

# Selected Aspects of Student Education in the Field of Air Transport

M. Džunda, L. Melníková & P. Dzurovčin

*Technical University of Košice, Košice, Slovakia*

**ABSTRACT:** In this paper, the issue of teaching professional aviation subjects in the field of higher education air transport was addressed. We present some research results in the field of didactics of professional aviation subjects, teaching effectiveness, motivation and evaluation of students in education. In this work we present some approaches to the development of didactics of professional subjects in Slovakia. We state that the subject of didactics is the student, teacher and knowledge forming the didactic tri-angle. Didactics of professional subjects examines the possibilities of transforming the knowledge of technical scientific disciplines into the content of education, didactic systems, teaching projects and the student's knowledge. We researched the area of didactics of professional aviation subjects with a focus on motivating students to study. We managed to involve a large sample of students in the research, which helped us increase the objectivity of the results. Based on the research results, we recommend some measures to increase the quality of higher education of students in the field of air transport. The motivating goal for our research is to support the quality of education at the Faculty of Aeronautics of the Technical University of Košice.

## 1 INTRODUCTION

Air transport is an integral part of the transport of passengers, goods, animals and other cargo. Its main advantage is the high transport speed compared to other modes of transport, especially for long-distance transport. One of the main requirements for air transport is safety, which we can achieve through knowledge and compliance with established standards and rules in this area. The safety and credibility of air transport is a very important and most frequently discussed issue in the professional public. When examining air safety, we find that there are a number of causes of air accidents. The rapid development of aviation is characterized by a reduction in the number of aviation accidents caused by aircraft failure. The development of aviation technology is causing an increase in the complexity of

systems and increased requirements for aircraft crew, air traffic controllers and other personnel providing air traffic. This factor has been shown to have a significant impact on air accidents caused by human error. Up to 80% of air accidents are caused by human error. The most common causes of air accidents are caused by failures of the aircraft control systems due to human error, errors by the aircraft crew and also by errors of other operating personnel. When investigating the cause of an accident, several factors that caused the accident are usually identified. Air accidents are usually caused by a sum of unfortunate events.

This is confirmed by ICAO statistics, which show the following classification of errors:

- procedural errors 40.8%
- communication errors 9.7%

- knowledge/skills 9.2%
- personnel incompetence 40.3%

The most common causes of human error include the incompetence of crew members due to lack of experience, insufficient training, failure of cooperation, but also loss of attention or communication errors [1]. One of the most effective ways of preventing air accidents is the quality training and education of aviation personnel and prevention, which is given constant attention in aviation. One of the ways to increase aviation safety is quality aviation education and training of aviation personnel with an appropriate didactic approach. The basic requirement for flight/aviation personnel after training for their future profession is that they have the required knowledge and skills when starting their profession. One of the faculties that prepares aviation personnel for civil and military aviation is the Faculty of Aeronautics of the Technical University of Košice (FA TUKE). In the study field of Transport, it prepares aviation experts according to the study programs Pilot, Air Transport Management, Aerospace Engineering, Professional Pilot and Air Traffic Controller. The evaluation of the results of the teaching process at the Faculty of Aeronautics TUKE shows that great attention is paid to didactic work with students and the quality of their theoretical and practical training. Also teacher training in engineering pedagogy courses with an emphasis on rationalization and quality socially oriented training. In Slovakia, reforms of the education system are underway, which are listed in the document Learning Slovakia. Changes in the education system will need to be made from kindergartens to universities. These changes will include a reform of the training of teachers who create curricula. Undergraduate and lifelong teacher training needs to be adapted to respond to the current training needs of aviation personnel. In this process, the requirement to apply research results to the teaching process comes to the fore. Recent research findings in higher education show that new approaches to student education and assessment are needed today. We were interested in how we could improve the education and evaluation of the acquired knowledge by our students at FA TUKE. First, we needed to find out the methodology of teachers' activities in teaching aviation subjects. Also students' attitudes to the process of teaching professional aviation subjects. In the process of teaching professional aviation subjects, it is first of all necessary to set educational and training goals. Furthermore, to select the appropriate study literature, to set appropriate requirements for practical teaching and to classify selected theoretical and practical knowledge into the didactic system [2]. The literature [3] states that in order to improve teaching, it is necessary to take into account the results of research in the field of pedagogical practice of technical subjects. A special place here is played by a special didactics, the aim of which is to help teachers of aviation subjects to work with students in the process of studying these subjects [4]. One of the teacher's main tasks is to become acquainted with the latest teaching methods, strategies and styles of the teaching process and the habits of students [5]. As part of improving the training of aviation personnel, research and an experiment were carried out at the Faculty of Aeronautics of TUKE, aimed at gaining

students' relationship to the study of aviation subjects [6]. The subject of the research was also the didactics of aviation subjects and the quality of education of aviation personnel. The questionnaire method was used in the research. Substantial results of the research and the performed experiment are presented at the end of this paper. Our goal was to contribute to the improvement of studies at FA TUKE.

## 2 RESULTS OF SCIENTIFIC RESEARCH IN THE FIELD OF HIGHER EDUCATION

The results of scientific research in the field of didactics of vocational subjects, teaching effectiveness, motivation and evaluation in education and the impact of the pandemic on higher education are presented in the following works. In study [7] it was investigated the question of how teachers should teach in order to support the development of personal characteristics as effectively as possible. Research results could be assigned to two large groups. The first group recommends methods with a high degree of self-direction, and the second group recommends methods with a high degree of guidance by the teacher. At work [8] it is stated, motivation and evaluation are key to promoting successful educational processes for all. These processes must be sustainable and must contribute to the sustainability of education. The results listed in [9] show that the key and most central factor salient in teaching quality is related to the teachers themselves and their training. Thus, any educational model that seeks educational excellence must focus foremost on ensuring care and respect for teaching professionals, beyond economic investment, resource availability, or any other factors. The study [10] aims to identify the factors associated with academic success or failure in students entering a university. Research has confirmed that if we want to predict the results of education, it is necessary to place emphasis on students' perception, performance skills and willingness to study. Verification of students' knowledge before the start of their studies with the help of a suitably chosen test has a great influence on the estimation of educational results. For improve the quality of university teaching is it is necessary to clarify the competencies of lecturers [11]. Understanding what students mean by lecturer competence can be crucial in order to recognize indicators with which to assess these competences, improve the quality of university teaching and support lecturers in undertaking their role appropriately. A Competency Framework for Teaching and Learning Innovation Centres for the 21st Century are discussed in [12]. Specifically, this study shows that most institutions counted with training plans for teachers before this period, mainly in the competencies of digital technologies and pedagogical quality, but that other initiatives were created currently to reinforce them, including students' support actions. Research aimed at developing the skills of beginning teachers is presented in the work [13]. The author of this publication emphasizes the need to devote oneself to applications such as ActivInspire, FreeMind, SMART Notebook, Google Docs, Prezi, Mindomo and their

use in the teaching process. In the manuscript [14] is proposed a novel approach for the acquisition of advanced competences in engineering courses associated with the use of thermographic images via free/open-source software solutions. In the process of teaching coordination, it is appropriate to use virtual resources and provide students with the opportunity to use free software tools. Results of this study [15] highlight the need to improve the digital competence of professors in order to meet the demands of the qualified professions of the future, and therefore, prepare students for it. Article [16] analyses the assessments teachers make about virtual reality as a teaching resource in their respective disciplines. Within the main results, gaps by area, years of teaching experience and academic level in the participants' evaluations have been identified and discussed. It can be concluded that technological knowledge has a positive influence on the identification and valuation of the technical dimensions of virtual reality, from which it follows that it is advisable to train non-specialist teachers in this type of dimension. In the literature [17] it is stated that the use of gamification in teaching contributes to the improvement of this process. Its influence grows as a result of its more frequent use. In [18] it is stated that artificial intelligence holds great potential for improving education as it has started to develop innovative teaching and learning approaches in education to create better learning. Currently, remote work is common, and this trend has come to several areas and processes, such as education and teaching [19]. Regarding higher education, universities have several challenges to overcome, the most challenging being transforming teaching to be more digital and engaging. Higher Education plays a decisive role in the training of competent professionals and active, responsible and critical-thinking citizens [20]. In addition to acquiring rigorous technical-scientific knowledge specific to their degree, students are also expected to develop a range of transversal skills essential for a successful academic and professional career. This work [21] contributes to predicting students at risk of dropping out, offers insight into understanding student behaviour, and provides a support mechanism for academic managers to take corrective and preventive actions on this problem. Research presented in [22] relates online education and food use to student behaviour. Emphasis is placed on compliance with students' lifestyles. Selected aspects of research on the impact of problem-based learning in online education on students' knowledge and their association are presented in [23]. The results of the student survey confirmed that the use of problem-based learning in online education contributes to the improvement of their mutual relations and study results. The combined model of bachelor's studies in security is described in [24]. It is recommended to make more use of practical forms of education that contribute to improving the quality of student training. In study [25] is given significant evidence for the proposition that open education and open science can support both traditional face-to-face and distance learning. The study [26] provides evidence that the pandemic has engendered changes in attitudes and practices within UK higher education that are conducive to educational reform.

### 3 SOME NOTES FROM GENERAL DIDACTICS

Research in the field of aviation didactics is not given enough attention. If we search the literature in this area, then the number of publications found is very modest. One of the reasons for this situation may be the low interest of students in aviation in Slovakia and insufficient financial resources devoted to education in air transport. Another negative is that there is no major air carrier operating in Slovakia. The National Institute of Lifelong Learning in Bratislava deals with the problem of didactics in optional subjects in Slovakia. On the website of this institute, it is possible to find knowledge on the issues of professional education, which are focused on selected topics of optional subjects. In this case, we can talk about the subject or special didactics. If the research outputs in the field of special didactics overlap with the issues of general didactics, then their application possibilities are limited. According to a review of the available literature at the beginning of this paper, some researchers are focusing on technical training to improve this process. Didactics is closely related to teaching and learning, so it is greatly influenced by other sciences such as psychology. Psychology is helpful to the teacher in understanding the student's learning process. Some scholars in the past have even considered didactics a part of psychology. Didactics is also influenced by pedagogy, which examines the problems of educating people. In this case, we have encountered the view in the past that didactics is an integral part of pedagogy, too. Efforts for the independence of didactics as one of the sciences of education were declared only in the 20th century. During this period, researchers described didactics as a separate science of education, independent of pedagogy, sociology, biology, psychology, or anthropology. The researchers gradually worked on the development of didactics for professional subjects and gradually placed it on a scientific platform. They developed didactic procedures for professional subjects and thus the didactics of professional subjects became a scientific field. The content of this scientific field is the theory of teaching professional subjects, as confirmed by several authors. Based on this, we can state that the subject of didactics research is the area of teaching and learning enabling the development of theories and practices in this area [6]. Didactics has become a discipline whose main goal is to develop knowledge that is specific to the subject. Our research conducted a search of available literature in the field of teaching and learning students before and during the period of the Covid-19 pandemic. We also focused our attention on the application of information technology in the teaching process. We assume that the application of information technologies in the teaching process will contribute to the improvement of teaching and make it easier for students to study aviation technical subjects.

### 4 CHARACTERISTICS OF TECHNICAL SUBJECT'S DIDACTICS

It is clear from the available literature that didactics, which we consider to be a scientific discipline, is not named the same everywhere. In the scientific

literature, we find terms such as methodology, special didactics, didactics of subjects, or didactics of technical subjects. As a rule, didactics is described in more detail in the didactics of individual subjects. Some research results from English language didactics, chemistry, mathematics, and the like are available. When we talk about the didactics of aviation professional subjects, we must state that this area is not examined in detail. We assume that this area of didactics belongs to the didactics of technical professional subjects [6, 27]. The status of teaching subjects' didactics depends on how the curriculum of the study programmed is written. The position of subject didactics depends on the educational policy in society. Therefore, the didactics of a subject may change depending on social developments and the associated change in teaching in an educational institution. Changes in the didactics of subjects are particularly relevant, for example, in case of the rapid development of new technologies in air transport. Based on our knowledge, we can state that the didactics of general and science subjects are relatively well developed at present. However, less attention was paid to the didactics of technical subjects. The development of didactics of technical professional subjects took place based on empiricism. This was due to the long tradition of teaching technical subjects. Changes in the didactics of vocational subjects, which are constantly evolving and contributing to the knowledge of our technical reality, are now coming to the fore. These changes can be seen as a good start to the development of this discipline in a rapidly changing world and the development of new technologies. The direction of the development of vocational subjects' didactics will also be determined by the community of experts in the field of vocational education. In some countries there are visible efforts to determine the main directions of the development of technical subjects' didactics. The key moments of its development, the specificity and interdisciplinary nature of this field of knowledge with an emphasis on scientific research are mentioned. The components of educational activity include general education and vocational training. Vocational education involves theoretical professional preparation and practical teaching such as vocational training, exercises, and professional work experience. The field of professional theoretical subjects can be divided into several groups. For example, theoretical vocational technical subjects and vocational subjects in the field of trade and services. Other groups comprise agricultural and healthcare vocational subjects, police training subjects, etc. On this basis, we can speak of group didactics with a very broad scope. We characterize didactics of vocational technical subjects as a discipline that applies general didactic knowledge to a group of technical vocational subjects. According to [2] didactics of professional technical subjects investigates the content and course of the educational process simultaneously with the didactic transformation of the results of technical sciences into teaching. By the term transformation of results, we mean the formulation of educational objectives, selection and inclusion of theoretical and practical knowledge into the didactic system. The current conception of vocational didactics is that didactics of technical subjects deals with the issues of the requirements of both the practice and the labor

market for the preparation of qualified technicians. Furthermore, it deals with the setting of teaching objectives, the content of teaching and the application of didactic principles in teaching. It is also associated with the application of guidelines, rules, teaching methods, organizational forms, and material devices in the teaching of technical subjects. The subject of its investigation is related to the requirements for teachers of technical subjects, students of technical disciplines, and issues connected with educational action in teaching. It is important to address the conceptual issues of technical education and problems related to vocational education as well as the concept of lifelong learning and retraining. The starting point for the development of didactics of technical subjects is a set of technical disciplines. We assume that ways of thinking and perceiving reality are different and unique to each area of human knowledge. Therefore, the concept of general didactics, a unified knowledge of teaching and learning that can be applied to all different disciplines, ceases to make sense. What is needed is specific didactics that enables teachers to assist students in the study of vocational subjects.

Aviation professional subjects differ from each other in their structure. They have different content and the scope of the subject is related to this. In each subject, it is necessary to master various specific facts and abstract concepts. Know theoretical lessons, methodological procedures and the like. These requirements require an individual approach to the teaching process. For each professional subject, there are also different requirements for students to manage the assigned issues. Based on this, it is necessary to develop procedures for teaching individual subjects or groups of subjects. The teaching of aviation subjects places high professional demands on teachers. We assume that graduating from the Faculty of Education as a beginning teacher is not sufficient for him to be able to teach aviation professional subjects. Therefore, teachers of aviation subjects should take engineering pedagogy courses. Such courses are provided under the auspices of the International Society for Engineering Pedagogy (IGIP) [6].

## 5 DIDACTIC TRIANGLE

Under the term didactic triangle, we understand the relationship between teacher and student (who), the subject taught (what) and teaching methods (how). These three elements of the teaching process are constantly the focus of educational research. Research in this area requires a focus on the individual elements of the didactic triangle and the relationships between them. It is necessary to examine the activities of teachers in the process of teaching students in professional aviation subjects. We currently have little knowledge of teachers' work in this area. The subject of research must be focused on the effectiveness of teachers' work in teaching professional aviation subjects, depending on their knowledge of these subjects. Also examining the relationship between teachers' work and students in classroom teaching. It is not right in extensive research in the field of teaching aviation subjects to focus only on finding the most capable individuals who could pursue the teaching profession. In research in the field of

teaching and learning, due attention must be paid to the content of these processes. It is important especially when creating a curriculum so that we can determine what needs to be taught. There is a need to create integrated frameworks for linking learning activities and practices (as) with thematic patterns (what) and patterns of interaction between patterns (who). Teaching aviation subjects is very demanding. The content of teaching these subjects is knowledge from the fields of sociology, cybernetics, pedagogy, psychology, mathematics, statistics and the like. Based on this, we can say that the didactics of technical subjects has an interdisciplinary character [6]. It is not easy to become an expert in technology and at the same time in the field of human souls. The teacher is an important element of the teaching process and has a significant impact on the quality of this process. We require the teacher to have the necessary knowledge to be determined and active. To manage the teaching process, it is necessary that the teacher has the necessary professional competencies, including didactic, pedagogical and socio-psychological knowledge. At FA TUKE, we conduct research in the area of students' attitudes to aviation professional subjects. It turns out that the student's relationship to the subject often depends on his knowledge and on the relationship with the teacher. We pay great attention to the preparation of students for the future profession, because educated students, adepts for aviation staff, contribute to increasing air safety.

## 6 RESEARCH INFORMATION AND DISCUSSION

In our research, we examined the teaching process at FA TUKE with a focus on air transport. Our goal was to evaluate the possibilities of creating innovative procedures for education in aviation subjects. One of the latest trends in education is the reduction of direct lectures in classes. In the study of professional aviation subjects, the efforts of teachers to place increasing emphasis on the independent work of students can be seen. Independent work of students should be considered, among other things, in the form of participation of students in solving assigned projects and conducting research of available literature on the assigned topic. This approach should motivate the student to work individually or in a team and positively shape his relationship to the study of professional aviation subjects. Our goal is to look for new methods that would improve the teaching process at FA TUKE. Student evaluation is also an important measure of the quality of the teaching process. We are also looking for new forms of student evaluation to maximize the objectivity of the evaluation. We focus our efforts on the use of information technology to evaluate the student skills in professional aviation subjects. We focused our research on the knowledge of students, their attitude to professional aviation subjects, and their study and evaluation of the gained knowledge. In the research process, we published some of the obtained results in [6, 27-30]. In this paper, we present selected findings from the study of FA TUKE students and their approach to the study of professional aviation subjects.

### 6.1 The First Phase of the Research

We divided our research into two phases. The first phase of the research was carried out in the academic year 2018/2019 and the second phase in the academic year 2021/2022. We conducted the research in the form of an electronic questionnaire. The total number of students who participated in the research was 118. There were 79 boys and 39 girls. The vast majority of them studied according to the Air Traffic Management study program. Our research of didactic problems in the study of aviation subjects aroused students' interest in this issue. In the first question, we asked students' interest in studying aviation. From the graph in Fig. 1 can be seen that 52.50% are interested in aviation issues. On the contrary, 4.20% of students are not interested in aviation. This finding shows that a relatively large number of students (in our case 9.3%) are not interested in studying aviation at FA TUKE, they are not or are not interested in aviation at all. This fact means that many of these students do not complete their studies within the set time. Which causes a large drop in students, which has a direct impact on faculty funding. After interviews with students who left school, we found out that they applied to study, among other things, because they were not admitted to another preferred field of study and needed to obtain health and social insurance, which is paid for them by the state if they are university students. The state is trying to solve this irresponsible approach by charging for above-standard length of study. For example, in a bachelor's degree, it is usually possible to study for free only for 3 years, unless otherwise stated. Some students enroll in the study only because they can use the student's benefits (cheap accommodation, food, transport, etc.) and they are not studying but working. One of the solutions to suppress these adverse events in the beginning is to improve the selection of students to study in the field of air transport. However, here we encounter problems of less interest of students in studying in this field in the case of strict admission interviews.

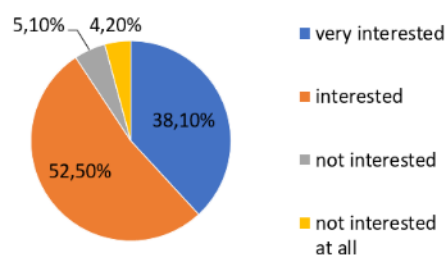


Figure 1. Question 1: Are you interested in studying aviation?

We also found out the students' interest in studying professional subjects at the Faculty of Aeronautics TUKE. As many as 90.6% of students answered in the affirmative and 10.4% of students stated that they were not interested in studying these subjects. If we compare the answers of the respondents to the question whether they are interested in studying aviation and to the question about their interest in studying professional subjects, we see that approximately the same number of students stated that they are not interested in studying aviation and studying professional subjects.

The higher number of students who have stated that they are not interested in studying professional subjects is probably due to the fact that these subjects are difficult to understand. Teachers' access to students during their time for study and extracurricular activities also plays an important role here. It is proving to be very beneficial to involve students in mixed teams of students and teachers so that they can take part in solving scientific tasks in the field of air transport.

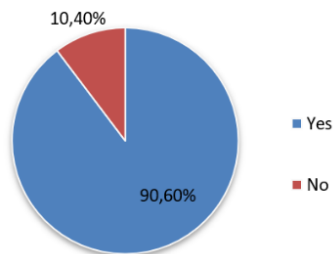


Figure 2. Are you interested in studying professional subjects at the Faculty of Aeronautics TUKE?

We researched how students understand the issues covered in professional subjects. From Fig. 3 it is clear that up to 53.4% of students do not understand the professional subject they are studying. On the contrary, 46.6% of respondents have no problem with the study of professional subjects. Based on this, it is necessary to pay more attention to the methods and forms of teaching professional subjects.

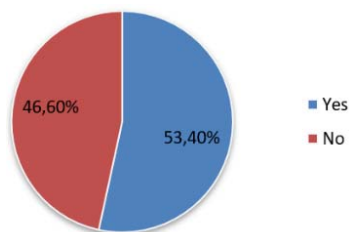


Figure 3. Do you understand the issues covered in professional subjects?

The results of the research show that most boys' students are interested in studying aviation, even though quite a few students do not understand the issues covered in professional subjects. On this basis, it is necessary to pay more attention to the methods and forms of teaching professional subjects. An important role in the teaching of professional subjects is played by their sophisticated teaching didactics and the use of information technology in teaching. The use of new teaching methods and an individual approach to each student make it possible to provide the student with sufficient information to understand the issues in the field of aviation. In the next question, we asked about the relationship between student and teacher in the teaching process. We examined the relationship between teacher and student in the teaching process. We asked how the teacher's praise influences the motivation to study a professional subject. As many as 33.9% of students said that teacher praise sometimes increases their motivation to study, and 32.2% of students said that praise always has a positive effect on their motivation to study. On the contrary, 13.6% of student's state that praise from the teacher does not motivate them to study.

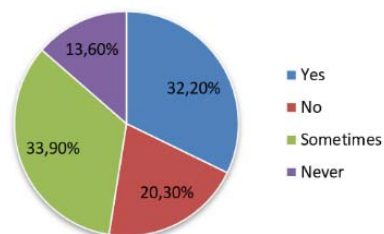


Figure 4. Does the teacher's praise affect your interest in studying the subject?

We were interested in how students prepare for exams and what literature they use. The results of the survey are shown in Figure 5. As many as 36.4% of students answered that often or sometimes only lectures are enough for them to prepare for the exam. Therefore, it is necessary at the Faculty of Aeronautics TUKE to motivate students to use other study materials during their studies. We recommend that teachers should motivate students to follow the latest research results in the field they are studying. It is appropriate to encourage students to follow the professional publications of faculty researchers and other important experts. Here it is important to manage this process so that publications difficult to understand do not discourage students from following the professional and scientific literature.

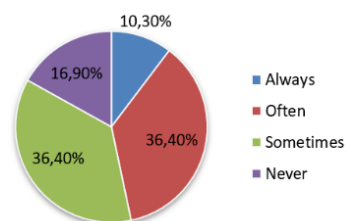


Figure 5. Are lectures enough for you to prepare for the exam?

In the sixth question, we examined students' access to the study during the semester. When asked if they study continuously throughout the semester, 8.5% of students answered that they study continuously throughout the semester. A large group of students 30.5% answered that they do not study continuously throughout the semester. Therefore, it is necessary to pay increased attention to the independent preparation of students. We suggest to motivate students to use available literature in the processing of assigned projects during the semester. We recommend assigning projects for each student separately but also for assembled teams of students. This teaches students how to work independently and in a team. Due attention must be paid to the defense of processed projects.

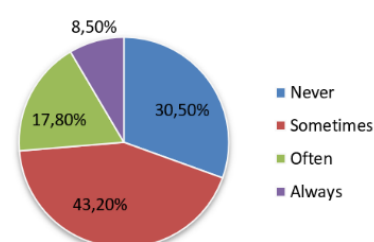


Figure 6. Do you learn continuously throughout the semester?

Based on the fact that 38.10% of students are very interested in aviation, there is a low number of students studying continuously and a high number of those students who are studying just before the exam. That's why we want to focus on factors that can positively motivate students to study aviation subjects. Among the factors that motivate students to continuously prepare for teaching are mainly semester works. We were interested in what forms of study they prefer when studying during the semester.

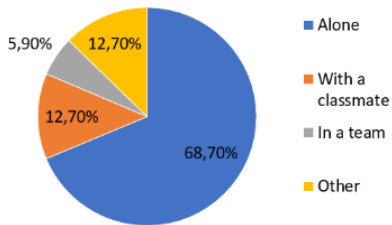


Figure 7. What way of learning do you prefer when learning?

The answers to question number 7 show that 68.7% of students prefer independent preparation. Only 5.9% of students prepare in a team. We believe that students will need to be motivated to work in teams in the future. To this end, it is appropriate to create teaching teams of students and give them specific tasks that they will solve together. We were interested in what environment our students prefer in independent preparation. We assume that the choice of the environment in which the student prefers to study depends on his nature. Some prefer silence and solitude; others work better with music or other ancillary activities. We researched what environment motivates students and in what environment they do not want to learn. Some research results are shown in Fig. 8. Figure 8 shows that 19.5% of students prefer to study at home or in the dorm. 30.5% of students often study at home. 44.1% of students prefer an alternate study at home or in the dormitory. The number of students who do not study at home or in the dormitory is 5.9%. In our research, we did not further investigate why students prefer these study options. We assume that at home and sometimes at the dormitory, students have good conditions for education and are not disturbed by external influences.

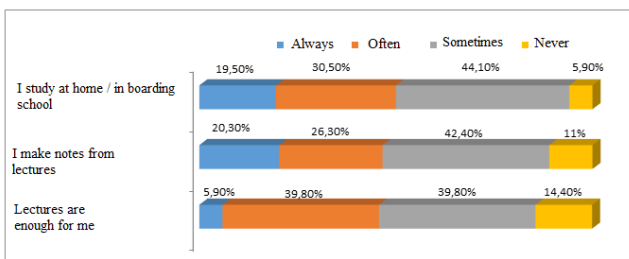


Figure 8. Choosing an environment for students to learn [6].

It turns out that the interest in continuous study during the semester is related to the quality and quantity of available literature for the course. Even in this case, the teacher's approach to the organization of the study is important. Teachers must devote sufficient time to preparing lectures. Identify the

necessary literature, which will recommend to students and draw students' attention to important facts related to the issues covered in the professional aviation subject. We found out if the students took notes during the lectures. The results of the research confirmed that only 20.3% of students take notes. Sometimes, but not often, 26.3% of students take notes. It follows that 53.4% of students usually do not take notes from the lecture. Therefore, it is necessary for the teacher to lead students to a responsible and consistent approach to the perception of the issue by the teacher. This approach shapes the student and creates a responsible relationship with him in the field of air transport. The teacher has his duties, among other things, specified in the Higher Education Act. The main duties of a teacher at a university include direct teaching of aviation subjects, lectures and conducting exercises. This activity takes up 52% of the teacher's total working hours. Also developing knowledge, practical skills and shaping students' approaches to aviation issues. Furthermore, motivating students to study, verifying their knowledge in various forms. Last but not least, it is the duty of a university teacher to carry out research in the range of 1000 hours per year. Also publication of research results and study literature. According to our research, up to 68.6% of students consider the work of a teacher to be necessary and beneficial in their education.

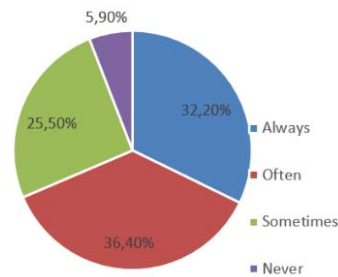


Figure 9. Opinions of students on the necessity of pedagogical work with students [6]

Teachers play an important role in higher education. The university teacher participates in the teaching process. Consulting and guiding students in the processing of final theses are part of his work. For a teacher to be able to perform this work, he must be professionally proficient and know didactics and pedagogy. The teachers must be interested in this job and willing to devote themselves to student education. The research results shown in FIG. 9 showed that 25.5% of respondents attribute great importance to the pedagogical work of teachers. In contrast, 5.9% of respondents do not consider pedagogical work with a teacher necessary.

We also examined students' views on the use of computer technology in teaching at the Faculty of Aeronautics TUKE. When asked about the necessity of computer projection in lectures, 39% of students answered that it is necessary and only 5.1% of student's state that they do not lack computer technology in their teaching. Research has shown that relatively few students attach importance to the use of information technology in learning. Therefore, it is necessary to lead students to work independently using these technologies. It is appropriate to assign students tasks aimed at processing searches that are

related to the issues addressed. Also lead students to design models and simulations of air transport processes.

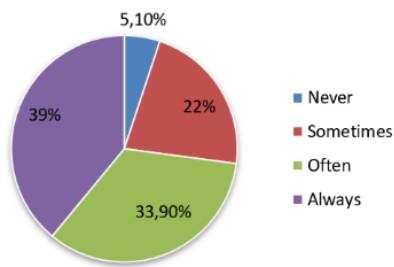


Figure 10. Is computer projection in the lectures necessary?

### 6.2 The Second Phase of the Research

We conducted the second phase of the research in the academic year 2021/2022. We focused on motivating students to study after overcoming the third wave of the Covid-19 pandemic. We used an electronic questionnaire. The respondents were students of FA TUKE, mainly from the study field of Air Traffic Management. The compiled questionnaire consisted of 9 questions. The research was attended by 98 students of 2nd and 3rd year from the study field of Air Traffic Management. The first question was focused on finding out the reason for choosing the study program Air Traffic Management by FA TUKE students. Most respondents 49.5% stated that they applied to study because they want to work in the field of air transport. 34.4% of students decided according to the family's recommendation. For this group of students, we assume that they may not have sufficient motivation to study aviation subjects. In addition to teachers, this problem can also be partially solved by our study advisers when selecting subjects by students when compiling their study plans for individual semesters.

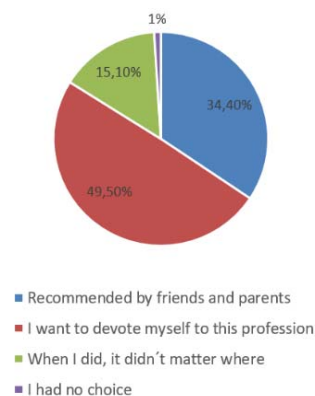


Figure 11. Why did you choose this department?

In the twelfth question, we examined how strong the motivation of students to study at FA TUKE. The results of the survey confirmed that up to 57% of students would choose the same study program. On the contrary, 25.8% of students would choose another study program. 17.2% would apply for another university. If we compare the results of the survey from the first phase of the research (Fig. 1) with the above results (Fig. 1), we can state that the motivation of our students in this period is essentially the same as

in the academic year 2018/2019. We assume that this is because the method of selection for the study has not changed yet. Therefore, the solution to this problem is very topical.

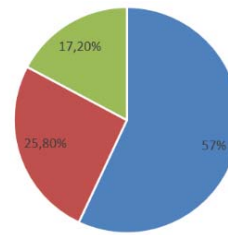


Figure 12. If you had the opportunity to choose to study at FA TUKE again, would you do it?

The aim of the thirteenth question was to find out the students' opinion on the problems that make it difficult for them to study at FA TUKE. Most students stated that it was the combination of work and study, as well as distance learning, that most influenced the quality of their teaching. The students' answers show that a relatively large proportion of students are forced to work in addition to their studies. Although the work burdens students, in a more detailed analysis we found that students who work have a more responsible approach to study compared to non-working students. Their study results also correspond to this.

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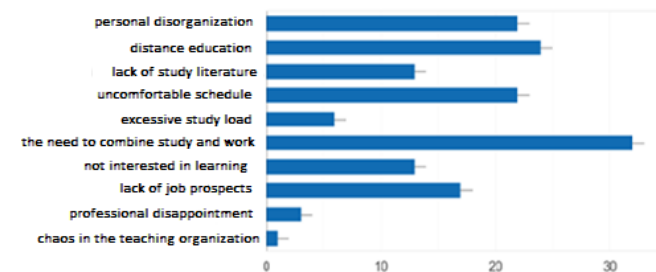


Figure 13. What problems do you think are the most difficult to study in your field of study?

The aim of the fourteen question was to find out the attitude of students to the evaluation of their knowledge at FA TUKE. As much as 84.7% believe that the evaluation of their knowledge is objective and only 15.1% are of the opinion that their knowledge is not always evaluated objectively. We recommend using a combination of verbal testing and the use of information technology to objectively assess students' knowledge. It is also necessary to verify the ability of students to work independently and in a team by assigning project solutions.



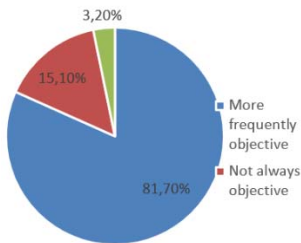


Figure 14. Is there an objective assessment of your knowledge?

The aim of the fifteenth question was to find out what can increase the interest in studying at FA TUKE. Students replied that interest in studying could increase the introduction of new teaching methods and increase the share of internships in airlines.

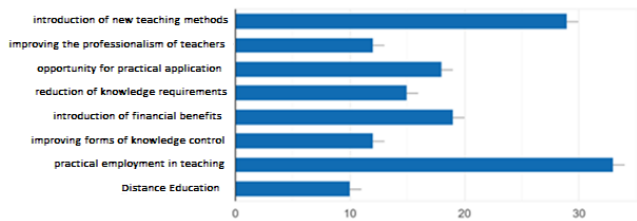


Figure 15. Indicate what you think can increase your interest in studying at FA TUKE?

The results of the survey in the field of study complexity at the Faculty of Medicine TUKE confirmed that 62.4% of respondents manage the study of professional subjects without any problems. On the contrary, 26.9% of respondents manage the study of specialized subjects with problems. The research confirmed that teachers need to devote more time to weaker students and lead them to understand the issues by applying practical exercises. We consider the lectures of prominent experts in the field of air transport to be an important factor supporting the motivation of students to study.

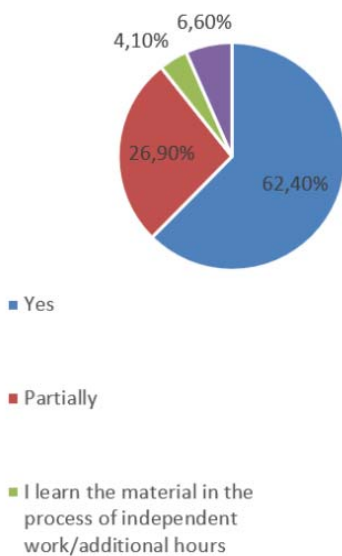


Figure 16. Do you master the issues in professional subjects without any problems?

The aim of the seventeen question was to find out whether the students' idea of aviation professions changed during their studies at FA TUKE. About

53.8% of students surveyed believe that their views on the aviation professions have changed for the better, while 23.7% have changed their views on the aviation professions for the worse. As many as 22.6% of student's state that studying at FA TUKE did not change their idea of the aviation professions. We assume that these are students who are not interested in aviation. It is important to consider whether students are not subject of high study requirements or whether there are problems in teaching on the part of teachers. We propose to solve this problem by organizing student internships at aviation companies.

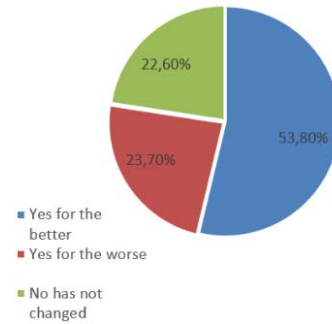


Figure 17. Did your idea of the aviation professions change during your studies at FA TUKE?

By the 18. question, we found out whether future graduates of FA TUKE are considering employment in aviation. As many as 62.4% of students say they would like to work in the field they are studying. As many as 19.4% of students say they do not want to work in the field they are studying. This is a very difficult problem. Most students are already a priori considering not working in aviation. They study only to obtain a degree. It is a society-wide problem that could be solved by gradually abandoning the preference for general higher education and moving to specialized/vocational education.

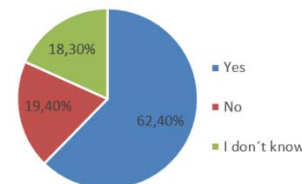


Figure 18. Are you going to work in air transport in the future?

## 7 CONCLUSIONS

Students study at FA TUKE according to accredited bachelor's and engineering study programs in the field of Transport. The scientific training of students is carried out according to the doctoral study program Air Transport Management. The main task of faculty teachers is to gradually increase the quality of higher education. Our aim is to pass on the maximum knowledge to students that they could use in their practical activities. This is also confirmed by the research presented in article [31], where it is stated that it is currently necessary to harmonize education with the needs of practice. Therefore, it is necessary to invite employers' representatives to create and modify

study programs. It is well known that high demands are placed on the activities of aviation personnel. These high requirements are closely linked to air safety. Based on this, we approached the research of the application of didactic knowledge in the teaching of professional aviation subjects at FA TUKE with a focus on motivating students to study these subjects. Study [32] states that teachers observed a decrease in motivation and interest in studying and an indifference to professional development when educating students online. However, about 25% of students focus on online education and consider it good. We conducted the research using a questionnaire prepared by us. We tried to involve as many students of the faculty who study in the field of air transport as possible in the research. Our main goal was to find out how students approach the study of professional subjects and, based on that, to take measures to improve their studies at FA TUKE. Based on the research, we found that in the first phase of the research, more than 90% of students were interested in studying aviation issues. This interest in studying does not change significantly during the study, which was confirmed by 53.8% of students surveyed. On the contrary, 23.7% of students changed their opinion of the aviation professions for the worse during their studies. The interest of students in the study of aviation is also related to the interest in studying professional subjects, where 90.6% of students answered that he is interested in studying these subjects and 10.4% of students stated that they were not interested in studying these subjects. Research has shown that up to 53.4% of students do understand the professional subject they are studying. On the contrary, 46.6% of respondents have no problem with the study of professional subjects. Therefore, it is necessary to pay more attention to the methods and forms of teaching professional subjects. Great attention must be paid to the independent work of students. In the teaching process, we lead our teachers to require students to prepare for the exercises throughout the semester. We found out what students think about their cooperation with the teacher during the semester. Research confirms [33] that teachers and students prefer full-time education over online teaching. From the students' point of view, the needs of socialization, establishing personal contacts come to the fore and direct discussions with teachers and classmates. The advantage of the full-time form of study is usually a minimum of technological problems. The prevailing view is that this form of education is of better quality than online education. The benefits of online education include saving time, implementing new teaching methods and the possibility of recording lectures for students. Research has shown that 32.2% of students consider this cooperation necessary. About 36.4 respondents stated that they use cooperation with the teacher only sometimes. Based on this, we conclude that it is appropriate to lead students to a responsible and consistent approach to study throughout the semester. We believe that this factor can significantly contribute to the quality of students' knowledge when studying professional subjects. The role of the teacher in the process of preparing students is irreplaceable. This process requires knowledge of didactics of professional subjects, pedagogy and personal enthusiasm of the teacher for working with students.

The authors of the [34], contribution on the basis of research on the efficiency of the online teaching recommended focusing on the pedagogical preparation of teachers and on the use of the latest information technology in teaching. They stressed that it is necessary to support students in the use of digital tools for education and for ensure the use of information technology is necessary technical support. The students confirmed that they consider the teacher's work in education to be necessary. 25.5% of students agreed with this fact. On the contrary, 5.9% of respondent's state that cooperation with the teacher does not help them significantly in their studies. The research confirmed that the use of computer technology in teaching has an important role. As many as 39% of students confirmed that it was necessary, and only 5.1% of students stated that they did not lack computer technology in their teaching. Based on the results of our research and published work in this area, we can state that in order to improve the teaching process of students in the field of air transport, it is necessary to select such students who have the motivation to study aviation issues. Further rework the didactics of teaching professional aviation subjects with emphasis on independent preparation of students, increasing the competence of teachers and material provision of teaching [35-39]. In cooperation with students, teachers, and important experts in the field of aviation, develop such study plans that will take into account current and future requirements for aviation personnel. When studying aviation professional subjects, make more use of the latest published research results of FA TUKE researchers, such as [40, 41]. It is advisable to follow the best aviation magazines, blogs and aviation business publications.

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