

PEER TUTORING AS A STRATEGY FOR PREVENTING ACADEMIC FAILURE AND SUPPORTING STUDENT PERSISTENCE

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Abstract

Student dropout remains a significant challenge in higher education, particularly in natural science programs characterized by demanding curricula and high academic expectations. At the University of Ostrava, Faculty of Science, this issue has been addressed through a comprehensive institutional strategy aimed at strengthening students' motivation, adaptation, and persistence throughout the study lifecycle. The strategy identifies critical stages in the student journey and proposes targeted interventions that can be implemented quickly within the institutional environment. One of the key areas identified is the transition to university studies and the first semesters, when students often encounter academic barriers, insufficient prior knowledge, and difficulties in adapting to the demands of higher education. In response to these challenges, the Faculty of Science has introduced "dOUčko", a peer-tutoring program providing academic support in foundational courses through consultations led by trained senior students. The contribution will cover the conceptual background, implementation model, and evaluation of the program during its first two years of operation. The analysis is based on institutional data on program participation and feedback collected from participating students. The findings indicate a growing demand for peer tutoring and suggest that the program contributes to improved understanding of course content, increased study confidence, and better academic integration of students. The results highlight the potential of peer-learning initiatives as an accessible and scalable intervention supporting student success and reducing dropout risk in science education.

Keywords: *Peer tutoring, student persistence, dropout prevention, higher education, science education.*

1. Introduction

University dropout represents a significant global challenge with profound social and economic consequences for both individuals and institutions (Lorenzo-Quiles et al., 2023). While the European Union has set a strategic objective for 2030 to ensure that 45% of young adults possess a higher education degree, current trends show that a substantial portion of students leave the system prematurely (Joint Research Centre, 2023). In the context of the Czech Republic, more than one-third of students (36%) who enrol in Bachelor's programmes at public institutions do not complete their studies and the situation in STEM fields is worst (European Commission – DGE, 2025). Current research highlights that dropout is not just a question of academic performance, but a complex result of the interaction between the individual and the environment, stress, anxiety and depression are key predictors of leaving (Ziegler et al., 2020, Guerreiro & de Jesus, 2025). Therefore, it is important to also build an academic community and a safe environment. Universities, as well as the researchers, are looking at various ways to improve the situation (Václavíková & Smolka, 2024, Gonçalves et al., 2024). Systematic literature reviews confirm that formal mentoring programs, characterized by structured relationships between senior students (tutors) and newcomers (tutees), significantly promote academic success and prevent dropout (Herinek et al., 2024, Herinek et al., 2025, Guerreiro & de Jesus, 2025, Alonso-García, 2021, Lane, 2020). But research also points out the existence of the mentoring paradox, i.e., the fact that some research can show small to medium effect sizes and sometimes even negative effects (Ziegler et al., 2020). The effect of mentoring is very sensitive to respecting the target group, mentors/tutors and mentees/tutees, and the implementation context. The Faculty of Science of the UO, as mentioned in the abstract, is solving the problem through a comprehensive institutional strategy, with the peer tutoring program "dOUčko" being one of the activities.

2. The student tutoring system and academic support framework at the faculty of science

The "dOUčko" program was established at the Faculty of Science, University of Ostrava (UO) as a structured support network, analogous to the existing system of pedagogical advisors (academic staff). The main mission of this initiative is that senior students (peer tutors) help junior students (tutees) with their own learning, whether in studying courses or topics that are difficult for them. Secondly, tutors also can help with orientation in university life and studies in general, which can significantly mitigate initial stress and anxiety. By involving senior students as tutors, the faculty purposefully creates a "positive and motivating environment" that removes barriers to successful study and strengthens students' institutional integration and sense of belonging.

2.1. Organizational structure and selection process

The system operates through a defined hierarchy which we described in internal regulations to ensure both faculty-wide coordination and department-specific expertise. The main structure consists of students – "peer tutors", in parallel the hierarchy is closely connected with the guarantors of the degree programme, the pedagogical advisors of the degree programmes (academics) and the vice-dean for studies and lifelong learning. At the top of the student's structure is a single Faculty Peer Tutor, who is selected from students to oversee the entire network. Each of the faculty's seven departments (Physics, Mathematics, IT, Chemistry, Biology, Physical geography, Human geography) is represented by one Departmental Peer Tutor, who is responsible for activities at the departmental level. To ensure a more granular support for specific academic disciplines, departments also appoint one to three Field Peer Tutor, depending on the diversity and number of degree programmes offered. To become a student advisor, a candidate must be an active student of the Faculty of Science. The selection process involves nominations by departmental secretaries or pedagogical advisors, which are then approved by the Head of the Department and officially confirmed in writing by the Vice-Dean for Study and Lifelong Learning. For specific events, the structure can also involve informal members who assist as needed.

This formal structure is essential, as participants generally prefer organized programs due to reciprocal commitment and reliable guidance. Furthermore, the voluntary nature of participation in "dOUčko" is a key success factor as it correlates with higher student motivation to benefit from the support provided.

2.2. Operational coordination and mandatory training

Effective functioning of the student's system is maintained through regular communication and professional development. Departmental peer tutors meet at least once a month during the academic year (September to June), with these meetings convened by the Faculty Peer Tutor. Furthermore, the Faculty Peer Tutor maintains regular contact with the Vice-Dean for Study through monthly briefings to report on activities and progress. The Vice-Dean is responsible for mandatory training, focusing on study-related issues and internal regulations. While training is essential for tutor self-efficacy, it is also focused on developing soft skills to maintain communication at "eye level" and build mutual trust. This approach prevents the creation of undesirable social hierarchies that can occur when tutors have a significant knowledge advantage. Tutors must grow into their new social role, carefully balancing their identity between being a student and an expert teacher. The training occurs at least once a year in close cooperation with the Head of the Study Department and the guarantors of the degree programme.

Every year, the structure expands with new members as some students successfully complete their studies at our faculty. However, the key positions have not changed yet. Because we also educate future teachers at the faculty, a large part of peer tutors is preservice teacher's students who see tutoring as beneficial for their development and as an activity for their professional portfolio.

2.3. The "first aid points" tutoring system

The cornerstone of the academic support provided by the dOUčko program is the anonymous "First Aid Points" system. This anonymity creates a safe environment for intellectual risk-taking, reducing the anxiety and stigma often associated with seeking help. This initiative offers structured, pre-prepared tutoring sessions for students who require assistance with their coursework. The organization of these sessions is a collaborative effort: while departmental peer tutors manage the schedule of the meetings and updates, they work in close cooperation with pedagogical advisors and degree programme guarantors to ensure the tutoring meets academic standards. All involved peer tutors have their own profiles on the program website, including contact information and information about the areas/courses/topics they are able to tutor.

Although the tutoring is primarily delivered by the peer tutor, academic staff and other lecturers may also participate if necessary. To protect student privacy, advisors are strictly prohibited from accessing the personal data of students who utilize these tutoring services.

First Aid Points are anonymous, i.e., the student who needs tutoring does not give their name. However, data is collected on the nature of the meeting:

- how long it lasted,
- what area/course it was focused on,
- how many mentees attended the meeting,
- what the content of the tutoring was - whether it was a drill/exercise, tutoring/absence of necessary previous needed knowledge, or expanding knowledge beyond the scope of the teaching (for example, talented students),
- whether the length was sufficient or whether a follow-up meeting was necessary.

We collect this data about each meeting, and we compare the intensity of meetings linked to specific areas, departments and courses and changes in their success in general. But unfortunately, we are not able to trace the specific benefit for individuals because of anonymity. Anonymity is essential for us because the "dOUčko" program creates a safe environment at "First Aid Points" that can reduce anxiety and stigma associated with seeking help.

2.4. Experience from the implementation and data

Generally, within the study information system, we have data on each:

- student (degree programme and specialization, enrolled courses, number of exam attempts, number of exam points, examiner's name, his/her success rate, etc.),
- course (enrolled students, teachers, lecturers, individual exam dates and their success rate, etc.)

and we are able to process/decompose this data at the level of degree programmes, specializations, departments, courses and individual teachers.

We can therefore compare, for example, the frequency of meetings dedicated to tutoring a specific course with the change in success rate in this course. Of course, the limit is still the fact that we are unable to monitor the effect of tutoring in the case of a specific student and also the fact that the cohort of students changes - and therefore their level of knowledge in general can also change every year. Nevertheless, data is a valuable tool for us to work with.

The "dOUčko" program started in the 2023/24 academic year. To raise awareness about it, several larger events were organized where the structure introduced itself and also organized overall meetings on various generally discussed topics related to the study. Although the start of the program was slower than we expected, the number of tutees involved and the number of individual meetings gradually increased significantly.

It is important to emphasize that, due to anonymity, the number of tutees does not reflect the physical number of people, as one student could participate (and often did) in more than one meeting. The following Table 1 shows how the number of meetings and the number of tutees increased. For the academic year 2025/26 we currently have complete data only for the winter term including the exam period (until February 15), so the numbers will increase.

Table 1. Data on implemented tutoring meetings during the implementation years.

<i>Academic year</i>	<i>Number of meetings</i>	<i>Number of tutees</i>	<i>Number of tutees per meeting – average</i>	<i>Number of tutees per meeting – median</i>	<i>The length of the meeting in minutes – average</i>
<i>2023/24</i>	<i>168</i>	<i>1458</i>	<i>8.8</i>	<i>1</i>	<i>112</i>
<i>2024/25</i>	<i>378</i>	<i>1069</i>	<i>2.8</i>	<i>1</i>	<i>120</i>
<i>Only winter term of 2025/26</i>	<i>419</i>	<i>821</i>	<i>1.9</i>	<i>1</i>	<i>120</i>

During the starting year, the average number of tutees per meeting is significantly higher – precisely because of numerous mass events, it gradually decreases significantly. Despite this difference, it can be seen that the median equals to 1 every academic year. This fact confirms that the program takes place predominantly in a private, pair-only environment, which is ideal for building trust and communicating on an equal level.

The most common reason for tutoring was the need to supplement the required entry knowledge for the course that students lacked from high school (students of the first year of study), and the need for more drill in some difficult courses. The concept of cognitive congruence is particularly evident in practice when "filling in the gaps" that student miss from high school, because they can explain these gaps from the perspective of someone who has recently successfully overcome them themselves. Only marginally – in

the lower units of the meeting – was there tutoring of topics that are beyond the scope of the curriculum for gifted students.

Regarding the content of meetings, it was very often preparation for mid-term tests during the semester in specific courses (March, November), and the intensity overlapped with the schedule of these tests/exams. Surprisingly, the number of meetings was not as intense in the area of exam preparation (during the exam period).

In terms of fields, especially with regards to the number of students in a given field, tutoring in Physics, Chemistry and Mathematics dominated. IT and Geography were less represented as shown in Table 2, where the rows are the ratio of the number of meetings in the field to the number of the students in degree programmes in this field in academic years. Since the ratio is higher than 100%, it is clear that there are students who used tutoring more than once. For the academic year 2025/26, the ratio will increase further (data only from the winter term).

Table 2. The ratio of the number of meetings to the total number of students in a given field.

<i>Academic year</i>	<i>Math</i>	<i>Physics</i>	<i>Chemistry</i>	<i>IT</i>	<i>Physical geography</i>	<i>Social Geography</i>	<i>Biology</i>
<i>2023/24</i>	<i>34.2 %</i>	<i>40.0 %</i>	<i>27.0 %</i>	<i>3.7 %</i>	<i>3.0 %</i>	<i>0.3 %</i>	<i>18.6 %</i>
<i>2024/25</i>	<i>94.3 %</i>	<i>123.4 %</i>	<i>60.5 %</i>	<i>4.7 %</i>	<i>0.8 %</i>	<i>9.5 %</i>	<i>24.4 %</i>
<i>Only winter term of 2025/26</i>	<i>64.6 %</i>	<i>101.5 %</i>	<i>130.2 %</i>	<i>1.4 %</i>	<i>2.0 %</i>	<i>5.6 %</i>	<i>20.3 %</i>

A student has the opportunity to pass the exam twice – a regular and a corrective term. The dean may, upon the student's request, allow an extraordinary corrective term for an exam. This extraordinary corrective term may be allowed to a student during his/her studies a maximum of the number of times equal to the number of years of the standard period of their studies. If a student does not attend any exam term, i.e., does not try to pass exam, the system will generate a "failed to appear" rating. This means that we are able to distinguish failure caused by insufficient preparation for the exam from failure due to the student not even attempting to pass the exam. Exam success rates for all courses of the given department in individual academic years are presented in Table 3. The data include success rates for all attempts that students used.

Table 3. Exam success rates for all courses of the given department.

<i>Academic year</i>	<i>Math</i>	<i>Physics</i>	<i>Chemistry</i>	<i>IT</i>	<i>Physical geography</i>	<i>Social Geography</i>	<i>Biology</i>
<i>2022/23</i>	<i>68.1 %</i>	<i>61.5 %</i>	<i>69.1 %</i>	<i>61.7 %</i>	<i>77.6 %</i>	<i>77.4 %</i>	<i>67.8 %</i>
<i>2023/24</i>	<i>73.1 %</i>	<i>62.4 %</i>	<i>68.2 %</i>	<i>57.9 %</i>	<i>74.0 %</i>	<i>78.1 %</i>	<i>66.9 %</i>
<i>2024/25</i>	<i>82.4 %</i>	<i>66.8 %</i>	<i>81.3 %</i>	<i>64.9 %</i>	<i>75.0 %</i>	<i>82.0 %</i>	<i>80.5 %</i>

The data reveals a positive trend across all departments, although the degree of correlation between tutoring intensity and exam success varies. While the most significant gains were observed in fields with high tutoring demand like Mathematics and Chemistry, substantial success rate increases were also recorded in Biology and Human Geography despite lower tutoring participation. This suggests that student persistence is a multifactorial process influenced by a 'soft assembly' of institutional and personal factors. The "dOUčko" program is not an isolated element, but operates within a broader ecosystem. It likely acts as a catalyst within a broader framework of academic support and pedagogical innovations.

3. The activities following up on the "dOUčko" project data

The detailed data is received from the study system and peer tutor reports is followed up by a number of other activities. On the one hand, we are able to select courses with higher failure rates – here we monitor the reasons and targeted evaluation by students with a separate questionnaire. Innovations are taking place in cooperation with teachers and course guarantors. In some cases, the reason for the difficulty is, for example, insufficient support in the form of study materials, or inappropriately chosen teaching methods for a certain topic. Teachers also have the opportunity to educate themselves in pedagogical competencies through various courses organized throughout the university. We provide targeted support. Some courses are being transformed into tandem teaching; peer tutors are also providing more group tutoring specifically for specific topics of specific courses.

4. Conclusions

As part of our work with data and conclusions, we did not work with a longer period of time, because the academic years 2019/20-2021/22 fell within the Covid-19 pandemic period, and the data was significantly distorted - some students significantly drop out for many reasons, and the requirements for success in some courses may have been reduced, because the implementation of the teaching and lessons during this period was specific. In addition to the limitations mentioned, another limitation that prevents greater generalization of the effectiveness of the program is the lack of longer time series data about the “dOUčko” program. However, we believe that the data confirms the conclusions of systematic reviews that formal programs with voluntary participation are the most effective in preventing dropout. In addition, volunteering in “dOUčko” increases the motivation of students to benefit from the support of a peer tutor and that the program has a positive effect on reducing the failure rate and increasing the success rate in exams in individual courses. By addressing the “mentoring paradox” through a structured institutional strategy, the program aligns with international best practices for effective student retention. To maximize future effectiveness, preparatory measures should continue to prioritize the relational aspects of tutoring over mere content delivery to foster deeper trust-building among peers. The observed across-the-board improvement in exam success indicates that institutional support programs can have synergistic effects beyond direct participants. By fostering a safer environment for intellectual risk-taking and enhancing institutional integration, such initiatives support student persistence even in departments where formal tutoring intensity remains moderate. The findings highlight the potential of peer-learning initiatives as a scalable intervention for supporting student persistence in demanding science education.

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