

Empirical Pre-survey of Student - Pilots' Opinions on the Evaluation Information System

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Abstract—The article presents the results of empirical pre-research of the opinions of students - pilots within the framework of the preparation of a questionnaire and the creation of a software tool for the comprehensive evaluation of the performance of students - pilots of the Faculty of Aviation of the Technical University in Košice in studies and flight training, for the improvement of individual study advice. The use of the method of questionnaire, analysis, deduction, and synthesis of knowledge made it possible to verify the answers to research questions. The pre-research was carried out on a smaller sample of students – pilots, who are, however, from the target group of the Faculty of Aviation of the Technical University in Košice. The results of the pre-research confirmed that the answering instructions are understandable, the questions are formulated and understandable to the report, the questionnaire items are logically arranged, and the questionnaire is sufficiently motivating. Errors that appeared during the pilot testing of the questionnaire were eliminated. The content of the pre-research also preliminarily confirmed the need for an innovative solution to the issue of comprehensive evaluation of the performance of students – pilots, with the support of information technology.

Keywords—empirical research, questionnaire, pre-research, evaluation, study, flight training

I. INTRODUCTION

The assessment of the performance of the student pilot within the framework of study counseling for the improvement of the quality of individual outputs in aeronautical education, the state of knowledge and aeronautical practice in the field studied, based on the available data, is the subject of our scientific work. We plan to process this topic within the framework of the lack of a situation in the evaluation of flight training of students/cadets – pilots of the Faculty of Aviation of the Technical University in Košice (FA TUKE), as part of an integrated and comprehensive evaluation of their performance using information systems [1]. The network of education managers (managers for practical training), study advisors at individual departments of the FA forms an important driving force for the management of this agenda. The application interface for supporting the quality performance of the study advisor service does not currently exist. All these elements of the information system are not so-called "digitally" connected to each other for immediate reaction, advice, and assistance to the student. For FA TUKE, the results of practical flight training are also not "automatically" available for objective and comprehensive assessment of the student's outputs during their studies. For these reasons, future scientific work will

focus on innovative solutions to the issue for the benefit of students.

As part of the research of specialized literature on relevant topics in the domestic environment or created by authorial teams from Slovakia in recent times, we have gained selected knowledge. For example, in a research platform limited to pilot students who overcome obstacles to the profession of pilot, but whose results are significant for them as future aviation personnel [2]. The priority in aviation is undoubtedly safety. To increase it, it is necessary to tighten up the criteria and requirements. The pressure to reduce airline costs is increasing, the psychological burden and stress of pilots are increasing. All this has an impact on the performance and safety of pilots [4]. Knowledge from the education and evaluation of safety experts is also applied in safety education and evaluation in aviation [5, 6].

Based on the study of international standards and experience. We can conclude that the inspiration for our national reforms in the field of higher education is the standards and guidelines for quality assurance in the European Higher Education Area [7]. In order to improve the quality of online learning teaching, a method of predicting students' academic performance online has been studied [8]. Quality theoretical education is the basis, driving force and inspiration for skills education [9], primarily in information technology education [10]. Skills are widely regarded as key elements conducive to the sustainable development of nations and the well-being of individuals [11]. The results of modelling reflect the actual effect of teaching from multiple layers and help rationalize teaching in the light of specific factors [12]. Computational experiments are performed to determine how selected machine learning techniques and their respective hyperparameters affect the quality of the solution. The results show that an extremely random tree-based machine learning technique can achieve almost 94% accuracy in predicting a candidate's success in the selection for aeronautical education [13]. The current environment reinforces the need for pilots to maintain training. As a result, there is pressure to provide high-quality training results for a growing number of pilots and trainees with limited available resources [14]. Methods are needed to evaluate the characteristics of aircraft ergatic control systems, warning systems for deterioration due to failures in avionics systems, quality of piloting technique and abnormal operating algorithms [15]. Its importance will increase as the prevalence of automation increases with the accompanying need for supervisory control. Monitoring is a

critical part of aircraft piloting and effective monitoring contributes to extremely high flight safety [16]. The pilot's involvement may also be assessed on the basis of a corresponding behavioral model, the parameters of which are estimated using mathematical identification procedures [17]. A crucial element of further scientific work was a model application to optimize pilot training [18]. Application knowledge and algorithmics from the development of expert risk assessment models [19] and hybrid models to support decision-making processes of decision-makers [20] are also inspiring. In the conditions of aviation education, they are primarily the heads of departments.

The main goal of the article is to present the results of the verification of the questionnaire on a research sample of respondents who are part of the target group of students – pilots of the Faculty of Aviation of the Technical University in Košice, within the framework of the preparation of the questionnaire and the creation of a software tool for comprehensive evaluation of the performance of students - pilots of the Faculty of Aeronautics of the Technical University of Košice in study and flight training, for the improvement of individual study counseling. The main findings based on the pre-research carried out confirmed that the answering instructions in the questionnaire are understandable, the questions are formulated and understandable to the report. The contents of the created questionnaire are logically arranged, and the questionnaire is motivating enough. Pre-research made it possible to eliminate the thread of minor errors that appeared during the pilot testing of the questionnaire.

II. METHODOLOGY OF PROBLEM SOLVING

The object of pre-research is the empirical opinions of students-pilots about the information system for evaluating performance in the studio and in-flight training. The subject of pre-research is a questionnaire for detecting the empirical opinions of students-pilots on the information system for evaluating performance in studies and in-flight training, on which cognitive activity focuses in this paper.

The methodology of solving the problem is based on the creation and verification of a research questionnaire, induction, deduction, and synthesis of knowledge to verify research questions and formulate conclusions. In addition to literature search, the input data for research come mainly from sources such as the Standards and Guidelines for Quality Assurance in the European Higher Education Area [7] and the Standards for the Internal Quality Assurance System in Higher Education [21].

Pre-research is aimed at solving research issues:

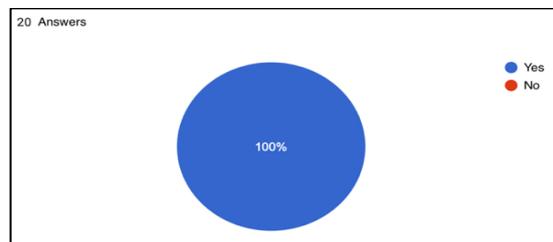
- RQ1 Are the answering instructions understandable?
- RQ2 Are the questions linguistically worded correctly?
- RQ3 Are the questions understandable?
- RQ4 Are some questions superfluous?
- RQ5 Are the items logically arranged?
- RQ6 Is the questionnaire motivating enough?

III. RESULTS

A. Quantitative evaluation of Preliminary Research

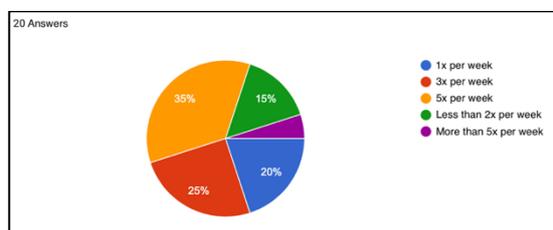
Question no. 1: „Are you a user of the “*student*,” interface within the MAIS - Modular Academic Information System at FA TUKE?“.

Fig. 1. Answers no. 1



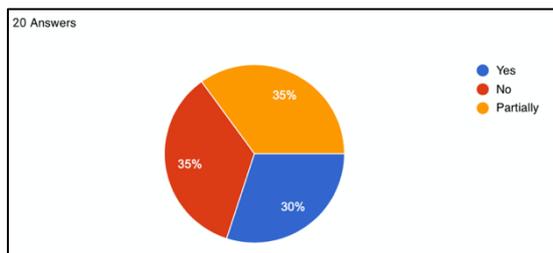
Question no. 2: „How often do you use MAIS during the academic year?“.

Fig. 2. Answers no. 2



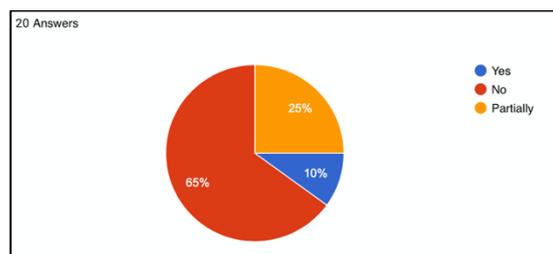
Question no. 3: „You are using the MAIS Public Portal section for your information, publicly accessible information - subject information sheets, study plans, contacts to departments and teachers, and timetable?“.

Fig. 3. Answers no. 3



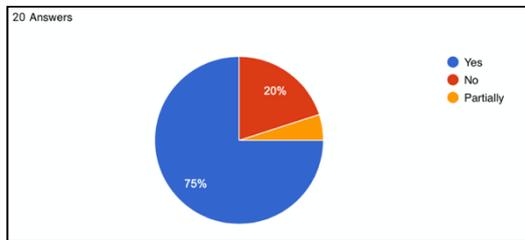
Question no. 4: „Do you use the special interface “Debate”, accessible from the interface of the teacher and the student, in which a discussion is opened on topics related to the subject, study program or topic of the final thesis? It thus concentrates comments, suggestions, and comments on the selected topic in one place and enables virtual meetings and debates without the need to organize a personal meeting.“.

Fig. 4. Answers no. 4



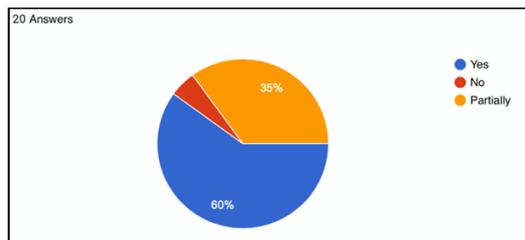
Question no. 5: „You are using the Accommodation section, which allows students or directly to the clerk to submit requests for accommodation via the Internet, set criteria for accommodation, manage financing - payments for accommodation, process the ranking, register fines, praise, reprimands, even between years so that the clerk and the student have an overview about accommodation for the entire study?“.

Fig. 5. Answers no. 5



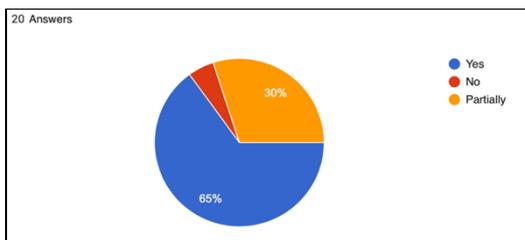
Question no. 6: „Are you satisfied with the current functionality of MAIS for managing and visualizing your interim and overall assessment from the theoretical subjects of the study program for your information and further decision-making?“.

Fig. 6. Answers no. 6



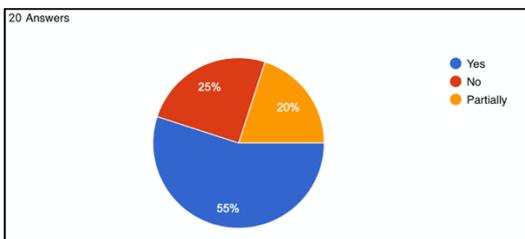
Question no. 7: „Do you agree with managing and visualizing your results also from pilot simulator training within MAIS?“

Fig. 7. Answers no. 7



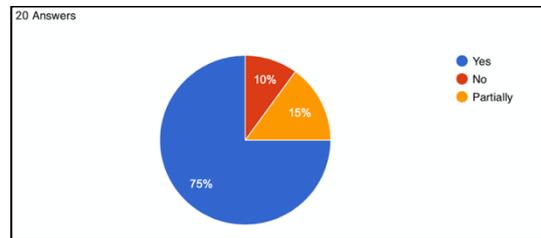
Question no. 8: „Would you welcome within the framework of MAIS also functionality for evaluation by flight instructors (examiners) from the subject Practical flight training for a comprehensive and objective evaluation of your performances, better information, further decision-making and improvement of the quality of assistance for you?“.

Fig. 8. Answers no. 8



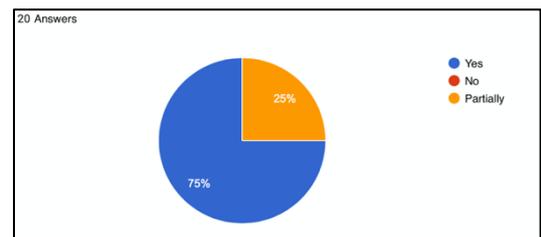
Question no. 9: „Would you welcome the creation of a "Study Advisor" interface within MAIS, which would have access to your results from theoretical subjects, simulator training and from flight instructors from practical flight training, to improve the quality of individual advice and help for you during your studies?“.

Fig. 9. Answers no. 9



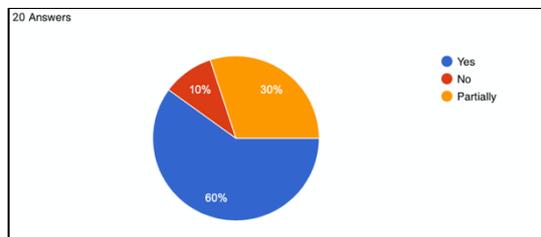
Question no. 10: "You would welcome a SW solution for evaluating data from the databases of the didactic system of aviation education (study results of theoretical subjects, training on flight simulators and from practical flight training) for risk assessment and overall (quantitative and qualitative) assessment of your performance as a student-pilot, for a timely response, help and improvement of individual counseling in your favor? The SW solution would be usable independently, or as part of the extension of functionalities and interfaces in the MAIS system."

Fig. 10. Answers no. 10



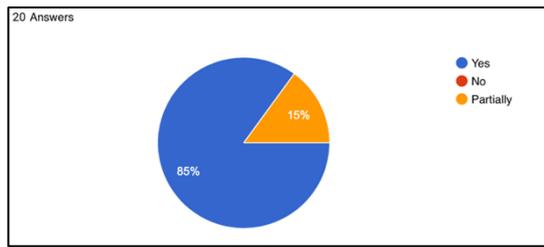
Question no. 11: "Would you agree that the created analytical application be used by flight instructors independently at the flight school where you will conduct (are conducting) practical flight training, or shared together with FA TUKE, to improve the quality of mutual communication, information and help you? The version of MAIS for mobile devices offers convenient control even in a small space while preserving all functionalities."

Fig. 11. Answers no. 11



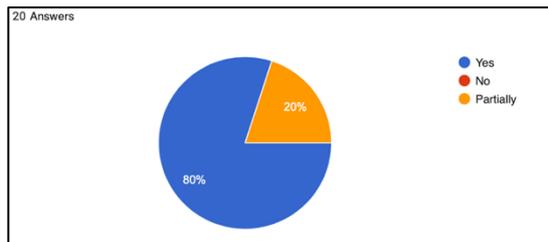
Question no. 12: "Are the questions in the form understandable for the future questionnaire to all students - FA TUKE pilots on airplanes and helicopters?".

Fig. 12. Answers no. 12



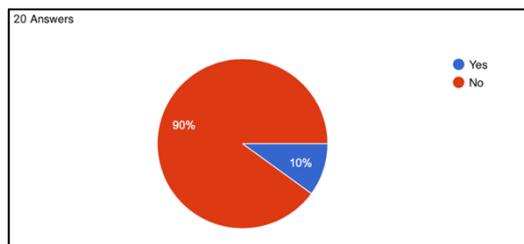
Question no. 13: "In your opinion, is the range of 12-15 questions for this issue sufficient?"

Fig. 13. Answers no. 13



Question no. 14: "Would you like to increase the number of answer options from 3 to 5?"

Fig. 14. Answers no. 14



Question no. 15: "Do you have a recommendation for improving the quality of questions, collecting data on experiences with the MAIS system or for the upcoming application for a comprehensive evaluation of your results during your studies as a student - pilot of FA TUKE?"

Fig. 15. Answers no. 15



B. Qualitative evaluation of Preliminary Research

Question no. 1

Using this question, we tried to find out if the respondents are students using the MAIS – Modular Academic Information System at FA TUKE. In the questionnaire, 20 respondents chose "Yes" i.e., 100%, which means that all respondents were users of the "student" interface.

Question no. 2

The second question of the questionnaire was intended to find out how often students/respondents enter and use the MAIS – Modular Academic Information System at FA TUKE. The largest number of respondents replied that they use the MAIS system "5 times a week", which was 7 respondents. The answer "3 times a week" was chosen by 5

respondents. In the case of the answer "1x per week", there were 4 respondents. Specifically, 3 respondents chose the option "less than 1x per week", and the smallest number of respondents chose the option "more than 5 times a week" was indicated by only 1 respondent. This shows that more than half of respondents enter and use the MAIS system frequently and enter it on average more than 3 times a week.

Question no. 3

The third question was supposed to help us find out if users using the MAIS system are visiting the system for information purposes, i.e., to browse information sheets, study plans, contact tracing, etc. The "No" option was chosen by 7 respondents and the top 7 respondents answered the question with the "Partially" option. From these answers, we can evaluate that the majority of respondents visit the MAIS system for information about schedules, study plans and contact tracing.

Question no. 4

With this question, we tried to find out if users within the MAIS system use a special "Debate" interface, which allows them to open a discussion on topics related to the subject, study program or final thesis. Thus, it is possible to discuss these things on the selected topic virtually without the need for a face-to-face meeting. The largest number of respondents answered this question, i.e., 13 with the answer "No". Five respondents chose the answer "Partially" and only two respondents answered the question with the answer "Yes". This evaluation shows us that most respondents do not use this special interface and prefer face-to-face contact to a virtual meeting.

Question no. 5

Using this question, we tried to find out whether users of the MAIS system use the "Accommodation" section, which allows them to submit applications for accommodation via the Internet, setting criteria for accommodation, managing funding, etc. The answer "No" was chosen by 4 respondents and only 1 respondent answered the question with the answer "Partially". Based on the results, it can be assessed that respondents are actively using the "Accommodation" section and are applying for accommodation in this way.

Question no. 6

Using this question, we were able to find out how users like the current state, appearance, and functionality of the MAIS system in terms of functionality and visualization. The answer "Yes" was chosen by the largest number of respondents, i.e., 12. The second largest number of respondents, i.e., 7, answered the question with the answer "Partially". Only one respondent said 'No'. These answers therefore show that the majority of respondents are satisfied with the current appearance and functionality of the MAIS system, but we can also evaluate that they are open to minor changes.

Question no. 7

The seventh question was intended to find out how students are comfortable managing and visualizing the results of pilot simulator training from MAIS. 13 respondents answered this question with the answer "Yes". The answer "Partially" was chosen by 6 respondents and only 1 respondent answered the question with the answer "No".

This result shows that respondents are mostly satisfied with the processing and visualization of the results of pilot simulator training from MAIS. However, it should also be pointed out that some respondents are not satisfied with this processing and would accept the change.

Question no. 8

With the help of the eighth question, we were able to find out whether users/students would welcome assessment functionality from flight instructors from the "Practical Flight Training" projection within the MAIS system for a comprehensive and objective assessment of their performance, which would contribute to further decision-making and improvement of student assistance. The largest number of respondents answered "Yes" i.e., 11 respondents. The answer "No" was chosen by 5 respondents and 4 respondents answered the question "Partially". We can evaluate that users/students would adopt assessment functionality from flight instructors from the "Practical Flight Training" project for a comprehensive and objective assessment of their performance.

Question no. 9

With this question, we sought to find out whether users of the MAIS system would welcome the function of "Study Advisor", who would have access to the student's results in theoretical subjects, simulator training and flight instructors from practical flight training, thus contributing to the improvement of individual counseling during studies. Of the 20 respondents, 15 responded to the question with the answer "Yes". Only 3 respondents answered "Partially", and 2 respondents answered "No". These responses show that 75% of respondents would accept the creation of such an interface within the MAIS system.

Question no. 10

This question helped us to see if users would welcome a SW solution for evaluating data from the didactic aeronautical education system databases for risk assessment and overall student-pilot performance assessment, which would provide timely assistance and advice to improve the benefit. The respondents' answers to this question were unambiguous, as 15 respondents answered "Yes" and 5 respondents answered "Partially". Thus, we can say that users are open to such a SW solution and would welcome it.

Question no. 11

Using this question, we were able to find out if users/students would agree to have the created analytical application used by flight instructors independently in the flight school where they would conduct practical flight training, or to share it together with FA TUKE, with the aim of improving mutual communication, information, and assistance. Based on the responses they saw, users would agree to such data synchronization, as 12 respondents answered "Yes", and 6 respondents answered "Partially". Only 2 of all respondents answered "No".

Question no. 12

This question was intended to find out if the questions from the questionnaire are understandable to all students – pilots of FA TUKE. 17 respondents answered this question with "Yes" and 3 respondents "Partially". It follows that the questions in the questionnaire were perfectly understandable.

Question no. 13

Using this question, we tried to find out how users perceive the scope of the questions that was devoted to this issue. Most respondents, i.e., 16, answered the question with an unequivocal "Yes", but 4 respondents answered "Partially". It follows from this that the scope of the questions devoted to this issue was sufficient.

Question no. 14

Using this question, we tried to find out if respondents would be interested in expanding the options from 3 to 5 options, due to more accurate answers. The evaluation of this question can be called unambiguous, since 18 respondents answered "No", and 2 respondents answered "Yes". In this case, the 3 answer options were sufficient for the respondents.

Question no. 15

With the help of question no.15, we tried to achieve whether the respondents can help us with any proposal for improving the quality of questions, collecting data on experience with the MAIS system or for an upcoming application for a comprehensive assessment of your results during your studies as a student - pilot of FA TUKE. We got answers from respondents answered in the manner of "No" or "I have none", from which we can conclude that they would welcome such an application, and the processing of the questionnaire questions was clever.

IV. CONCLUSION

The topicality of the subject stems from the key mission of the Department of Flight Preparation of FA TUKE, which is the preparation of future aircraft pilots and air traffic controllers. In connection with this, the question of the quality of the individual results of the student during university studies, which are influenced by both internal and external factors in the educational process, is important. The trend is to explore the potential of students, strengthen their strengths and help in increasing resilience to endure obstacles on the way to learning outcomes, but especially to the creation of the required competences, acquisition of knowledge and skills. The solution of the topic has the potential to contribute to the improvement of the outputs of FA TUKE, but also within the framework of institutional and external accreditation of the institution and quality evaluation at the university. To fulfill our intention, we plan to conduct empirical research on opinions, for which we have created a questionnaire. The specific target group will be represented by students – pilots in training, within the accredited bachelor's degree program "Pilot", at FA TUKE.

Empirical pre-research on opinions made it possible to verify the answers to research questions. The results of the pre-research confirmed that the answering instructions in the questionnaire are understandable, the questions are formulated and understandable to the report, the questionnaire items are logically arranged, and the questionnaire is sufficiently motivating. Errors that appeared during the pilot testing of the questionnaire were eliminated. The content of the pre-research also preliminarily confirmed the need for an innovative solution to the issue of comprehensive evaluation of the performance of students – pilots, with the support of information technology.

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