58% tests were passed at the first attempt. Although not as evident in total numbers, the ratio is more clearly seen in the graph and in the proportion of successful to unsuccessful students.

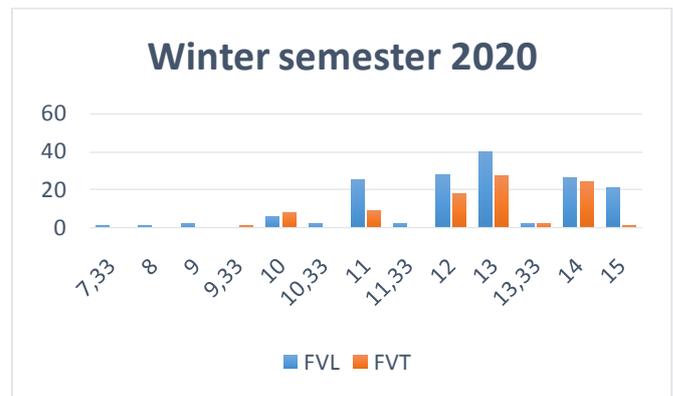


Fig. 1 Results of the Test in the Winter Semester of Distance Education in 2020.

3.2. The results of the test in the winter semester of distance education in 2021

Both faculties received similar evaluations. The FVL average was 11.80, and the FVT average was 12.01. As for FVT, regardless of the better results, I see an absence of outstanding students, which is because this subject is more or less marginal for them: they are generally more interested in studying technical subjects. In contrast, a wider range of results is visible among FVL students. This is given by the large differences between students and the varying degrees of interest in the subject, which is due to the large number of different specialisations that students start studying after their first year.

The overall results are expressed in a graph.

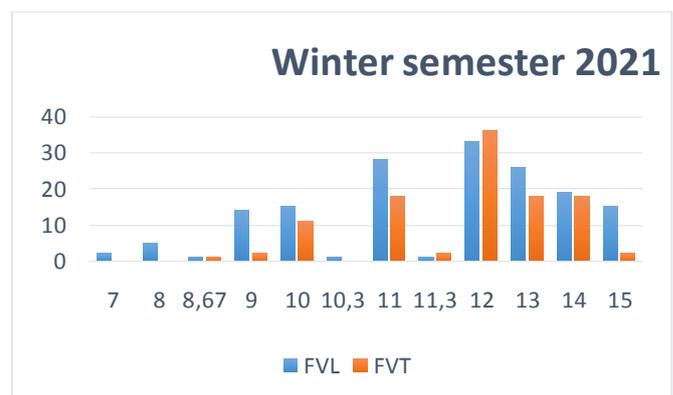


Fig. 2 Results of the Test in the Winter Semester of Distance Education in 2021.

Again, a minimum of 13 correct answers was required to pass the test. The percentage of success of the individual faculties was 37% for FVL, i.e. 58 students, and 35% for FVT, which was only 38 students. Overall, the test can be seen as relatively unsuccessful.

A deeper analysis of the questions showed that students achieved the highest error rate in the five application questions mentioned above. On average, only 82% of students answered them correctly; with only 70.5% correctly answering the most difficult question.

3.3. Results of the summer semester of 2020

In this semester, students are supposed to have already fully mastered the study material, which is given by clearly formulated study outputs. The average examination score for individual faculties was 13.16 for FVL and 13.21 for FVT. Slightly better results were shown by students of the Faculty of Military Technologies, which confirms the trend described above. Students of the Faculty of Military Leadership had a much higher number of absolutely correct tests again, but as far as lower results are concerned, the proportionality of their results to the results of FVT declined. In total, 131 students of FVL, which is 83.97%, and 75

students of FVT, which is 83.97%, passed the test at the first attempt.

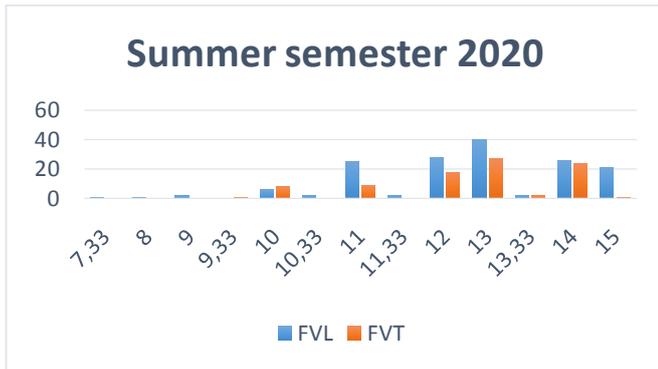


Fig. 3. Results of the test in the summer semester 2020

Closer examination of the success rate in answering individual questions showed that no particular problem area could be identified: mistakes were made rather due to a lack of attention or lack of knowledge, or misunderstanding some of the questions. However, the rate of mistakes in answering all questions did not show any significant differences.

3.4. Results of the test in summer semester 2021

Although, as stated above, towards the end of the summer semester attendance-based education began again, and students were allowed to start undergoing practical training in the subject, the results of the final test clearly showed a decline in their knowledge. During the entire practical part, the students asked a large number of questions concerning elementary matters that they were supposed to have already mastered in the preceding semester, or that were included in the prerequisites for the subject and knowledge of which was required from the students automatically. Despite comparatively greater efforts made during their own practical training, students were unable to achieve a better than average evaluation, unlike students in previous years. And an average evaluation was achieved by only the best of them. It was evident that students had problems with e.g. the practical application of topography, as well as resilience to the adverse weather and personal discomfort which accompanies training.

Students also did not pass the final test in the appropriate manner. The results of students from both faculties were much worse than before. For FVL, the average score dropped to 12.21 as compared to the previous year, and the test was only passed by 69 students, which is only 43%. For FVT, there was also a decline: the average of correct answers dropped to a score of 12.36, which means that only 46 students, i.e. 42%, passed the test at the first attempt.

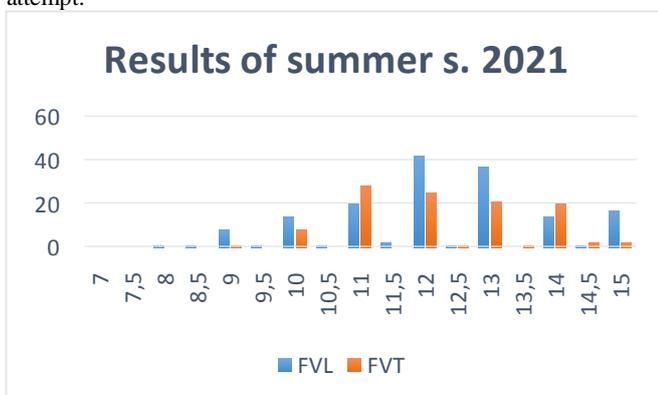


Fig. 4. Results of the test in the summer semester 2021

A deeper analysis of the students' answers revealed a substantial decline in their ability to apply acquired knowledge in practical cases. Most of the answers to theoretical questions and the student error rate did not differ from the preceding year. However, a

dramatic decline was seen in application questions, which are, moreover, polytomous. Except for the best students and two others, everyone who did not achieve a full score made mistakes in answering these questions.

3.5. Overall evaluation

Overall, the results show that the success rate of students dropped by almost 40% at the end of the summer semester. Students managed to deal quite well with the educational material conveyed to them by distance learning methods instead of lectures, but even several months after the epidemic restrictions had been lifted, they were unable to apply the gained experience outside model cases.

Although at the time of publishing the winter semester results the study author considered the main issue to be the problematic [9] acclimatisation of students in the university environment and their self-motivation skills, after these results were achieved and the practical part of the training was completed, it seemed that the main problem lay elsewhere. During distance education, students were unable to understand the contents of topics in context. They had a problem with questions, which they did not ask to the required extent, partly due to technical problems and partly to shyness. Despite problems gaining the credit in the winter semester, they did not devote themselves to the subject and failed to retain a lot of knowledge. The reasons are the gap of more than four months between the beginning of summer practical training and the end of the winter semester, as well as the fact that they failed to master the whole issue as required. However, the study author regards as the main cause of the decline in results the fact that certain fundamental teaching principles were denied during the education. This withholding concerned the following principles:

- "Principle of illustration" – through [7] the author of the lectures was unable to introduce to the students an adequate number of aids they usually use during lectures;
- "Principle of activity" [2] – due to the absence of feedback, resulting from the fact that a large group of students had to switch off their cameras in the programme [8], it was very difficult or even impossible for the lecturers to estimate the current state of mind of students in the group, as well as how they were responding to the lecture or how they understood the given subject;
- The "Principle of consistent and systematic work" [2] was broken by disruption to the schedule of the academic year due to the pandemic. There was a much too long a gap between the theoretical foundation built in the winter semester and the practical experience at the end of the summer semester;
- "Principle of connection between school and life" [2] – students did not have an opportunity to check the knowledge gained in the winter semester in practice;
- "Principle of activity and creativity" – during lectures given through [8], students could not participate in shaping the lecture. Although the lecturer was available through the programme [7], over the course of the lecture students asked a minimal number of questions and failed to understand the matter, thereby undermining this principle.

The breach of all the principles described above due to the switch to distance learning resulted in a decline in the knowledge of students at the end of studying the subject. The teaching principles described above are constantly valid and are accepted by the broad scientific community. Their breach due to distance education resulted in a full or partial failure to understand the subject, which was partially compensated during final training on the course, when the students showed a good theoretical knowledge of the required topics. However, they were unable to master the knowledge transmitted in lectures well enough to be able to apply most of it in specific cases.

4. CONCLUSIONS

Thanks in part to the pandemic situation and technological developments in connection with distance education, it is likely there will be a significant increase in the total number of distance teaching hours within the university system in the Czech Republic in future. However, when deciding whether distance teaching is acceptable for a given course, it is necessary to take into account the fulfilment of educational principles. For example, not using distance teaching at moments when, based on any criterion, basic valid educational principles are not fulfilled or are restricted, in particular those principles associated with the possibility of obtaining feedback from students. Conversely, this method could be better used to give lectures on actually chosen topics with a more supplementary character, prioritising attendance-based education instead for the basic topics necessary for understanding the fundamental relationships, and for giving the most important lectures. For the time being, the study results published above are only partial, and will be complete after the end of the study. Nevertheless, it is evident that the unplanned switch to a distance form of education due to the COVID-19 pandemic has had a serious impact on the education of a future generation of workers in the security sector.

REFERENCES

- [1] JŮVA, Vladimír. Úvod do pedagogiky. Brno: Paido, (1997). 3rd ed. ISBN 80-85931-39-7. 112pp.
- [2] ŠMAHELOVÁ, Bohumíra a Jarmila SVOBODOVÁ. *Kapitoly z obecné pedagogiky*. 1st. ed. Brno: MSD s.r.o., (2007). 140 s. Pedagogická teorie. ISBN 978-80-86633-81-7.
- [3] L, ROKOS, "Distanční výuka při opatřeních spojených s koronavirovou pandemií – pohled očima učitelů, žáků a jejich rodičů". *Pedagogická orientace*, vol. **30**, no. 2, pp. pp. 122–155, (2020).
- [4] SINTEMA, E. J. "Effect of COVID-19 on the performance of grade 12 students: Implications for STEM Education". *EURASIA Journal of Mathematics, Science and Technology Education*, (2020).
- [5] MAŇÁK, Josef a Vlastimil ŠVEC. *Výukové metody*. Brno: Paido, (2003). ISBN 80-7315-039-5. Dostupné také z: <http://www.digitalniknihovna.cz/mzk/uuid/uuid:573c7370-c430-11e2-b6da-005056827e52> DOUGIAMAS, M.,
- [6] *Microsoft Moodle* [software]. 19 October 2021 [2021-10-19] available from: <https://www.microsoft.com/cs-cz/microsoft-teams/download-app>. System Requirements: Win10; Size 270 MB.
- [7] MICROSOFT, *Microsoft Teams* [software]. 19 October 2021 [2021-10-19] available from: <https://www.microsoft.com/cs-cz/microsoft-teams/download-app>. System Requirements: Win10; Size 512 MB.
- [8] GOOGLE, YouTube [software]. 19 October 2021 [2021-10-19] available from: <https://www.youtube.com>. System Requirements: Win10; Size WebPage.
- [9] L. Rak, P. Zahradníček, Ľ. Hradský (2021) Influence of Distance Learning on Vocational Subjects of First-Year Students at the University of Defence. Comparative Study results". IN: *EDULEARN21 Proceedings*, pp. 6680–6685. ISBN: 978-84-09-31267-2.
- [10] RAK, Luděk. Příprava v poli I.: studijní pomůcka. Brno: Univerzita obrany, 2018. ISBN 978-80-7582-073-0.
- [11] ZAHRADNÍČEK, Pavel, Luděk RAK a Jan DROZD. Příprava v poli II: studijní text. Brno: Univerzita obrany v Brně, 2020. ISBN 978-80-7582-362-5.
- [12] RAK, Luděk, ZAHRADNÍČEK, Pavel. PŘEPRACOVANÁ KONCEPCE PŘÍPRAVY V POLI STUDENTŮ UNIVERZITY OBRANY. In: doc. Ing. Peter SPILÝ, PhD. *NÁRODNÁ A MEDZINÁRODNÁ BEZPEČNOST 2020*. Akadémia ozbrojených síl generála M. R. Štefánik: Akadémia ozbrojených síl generála M. R. Štefánik, 2020, s. 382-391. ISBN 978-80-8040-589-2.