Analysis of education quality at a technical university during the COVID-19 pandemic

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ABSTRACT

The article considers the impact of the COVID-19 pandemic – specifically the introduced quarantine measures – on the educational process at the Dnipro National University of Railway Transport (named after academician, V. Lazaryan). In general, distance learning has caused inconvenience to all participants in the learning process, teachers and students alike. First of all, the general problems that teachers faced across the board, as the main guarantors of the success of the educational process, are noted. Then, based on the concrete example of a technical university in Ukraine, an analysis of the success of student learning during a pandemic has been carried out. To achieve this, the static data on the success of students' training across different courses and specialties for the last four academic years are considered. It was found that, for both students and professors, the pandemic caused significant inconvenience – plus, in some cases, mental health and technical problems were not fully resolved, which led to a further decrease in the quality of the educational process. In light of these findings, in order to improve the quality of education, proposals are made to: use tutoring with first to fourth year students; improve the quality of technical equipment and the internet connection, and to pay more attention to high-quality digital content for teaching in distance learning, as well as conducting training courses on working with such content.

KEYWORDS

university, learning, COVID-19, tutoring, education, students

Introduction

In Ukraine, the 2021/2022 academic year began with increased quarantine restrictions: by the end of October 2021, many regions were in the red zone due to the growing number of Covid-related deaths. At the same time, the operation

of non-food, fitness, cultural, catering, entertainment, and educational establishments (except for kindergartens and primary schools) was prohibited in the areas which fell into the quarantine zone. However, the restrictions did not apply to facilities with fully vaccinated workers and visitors (i.e. those with two vaccinations) or who had a negative PCR test. Against this backdrop, it should be understood that not all teachers and students at Ukraine's higher educational institutions expressed or possessed a desire to be vaccinated. In any case, the country's universities switched to distance learning. Considering that this mode of operation has now fully extended into its second year, the question of the current quality of Ukrainian higher education must be examined, most urgently in terms of measures to increase this quality (Stukalo et al., 2020).

Under such conditions, an important role was played by teachers' motivation and technical skills for conducting the education process remotely – specifically, requiring mastering a variety of software and video-conferencing services. The same demands apply to students, but, in their case, the motivation to study is related to environmental factors such as household chores, technical problems at home (e.g. computers or internet connection), or employment. In motivating their students, the most effective approach is for educators to work with small groups (of up to three) via tutoring, using different models (Pérez-Jorge et al., 2020) and roles (Faroa, 2017). The main task of tutoring is to help an individual to reveal their potential and develop their competences.

Purpose

The purpose of this study is to analyse the educational success of students studying at the Dnipro National University of Railway Transport during the COVID-19 pandemic.

Material and methodology

The study analysed statistical data on the educational success of Dnipro National University of Railway Transport students in full-time education on various courses over the last four academic years. Data were gathered across diverse areas of study: both in the sciences and the humanities.

The statistical data were obtained from Cursor (the internal organisational and information management system), which contains information about stu-

dents and teaching staff; exam results; class attendance logs, etc. The students' success was assessed using a 5-point system.

Results and discussion

Put simply, the introduction of quarantine measures to the university's educational process was stressful for all participants – both for teachers and students. First of all, teachers faced fundamental problems as the main guarantors of the success of the educational process. In fact, in most cases, they lacked previous distance learning experience, which manifested in incomplete distance learning courses, a lack of presentations, etc. Furthermore, many teachers did not possess an understanding of how to conduct laboratory and practical classes (i.e., in scientific or technical disciplines) in a long-distance format.

The overwhelming majority of the surveyed teachers (approximately 60%) had a problem with distance learning, since, as mentioned above, they had no previous experience, and therefore were not prepared to teach during quarantine. Additionally, approximately 45% noted that they had never used distance learning technologies (for example, Zoom) in their teaching activities before. These findings can be explained, at least in part, by the fact that the teaching staff had not received any recommendations or training on how to conduct distance learning and work with online tools.

The next problem the surveyed teachers faced was a lack of access to high-speed internet, as well as the technical equipment needed for teaching long-distance. This problem was also experienced by students, but to a lesser extent due to the widespread practice of using mobile phones as a translator during distance learning – improving their access to distance courses, but worsening their levels of information perception and ability to perform more complex tasks.

At the same time as these technical considerations, the impact of the pandemic on the surveyed students' psychological states should also be noted (Grubic et al., 2020) – particularly regarding anxiety and economic uncertainty about the future. This trend is also confirmed in a survey by Cao et al. (2020), who found that young respondents experienced a deterioration in their mental health, due to limited social contact and the inconveniences added to everyday life.

Cumulatively, the above factors influenced the level of students' learning success. However, given these negative influences, the current analysis reveals perhaps surprising results. In the 2017/2018 and 2018/2019 academic years – that

is, before the onset of the COVID-19 pandemic – the success of students in technical fields averaged 3.8 points (see Figure 1).
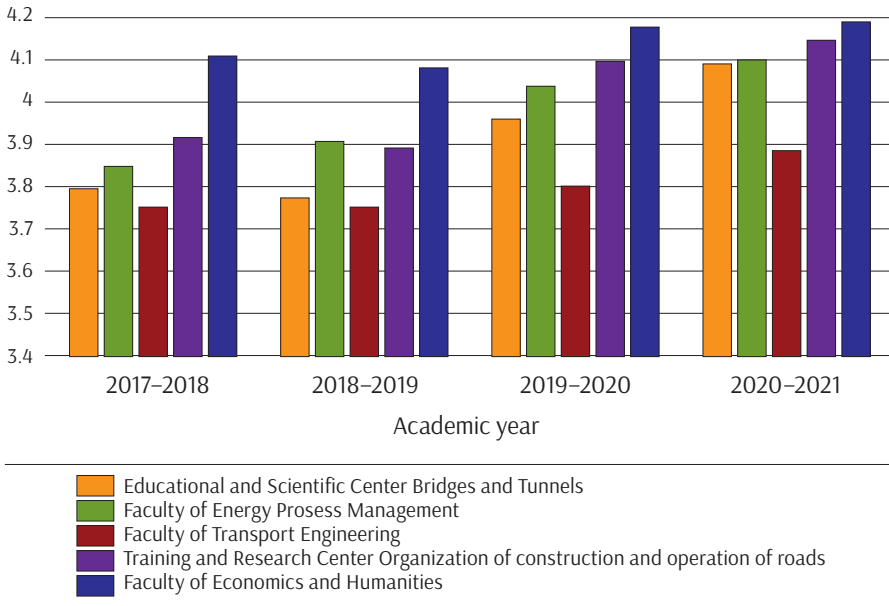

Figure 1. Statistical data on the educational success of Dnipro National University of Railway Transport students over the last four academic years

From this data, it can be seen that (during quarantine and distance learning) students' average level of academic performance increased to about 4.1 points. Such growth is shown by students across almost all technical fields of study. As for the humanities, namely, students of the Faculty of Economics and Humanities, there is an almost constant academic performance between pre- and mid-pandemic periods.

The obtained results seem to contradict expected trends in terms of the (negative) impact of the pandemic; however, they can perhaps be explained by low levels of motivation for teaching students, as well as and the teaching methods, in place at the university pre-pandemic. For the analysis of these factors, the above statistics (see Figure 1) are divided into two parts in line with courses studied – the first including bachelor's students from first to fourth year. These statistics are shown in Figure 2.
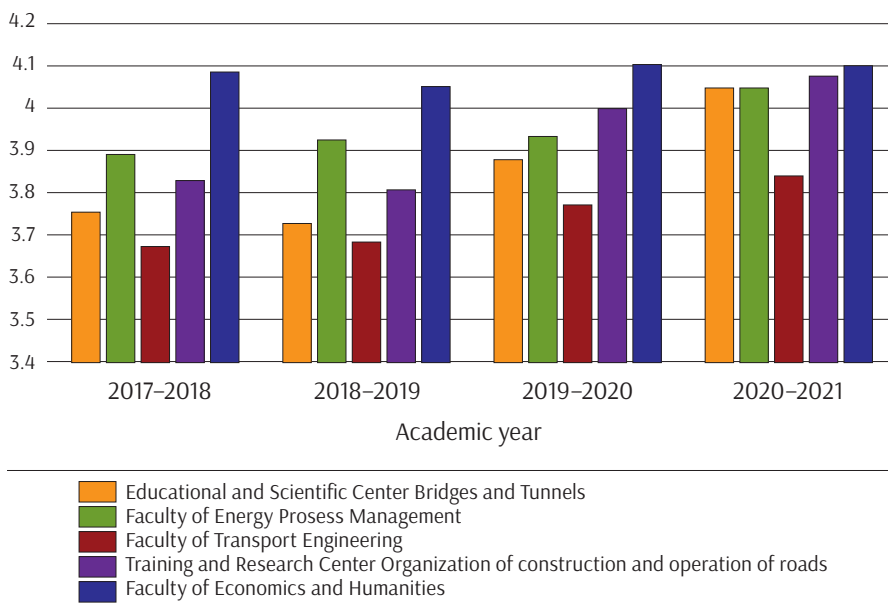
Figure 2. Statistical data on the academic success of first to fourth year students across the last four academic years

The low average (i.e., 3.78 points) of students' academic performance in technical subjects pre-pandemic speaks to insufficient motivation among their teachers. However, during distance learning, according to the statistics obtained in this research, there was actually a slight increase in their average grades – increasing to 3.9 points in the first year and 4.0 points in the 2020/2021 academic year. This growth in students' average educational success can perhaps be explained by the widespread use of online lectures and practical material (located on the discipline website), as well as assessment methods taking a greater variety of forms and a corresponding decrease in teachers' subjective influence on the results.

On the other hand, a significant proportion of the surveyed students took on temporary jobs during the pandemic, which led to a comparative lack of time available for them to spend on their education – accordingly, this may have interrupted their academic motivation and performance. Therefore, the unexpected increase in average grades may be associated primarily with the incompletely configured education system at the university. Difficulties encountered by teaching staff during the transition to distance learning led to a deterioration in the quality of education they were able to provide, accompanied by feelings of sympathy towards their students and, as a result, a more loyal attitude towards them

when formally assessing their knowledge. Figure 3 illustrates the educational success of fifth year (master's) students over the last four academic years.
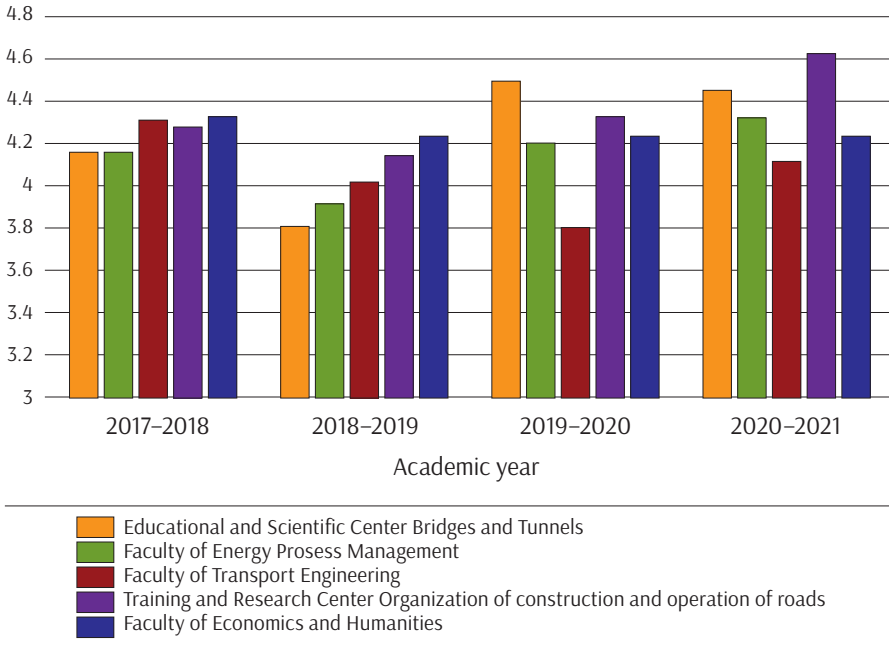

Figure 3. Academic success of fifth year students over the last four academic years

It can be seen here that fifth year students' average scores in most technical subjects (i.e., 4.38 points for the 2020/2021 academic year) is slightly higher than those of humanities students (i.e., 4.2 for the same year), which is the inverse result to the data on first to fourth year students. It is also necessary to note the generally high level of academic performance from humanitarian students over the entire period of the study measured by this research, which may indicate a greater ability to adapt to distance learning.

Figure 3 also illustrates how the fifth year students' average level of academic performance at the beginning of the pandemic (i.e., 4.13 points) was noticeably higher than first to fourth year students' average level of academic performance (i.e., 3.83 points). These levels remained during the pandemic and, as noted above, for some specialties, they even increased.

In terms of explaining the comparative success of fifth year students, the fact is that, in most cases, far fewer students enter and study for a degree at master's level than at bachelor's level. While the higher average scores of fifth

year students can be explained by their increased professional motivation, the influence of the teaching method used should also be considered since, in most cases, master's students are taught in small groups (i.e. tutoring). Under such conditions, the teacher can get to know the students and their problems better, as well as strengthen and nurture their personal interest in their chosen field.

Ultimately, in such classes, the teacher can improve the quality of students' thinking; their attitudes towards the future; core life values; personality development; and capacity for self-education – the latter of which is becoming a key global trend in education today.

Conclusions

For both students and teachers at Ukraine's Dnipro National University of Railway Transport, the COVID-19 pandemic caused significant inconvenience and, in some cases, problems still not yet fully resolved – especially how students' mental health worsened due to the abrupt shift to distance learning that their teachers had not been prepared for. Thus, the results of this study show a decrease in students' attainment levels via the university's educational process.

Going forwards, to improve the situation at the university, it is essential to provide all teachers with reliable computer equipment and high-speed internet connections; develop high-quality digital content for teaching in a distance form; and train teachers in methods of working with this digital content.

An important role in the educational process should be played by tutoring, which – using the example of fifth year students in this case – is found to provide students with both motivation in their chosen direction of study, and improve their personal qualities and values. This form of learning should be introduced for students across first to fourth year, for example in practical classes or seminars, in order to develop inclusive communities that can exist both online and offline.

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