NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ

UCZELNIA BADAWCZA
INICJATYWA DOSKONAŁOŚCI

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Yerun

Young Science

YOUNG SCIENCE IN POLAND 2025/2026

REPORT ON A NATIONWIDE STUDY OF THE NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ OF THE SUPPORT SYSTEM FOR STUDENTS AND DOCTORAL STUDENTS

Partners:

Krajowa Reprezentacja Doktorantów KRD

Parlament Studentów Rzeczypospolitej Polskiej

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Adam Kola, PhD, Professor at NCU
Vice-Rector for Research
Nicolaus Copernicus
University in Toruń

The development of the next generation of researchers is one of the key conditions for the long-term resilience and future of the higher education and research system. It is within the student and doctoral community that new research ideas emerge, future directions of research development begin to take shape, and the competences required to conduct research and translate its results into social and economic practice are developed. Supporting the research activity of young researchers should therefore remain one of the core priorities of contemporary universities and research institutions.

From this very perspective, undertaking a study devoted to the research activity of students and doctoral students was a natural response to the need for a better understanding of the conditions of development for the next generation of researchers in Poland.

The aim of the project was not only to determine the extent and forms of young researchers' engagement in research, but also to identify the factors that foster its development and the barriers that hinder the initiation and conduct of research.

This report seeks to provide a systematic account of the experiences, needs and expectations of young researchers. The findings reveal, on the one hand, the considerable potential of the student and doctoral community and, on the other, a range of challenges facing the institutions responsible for organising and coordinating the educational process, and creating conditions conducive to research activity.

We do hope that the conclusions and recommendations presented in this report will provide a starting point for further discussion on the development of a support system for the next generation of researchers in Poland. At the same time, they may provide an impetus for measures aimed at creating a more stable and supportive environment for the development of students and doctoral students. Investing in young researchers remains one of the most pivotal investments we can make in the future of research and, consequently, in the development of our country. The quality of the conditions we create today for the next generation of researchers will determine not only the future of Polish research, but also the country's capacity to build an innovative economy, strengthen social capital and respond responsibly to the challenges of the contemporary world.

Adam Kola

I. Introduction

Since 2020, the Nicolaus Copernicus University in Toruń (hereinafter: NCU), together with nine other Polish universities selected through a competition organised by the Ministry of Science and Higher Education[1] have been implementing the Excellence Initiative – Research University programme (hereinafter: IDUB). The first competition under the programme was announced pursuant to the Announcement of the Minister of Science and Higher Education of 11 May 2018 on the establishment of the initiative entitled "Strategy of Excellence – Research University"[2] . As a result of the competition, 10 universities were selected from among the 20 institutions eligible to participate and were granted an annual increase in funding of 10% of their 2019 subsidy to implement the development plans presented in their competition applications. The funding period covered the years 2020–2026.

The aim of the competition, as specified in the Announcement, was "to support research and analytical activities aimed at developing the objectives and principles of the university's long-term development plan" (Chapter I, paragraph 1). The specific objectives included "improving the quality of education for undergraduates and doctoral students, particularly in fields of study and academic disciplines related to priority research areas, including with a view to the need to compete effectively to

[1] The universities that were granted research university status in 2019 are: the University of Warsaw, Gdańsk University of Technology, Stanisław Staszic University of Science and Technology in Kraków (AGH), Warsaw University of Technology, Adam Mickiewicz University in Poznań, Jagiellonian University, Medical University of Gdańsk, Silesian University of Technology, Nicolaus Copernicus University in Toruń, and the University of Wrocław.

[2] https://www.gov.pl/web/nauka/komunikat-ministra-nauki-i-szkolnictwa-wyzszego-z-dnia-11-maja-2018-r-o-ustanowieniu-przedsiewziecia-pod-nazwa-strategia-doskonalosci--uczelnia-badawcza

attract the most talented candidates for study, including from abroad" (Chapter I, paragraph 1, point 3).

The Announcement did not specify particular areas or methods of supporting the careers and competences of young researchers; however, it was understood that such measures should be aligned with the results of the competition evaluation, the universities' institutional strategies and their long-term development objectives. Consequently, the measures adopted to improve the quality of education for undergraduates and doctoral students at IDUB universities have been implemented in accordance with the principle of institutional autonomy and tailored to the specific needs and priorities of individual universities. Since 2020, Polish research universities have therefore been implementing programmes, competitions, courses and other educational initiatives designed to significantly and sustainably enhance the quality of education in the preparation and implementation of research projects at both undergraduate and doctoral levels.

Apart from the mid-term evaluation reports prepared by IDUB universities for the external assessment of the implementation of tasks contained in their competition applications in 2023, no comprehensive analyses of institutional support for students and doctoral students in their research activities are currently available. For this reason, in 2025, at NCU in Toruń, on the initiative of the Vice-Rector for Research – Dr Adam Kola, Professor at NCU – the 'Young Science' ('Młoda Nauka') research project was launched to identify the needs and expectations of students and doctoral students with regard to research support, and to analyse institutional strategies in this area.

The 'Young Science' project concerns not only NCU as an IDUB institution, which independently and regularly evaluates all activities aimed at students and doctoral

students, but the broader landscape of Polish higher education institutions. The resulting report highlights the key challenges, values and issues associated with creating and conducting high-quality research by undergraduate and doctoral students.

The primary aim of the Young Science research project is to develop specific recommendations for actions that can contribute to creating a more welcoming, effective and inspiring academic environment for young people pursuing scientific research and academic education. A deeper understanding of the challenges and barriers faced by students and doctoral students in conducting and preparing research will also enable the identification of priorities in the context of stagnant public spending on science and the continuing outflow of young people from universities and research institutes.

I.1. The research team

The Young Science project is being carried out by a team of researchers and experts in the field of higher education. The team comprises: Dr Jarosław Domalewski (Institute of Sociology, Nicolaus Copernicus University), Wojciech Kiełbasiński (IDUB, Nicolaus Copernicus University), Dr Agata Karska (Institute of Advanced Studies, Nicolaus Copernicus University, IDUB, Nicolaus Copernicus University), Dr Anna Kola (Institute of Pedagogical Sciences, Nicolaus Copernicus University, IDUB, Nicolaus Copernicus University), Dr Robert Musiałkiewicz (Rector of the State University of Applied Sciences in Włocławek), Dr Cezary Odrzygóźdź (Centre for Academic Entrepreneurship and Technology Transfer, Nicolaus Copernicus University, IDUB Nicolaus Copernicus University), Dr Jakub Szczepkowski (Faculty of Economics and Management, Nicolaus Copernicus University, IDUB Nicolaus Copernicus University),

Dr Barbara Pietrzyk-Tobiasz (National Doctoral Students' Representation), and Paweł Zdybel (the Students' Parliament of the Republic of Poland) .

THE RESEARCH TEAM



















I.2. Scope and implementation of the Young Science project

The official launch of the project [photo: Andrzej Romański]



The project was officially launched on 16 September 2025 during a meeting of the University Science Committee, composed of the Vice-Rectors for Research representing member universities of the KRUP[3]. The keynote speaker was Dr Tomasz Rożek, a science communicator, who delivered the inaugural lecture opening both the Young Science project and the accompanying seminar[4] . Dr Rożek emphasised that education should be understood as a developmental process, with educational trajectories beginning as early as the pre-school and school years. It is during this period that interests, passions and attitudes towards learning are formed. From the university's perspective, however, interdisciplinary education is important, as it enables flexible curricula and student research projects, whilst mitigating the risks associated with the use of artificial intelligence in teaching and learning.

The meeting also included a panel discussion entitled 'How to support young Polish science?', featuring Dr Agnieszka Dardzińska-Głębocka, Chair of the Team for the Development of a Higher Education Strategy; Anna Nieczaj, MSc Eng., then Chair of the National Doctoral Students' Representation; Paweł

[3] KRUP (Conference of Rectors of Polish Universities) https://portal.umk.pl/pl/article/obrady-o-polskiej-nauce

[4] https://portal.umk.pl/pl/article/sila-mlodej-nauki

Zdybel, Vice-Chair of the Students' Parliament of the Republic of Poland, and Dr Tomasz Rożek. The discussion was moderated by Vice-Rector for Research, Dr Adam Kola, Professor at Nicolaus Copernicus University, and focused on the key challenges and possible solutions regarding support for young researchers in the academia[5] .

Publicly launched at NCU on 16 September 2025, the Young Science project comprises qualitative and quantitative research, study visits to leading foreign research universities that educate students and carry out research projects at the highest global level, the preparation of a research report[6] , the maintenance of the project's website, and active participation in the public debate on academic career development for young researchers, and the dissemination of project results through scholarly publications and social media.

I.3. Methodological framework and scope of the study

Research within the Young Science project was conducted between May 2025 and February 2026. The methodological framework of the study addresses both the selected research methods and strategies employed and the substantive scope of the study together with the rationale for selecting the study population. Accordingly, the study is examined from two complementary perspectives: **(1) methodological** and **(2) substantive**. These perspectives are closely interconnected and mutually reinforcing. The adopted triangulation strategy allows to combine multiple research methods,

[5] The event was attended by representatives of the younger generation, including pupils from the University Secondary School, as well as Vice-Rectors for Research and Research Development from research universities participating in the meeting of the University Science Committee. Representatives of both groups actively participated in the discussion, demonstrating a high level of engagement and insight through the questions they raised and the arguments they presented.

[6] This report is entitled "Young Science 2025/2026". The title refers both to the convention of designating and to the period during which the research was conducted - – 2025 and 2026.

each selected in response to the research questions and motivated by the main research problem. The selected methods and tools enabled us to understand the phenomenon under investigation and to identify the underlying mechanisms.

The main research problem of the Young Science study concerns **the conditions necessary for an effective, efficient and inclusive model of undergraduate and doctoral education in Polish higher education institutions that enables the achievement of excellent research outcomes and supports the development of an academic education model capable of competing successfully with universities worldwide.**

This research problems is operationalised through a series of more specific questions concerning the following areas : **(1) doctoral programmes and doctoral education, (2) research competences, (3) the implementation of student and doctoral projects, (4) the commercialisation and dissemination of research results, (5) student and doctoral mobility, (6) systemic mechanisms supporting the preparation and implementation of student and doctoral research, (7) funding for student and doctoral research, and (8) long-term policy for the development of student and doctoral research.**

As stated above, the study was conducted using a triangulation strategy involving multiple data sources, theoretical perspectives and approaches to research and data analysis. This approach was adopted to enhance the reliability and validity of the findings, and to provide a complementary and comprehensive understanding of the phenomenon, process or problem under investigation. Triangulation enables

identifying the most characteristic phenomena (through quantitative analysis) and subsequently interpreting those using qualitative data[7] .

In accordance with the adopted methodological framework, the study conducted as part of the Young Science project employed a mixed-methods research design comprising the following components:

I. **Quantitative research :**

(1) **A diagnostic survey conducted** among undergraduate students and doctoral students between May 2025 and December 2025.

II. **Qualitative research:**

(1) **Focus** group **discussions conducted** with a group of undergraduate and doctoral students held on 16 September 2025;

(2) **In-depth interviews based on a standardised interview guide,** conducted with individuals responsible for the education and research processes at universities (January and February 2026). A total of eight interviews were conducted, covering all the research categories identified above;

(3) **Content analysis of** higher education institutions' strategies, conducted between May and June 2025.

The second research perspective – thematic and substantive – concerned the groups of respondents and the scope of the documents analysed. It therefore encompassed undergraduate students and doctoral students, and, as indicated above, university strategies. The interviews conducted with vice-rectors, deans and directors of doctoral schools served to triangulate the data and evidence obtained in the study.

[7] For more on triangulation in social research methodology, see, for example: *Qualitative Research Methods*, vols. 1 and 2, ed. N. Denzin, Y. Lincoln, trans. K. Podemski, PWN Scientific Publishers, Warsaw 2009.

During the compilation of the research material and the drafting of the report, artificial intelligence-based tools were used to support the analysis of document content, the organisation of quantitative and qualitative data, and the editing and proofreading of the report. These tools were used for auxiliary and technical purposes, streamlining analytical work, improving the clarity of the report, and ensuring terminological consistency throughout the document.

Missing responses were excluded from the general analyses, whereas in the detailed analyses the category ‘no data’ was used to indicate cases in which respondents did not answer a particular question. Consequently, slight differences in percentages may occur across individual tables due to variations in the number of valid responses included.

I.4. Student surveys

Student groups were surveyed using two complementary methods: a large-scale questionnaire survey administered across all universities in Poland, and a focus group interview conducted with representatives of the Students' Parliament of the Republic of Poland (hereinafter: Parlament Studentów Rzeczypospolitej Polskiej - PSRP), and its sectoral committees.

Of the more than 45,000 questionnaires administered through the Qualtrics platform, 1,507 were ultimately included in the analysis, all of which contained responses to at least half of the survey questions. Women constituted the vast majority of the sample (63%), men accounted for 35%, and a further 2% of respondents selected the ‘other’ category[8] . It is worth noting that women represented 58% of the student population in Poland in the 2024/2025 academic year, i.e., the gender distribution in the sample

[8] Slightly over 7% of respondents did not answer the question about gender.

closely reflected the national student population[9] . The average age of respondents was 24 years and was identical for both women and men.

More than half of all respondents (52%) were enrolled in first-cycle programmes (bachelor's and engineering degree programmes), followed by second-cycle students (28%), with the smallest group comprising students in long-cycle Master's programmes (20%). The latter type of programme is the most highly feminised, with women accounting for slightly under 70% of all students in these programmes, compared with 59% in first-cycle programmes.

The survey primarily involved students enrolled at public higher education institutions. Nearly half of all respondents (49%) were university students, 21% were enrolled at universities of technology, and as many as 17% studied at public universities of applied sciences. The remaining 13% of respondents were primarily students of medical universities, universities of physical education, Catholic universities and art universities. Compared with national data on the overall student population in public higher education institutions , the sample is characterised by a slightly higher proportion of university students (49% compared with 40%), a similar share of students at universities of technology (20% - 25%) and a significantly higher proportion of students at public universities of applied sciences (17% compared with 6%).

The largest share of respondents represented social sciences, engineering and technology, and medical and health sciences. The relatively high representation of students in medical and health-related disciplines, despite the small number of respondents from medical universities,, results primarily from the over-representation

[9] The authors' calculations based on GUS data contained in the publication *Higher Education and its Finances in 2024*, Warsaw–Gdańsk 2025.

of students enrolled at public universities of applied sciences, many of which have expanded their educational provision in recent years to include nursing and emergency medical services, as well as from students attending two comprehensive universities offering medical programmes[10] .

I.5. Doctoral students' survey

The same research methods were applied to the doctoral student population as to undergraduate students. In the qualitative component of the study, the doctoral students were represented by members of the Polish National Association of Doctoral Students, as well as representatives of inter-institutional and local doctoral organisations.

Of the more than 1,500 questionnaires administered through the Qualtrics platform, 601 were ultimately included in the analyses, each having been completed by more than half of the total number of survey questions. The sample consisted of 50% women, 39% men, while 11% of respondents did not answer the question regarding gender. The distribution of respondents across years of doctoral study was relatively even, ranging from 16% (first-year doctoral students and those with extended study periods) to 24% (third-year doctoral students).

The majority of respondents (57%) were doctoral students enrolled at doctoral schools at comprehensive universities, followed by those studying at universities of technology and natural science universities (18%) and institutes of the Polish Academy of Sciences (14%). The category 'other higher education institutions' (11% of the

[10] Due to the small number of students of agriculture or theology, their responses were not included in some parts of the analysis.

sample) consisted primarily of doctoral students from universities of physical education, academies of fine arts , and universities of economics.

With regard to the disciplines in which doctoral dissertations were being prepared, the largest group represented the exact and natural sciences (31%), followed by the social sciences (16%), and engineering and technology (10%). Doctoral students in disciplines belonging to the humanities (7%), medical and health sciences (6%), agricultural sciences and the arts (4% each) constituted smaller proportions of the surveyed sample[11] .

Noteworthy is the relatively high proportion of respondents preparing implementation doctoral theses (17.6%), which, unsurprisingly, are most frequently pursued in disciplines within engineering and technology (26%), followed by the social sciences and the natural sciences (16% each).

I.6. Institutional support for the academic development of students and doctoral students within the Research University (IDUB) strategies

To identify the scope of institutional support for the academic development of students and doctoral students, a qualitative analysis of the development strategies of selected higher education institutions was conducted. The study covered the strategic documents of the ten universities participating in the Excellence Initiative – Research University (IDUB) programme.

[11] For one in five survey participants (20.6%), it was not possible to determine the discipline in which the dissertation is being prepared. However, only two persons were representatives of theological sciences; consequently, a decision was made to exclude this field from parts of the analysis.

The analysis focused on the current development strategies adopted by individual universities. It examined strategic and operational objectives, planned actions, strategic initiatives, implementation mechanisms, and, where applicable, monitoring indicators. Particular attention was paid to provisions concerning doctoral schools, scholarship systems, the development of student research activity, and mechanisms for engaging early-career researchers in research.

The study employed qualitative content analysis, involving the identification and extraction of issues directly or indirectly related to the support of students and doctoral students in their academic development. To systematise the research material, comparative tables were drawn up, showing the links between strategic objectives, operational objectives, and specific measures targeting this group of the academic community.

The analysis was comparative in nature and was limited to formally adopted strategic documents available to the public. It did not include implementation programmes, regulations or separate operational documents, unless these were explicitly identified in the strategy as an integral part thereof.

I.7. Qualitative research with university stakeholders responsible for education and research

The research was complemented by a qualitative study consisting of individual in-depth interviews with individuals responsible for the education and research processes at universities. A total of eight interviews were conducted with representatives of university authorities and individuals holding managerial positions in areas related to teaching, doctoral schools, and the development of research.

The aim of the interviews was to deepen the understanding of the practical mechanisms through which universities support the academic development of students and doctoral students as well as the ways in which these objectives are implemented in everyday institutional practice. The interviews were qualitative in nature, which enabled us to address key organisational, financial and managerial aspects associated with the implementation of measures supporting young researchers, as well as to identify good practices and challenges arising during the process of implementing solutions at the institutional level.

Despite the research achievements described, further development of the support system for students and doctoral students remains necessary, both at the institutional level and across the Polish higher education system as a whole.

*

The Young Science project team would like to express sincere gratitude to everyone who took part in the research – students, doctoral students, university authorities, directors of doctoral schools, and experts who contributed through interviews and debates. We are deeply grateful for your time, openness, and willingness to share your experiences and reflections on the future of the next generation of researchers in Poland.

We would also like to extend our thanks to all the institutions and partners supporting the project, as well as to everyone involved in its organisational implementation. We hope that this report will contribute to further in-depth discussion on systemic support for early-career researchers in Poland.

We would appreciate if all interested stakeholders shared their thoughts and joined the nationwide discussion on the need for systemic measures supporting young

researchers. Just contact the Young Science project team, and follow the project website: https://mlodanauka.umk.pl/.

Editors of the Report

Wojciech Kiełbasiński

Anna Kola

Cezary Odrzygóźdź

Jakub Szczepkowski

Graphic design of the report

Dominika Kurda

II. Support for students' academic development: study findings

II.1. General remarks

All components of the study – surveys, focus group interviews and in-depth interviews – were organised around categories relevant to students' experiences at universities and the institutional support for their academic development.

Particular significance in the analysis was attributed to study programmes, which usually constitute students' first encounter with professionally conducted academic research. This contact takes place primarily through academic staff – researchers and lecturers – who present the results of their own research and employ a variety of teaching methods intended to foster research-oriented attitudes and strengthen students' academic aspirations. It was therefore important to examine students' perceptions of the conditions, opportunities, and barriers associated with engaging in research activity during their studies, as well as the forms of support available to them.

Within the analysis of the educational process, particular attention was paid to whether programmes included courses designed to develop research competences, enabling the preparation, implementation and evaluation of research projects. This applies primarily to areas such as formulating research questions, research design and methodology, preparing grant applications, conducting empirical research, writing academic publications, and preparing for participation in academic conferences. Equally important is the development of competences related to securing research funding , disseminating research results—including collaboration with the media—as

well as building research project teams and managing the implementation of research projects.

At the same time, it should be emphasised that not all students intend to pursue an academic career. For this reason, programmes should also support the development of cross-disciplinary (transferable) competences, including analytical, communication and organisational skills, teamwork, time management and critical thinking. These competences are valuable both in research and in a wide range of professional contexts.

Students were also asked whether courses aimed at developing research skills were taught by academic staff actively engaged in research, and what teaching methods were used, including *project-based learning,* mentoring and academic tutoring.

The analysis of the educational process also examined students' experiences of international mobility. Particular attention was paid to participation in international mobility, including internships, work placements, study exchanges, summer schools, academic conferences or study visits, which often extend beyond standard mobility programmes such as Erasmus+. The study also sought to determine the availability of these forms of mobility to students.

Institutional support for establishing contacts with foreign partners, including the recruitment of supervisors for research internships, was also a key element of the analysis. In this context, the study examined existing support mechanisms, forms of international cooperation, and the role of university units in facilitating such relationships.

Another key issue concerned mechanisms supporting the institutionalisation of academic partnerships leading to new cooperation agreements, including double

degree programme arrangements. Particular attention was paid to cases in which international cooperation developed as a direct consequence of previously implemented research projects.

Although the scope of the analyses was broad, the educational model adopted by universities and the role of academic staff as role models, capable of inspiring students to develop academic interests and engage in research activities emerged as particularly important factors.

II.2. Research competences developed within study programmes

II.2.1. Analysis of study findings

As indicated above, one of the objectives of the study was to determine the extent to which study programmes at higher education institutions prepare students to undertake research activity.

The findings show that a significant proportion of respondents do not perceive their study programmes as including content directly related to the design and conduct of research. The main exception concerns courses devoted to formulating research questions, in which 59% of the students surveyed reported having participated. Such experiences were most frequently reported by students of social sciences (67%), and least frequently by students of engineering and technology (50%). This difference may be related to the nature of dissertation seminars offered in many social science programmes, where students prepare written assignments based on independently designed and completed research projects.

Content related to research design was reported by 45% of students, particularly those enrolled in science, natural sciences and social sciences programmes.

Participation in courses involving the conduct of research was reported by 44% of respondents and was relatively more common among students in engineering and technology programmes.

„A significant proportion of respondents report that their study programmes do not include content explicitly related to research design and the conduct of scientific research".

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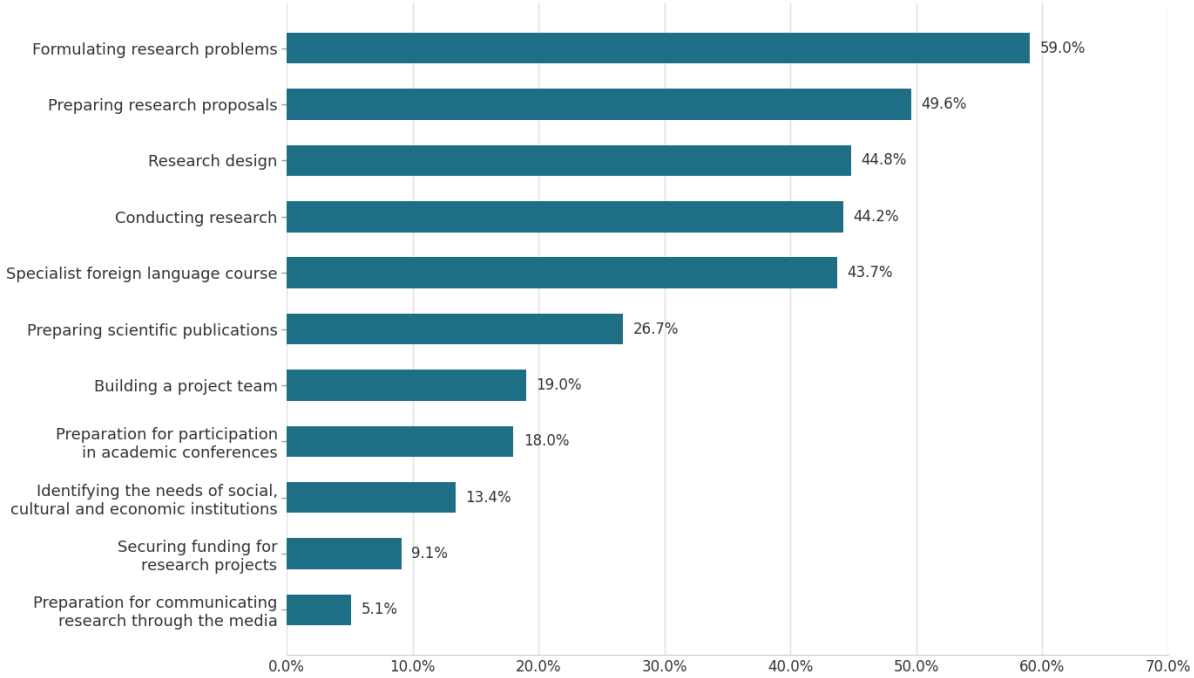
The results therefore indicate a clear differentiation within the sample, both in terms of the disciplinary profile and the stage of education. Fields with a stronger empirical orientation – in particular, social sciences, science and natural sciences, and engineering and technology – more frequently offer courses that support the development of methodological competences. Among students of disciplines such as psychology, sociology, cognitive science and education, 90% reported participation in courses involving the formulation of research problems, 82% in research design, and 62% in conducting research.

At the same time, a clear correlation is evident between the availability of courses preparing students for research activity and the level of study. As students progress through their study programmes, the proportion of those reporting participation in courses developing research competences increases. This may be interpreted as a consequence of the progression, in which methodological content and research-related activities become more prominent in the later stages of higher education.

Fig. 1. Components of study programmes declared by respondents



Source: the "Research Activity of Students" study.

At the same time, the survey results clearly indicate that study programmes contain relatively few elements related to identifying the needs of the socio-economic environment (13.4% of responses), securing funding for research (9.1%) and disseminating research results (5.1%). This suggests that while students acquire competences related to conducting research, they are less frequently equipped with the skills necessary to apply and utilise research.

These findings indicate that **the preparation of students for research activity within study programmes remains incomplete and requires further strengthening**. In particular, this concerns the development of competences that enable practical implementation of research projects, including securing research funding, communicating research results, and commercialising research results.

Students' responses also suggest that study programmes relatively rarely include modules designed to develop skills related to teamwork in research projects, presenting research findings, and preparing academic publications. This indicates that **several key competences required for effective participation in research activity are developed only to a limited extent or remain outside the core curriculum.**

It should be emphasised, however, that **in many cases study programmes provide students with a solid foundation of research competences**, including the ability to formulate research questions, design data collection tools, critically analyse source materials, and identify the theoretical foundations of research. This is a significant and positive element of the educational process, particularly in the context of contemporary challenges associated with the increasing use of artificial intelligence tools in academic work. As technological solutions increasingly affect the preparation of written assignments, the development of analytical competences and critical thinking becomes essential for maintaining academic quality and safeguarding the integrity of intellectual work.

The qualitative findings should also be interpreted in conjunction with qualitative research. Students participating in the focus group interviews expressed the view that: "The study programme does not prepare students for, or in any way support, academic work." The difference also lies in the characteristics of the study programme – **the more mass-market the programme, the lower the opportunities for developing research competences**. Programmes such as law or economics, which admit several dozen or several hundred students annually, were frequently cited by the interviewees as examples of large-scale or 'mass-market' programmes. One of the main challenges that may then arise are, for example, dissertation seminars with very large numbers of participants, where **individualised supervision and mentoring**

become difficult to achieve: "Most of the seminars […] were seminars for 20–30 people". Large seminar groups may reduce the originality, independence, and innovativeness of student research projects. They are also associated with limited **opportunities for close interactions between academic staff and students, whether in terms of mentoring, tutoring or ensuring the quality of dissertations**.

However, the study programme and its curriculum, or the intended learning outcomes, do not in themselves determine the low or high quality of student research, because: "Law […] is a mass-market programme; it has little to do with scholarship. If someone **wants to do research in law, they have to join a research society**". Student research societies were therefore perceived as an attractive and important feature of academic life: an initiative that is not always appreciated, and aimed at students who want to engage in research without the pressure associated with grades or examinations.

Another key factor supporting the development of students' research competences is the interdisciplinary character of study programmes and their thematic diversity, which help broaden cognitive perspectives and address research problems at the intersection of different disciplines. As participants in the qualitative research noted: "This is an interdisciplinary programme. It is the only one of its kind in Poland." Courses drawing on multiple disciplines enable students to learn about diverse research approaches and methodologies characteristic of various fields of science. Such programmes are often organised around a project-based learning model, in which students' independent research activity plays a significant role. One respondent emphasised: "The intensity of the projects – practically every other module was a project." This was identified as a key feature distinguishing the programme from more traditional models of education. Students were required to independently develop a

research concept, collect empirical data and analyse it: "Each of us had to come up with a research project on our own, conduct a survey […], everything had to be related to the field of study, i.e. it concerned regional development". As a result, the educational process was centred on specific research problems and substantive challenges, rather than solely on the transmission of theoretical knowledge. Such an approach facilitates the development of study programmes focused on major contemporary challenges, including security, artificial intelligence, medical issues, education, or crisis management.

Furthermore, the research-oriented character of these programmes is also linked to small class sizes, which ensures the successful implementation of the curriculum. One respondent observed: "Only 20 of us are admitted in the first year, whereas in law there are 1,000 students." This certainly makes a difference, but it also allows for the broadening of knowledge and skills: "Each of us had to develop a strategy for one of the provinces. […] developing this for a single module was quite a challenge."

Interestingly, **stereotypes concerning study programmes and their specialisations should be challenged.** Respondents referred to their experiences of developing research competences within a practical profile, rather than solely within a general academic one. Practical profile in education is no longer understood solely in terms of preparation for a professional dimension of studying, but as the ability to solve specific problems, most often through project-based ***learning*** (***PBL***). This occurs **at a more advanced stage of study**, when students have acquired sufficient discipline-related knowledge to undertake research projects, carry out assessment, and apply specific solutions within their field of study: "The study programme certainly takes the practical aspect into account – in the final semesters of the engineering programme we have project-based classes" and therefore "In the first semesters we study core

subjects, and later the specialised subjects allow us to modify and implement engineering solutions".

For this reason, it is worth considering the incorporation of innovative teaching methods and new approaches to the educational process into study programmes, particularly those that are already being successfully implemented at selected universities in Poland. Examples of such practices were provided by experts participating in the qualitative study. As one respondent emphasised: "Such elements appear both in the curriculum at Master's level and in doctoral programmes. They are, in fact, a standard feature."

These examples point to the growing importance of practical preparation for students and doctoral students to conduct research, encompassing not only the development of methodological competences, but also knowledge of research funding mechanisms and the ethical standards applicable in research activity.

Teaching approaches sometimes extend beyond traditional models of instruction, as one of the experts explained: "It seems to me that what is missing, and which we have successfully established at faculty level, are our internal empowerment seminars, which are a form of collaboration between researchers at various stages of their careers, but also an open discussion where we present our papers or our research ideas. This does not take place outside the department structure; it is a faculty seminar held once a month, which anyone can join, but on the condition that they do not merely expect their ideas to be reviewed, but also actively participate on the basis of reciprocity and contribute to the evaluation of others' projects and written ideas." Involving students in such initiatives from the very beginning of their studies may help foster research-oriented attitudes, as well as to develop competences related to

presenting research ideas, participating in academic debates, and translating the language of concepts into the research process.

Each institution may adopt its own distinctive approach in this regard, as one of the respondents noted: "In the sense that I am not particularly fond of the concept of soft skills, but here we can encounter issues connected precisely to the fact that, above all, we place a strong emphasis on project work and group work. This is a form of education rather than just the content in itself."

The **integration of knowledge and project work**, as well as the effective distribution of research-related activities across the educational cycle and the establishment of a timetable, are very important: "Semester projects are integrated into larger units so that students can concentrate on one or two projects." This approach enables the effective development of competences essential for research and project implementation. The analysis of institutional good practices demonstrates that project-based activities are being given priority within curricula. At one university, this has taken the form of an umbrella course entitled 'Living Lab'. Within this framework, large semester-long projects are carried out and the content and requirements of other courses are aligned with these projects. Students complete a single project addressing learning outcomes from multiple modules rather than several unrelated assignments. Student projects may result in academic publications prepared jointly with academic staff, including monographs or reports on the research activities of student research societies. In this context, specialised initiatives also play a significant role, such as the GrowPro University-wide Project Management Research Society operating at the Faculty of Economics and Management at Nicolaus Copernicus University in Toruń, which supports students in developing project management skills and carrying out interdisciplinary projects.

However, the most important aspect is **the integration of teaching and research**, as illustrated by one of the interviewees: "Our research is embedded in teaching, and teaching in research. First- and second-cycle students are involved in research projects conducted by academic staff – as part of the new specialisation, 30 hours of classes are divided among several lecturers who formally take charge of a group of students".

Project-based *learning* (PBL) **is also increasingly becoming a standard element of higher education**, with students carrying out research tasks in teams. As one of the experts participating in the study explained: "Sometimes these are inter-departmental teams, meaning they combine expertise from different disciplines, and we also involve secondary schools." Such solutions are particularly valuable because they create opportunities for students to collaborate with secondary school pupils, thus enabling young people to become familiar with the academic environment at an early stage of their education. In some cases, secondary school pupils participate directly in university research project teams: "It is also often the case that these are children, even from secondary schools, who join the teams of such young researchers and students." Such experiences help to build a relationship with the university at an early stage of education. As one respondent noted: "Very often, they are simply already connected to the university; they are no longer afraid; for them, it is just another place they are familiar with." The PBL-based approach is also often linked to competitions organised for school pupils and university students, which provide a platform for presenting the outcomes of project work. As one expert emphasised: "After PBL projects are completed, there are always competitions, and there are winners of these competitions […], they feel right at home. They move on to university; they've already been here before, carrying out various tasks." As a result, such projects can become young people's first, often very important, contact with research activity and the academic community.

II.2.2. Recommendations

Strengthening research-based teaching within study programmes

It is recommended that teaching focused on conducting scientific research be strengthened by incorporating into study programmes courses that prepare students to undertake research projects. These courses should cover the entire research project cycle, from problem formulation and research design, through implementation and analysis of results, to the preparation of publications and the dissemination of research findings. This approach would provide students with more comprehensive preparation for active participation in the scientific community.

Developing students' project management and grant-writing skills

It is recommended that study programmes include elements of training in grant applications preparation, securing research funding and research project management. The study findings indicate that these skills are currently developed to a limited extent, despite their central importance in academic careers. Their systematic inclusion in curricula may enhance students' capacity to independently initiate and implement research projects.

Expanding project-based and research-based teaching methods

It is recommended that greater use be made of teaching methods based on project work, including Project-*Based Learning* (PBL) or *Research-Based Learning* (RBL). These approaches foster the development of analytical skills, teamwork and the integration of knowledge across various fields and disciplines of science. Embedding research projects within the curriculum enables students to gain practical experience in conducting research during the course of their studies. .

Promoting interdisciplinary study programmes

It is recommended that interdisciplinary forms of education be further developed, enabling students to learn about diverse research and methodological approaches characteristic of various academic disciplines. Interdisciplinary research projects help broaden students' cognitive perspectives and encourage them to address research problems at the intersection of multiple fields of knowledge. Such an approach also enhances students' ability to respond to complex problems of the contemporary world.

Creating conditions for more individualised student research

It is recommended that organisational measures be introduced to facilitate more individualised research work by students, in particular by reducing the size of seminar groups and expanding academic mentoring and tutoring. Excessively large seminar groups limit opportunities for individual work with students and reduce students' capacity to develop their research independence. Strengthening the mentor–student relationship may significantly improve the quality of student research projects.

Involving students in the research community from the early stages of their studies

It is recommended that students be systematically involved in the research community through participation in research seminars, research team meetings, and initiatives that promote a culture of academic discussion. Such activities allow students to become familiar with research practices at an early stage of their education and to develop the abilities to present their own research ideas. Early involvement of students in such initiatives fosters a research-oriented mindset and strengthens their motivation for academic activity.

Developing university-wide project-based research societies

It is recommended that the establishment of university-wide research societies be supported, as these enable students from different disciplines to collaborate on ambitious research and implementation projects, conducted and organised in accordance with project management principles. Such initiatives strengthen integration within the academic community and facilitate the effective combination of diverse competences and perspectives.

Participation in project teams enables students to acquire practical skills in project planning, organisation, implementation, teamwork, and problem-solving. It also creates a space for developing initiatives with high scientific and practical potential, which may become a starting point for further research activity or collaboration with the socio-economic environment.

The development of such structures contributes to strengthening a project-oriented research culture within the university and increases student engagement in academic activities, particularly in their practical and interdisciplinary dimensions.

II.3. Additional training opportunities supporting students' research activities

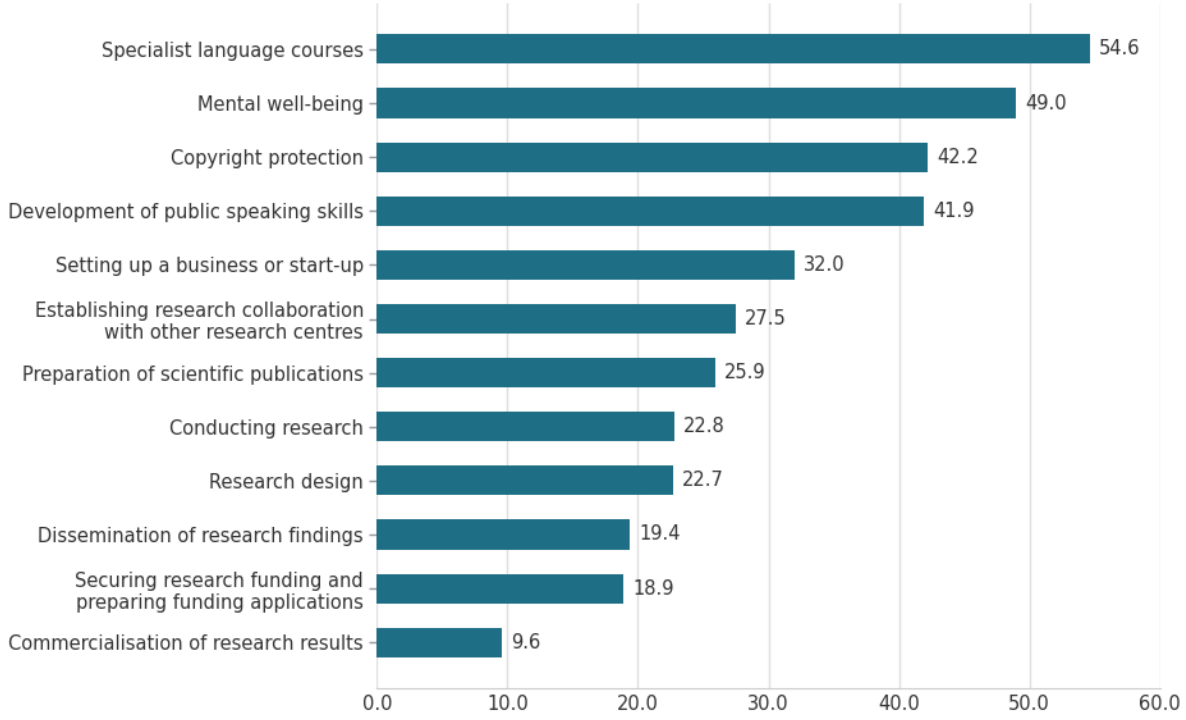
II.3.1. Analysis of study findings

Strengthening students' research competences can take place outside formal study programmes. One important solution is tutoring and mentoring, which are established elements of education at many Polish and foreign universities. Tutoring and mentoring are offered to students and academic staff through teaching centres, which often coordinate a comprehensive range of pedagogical and methodological training programmes aimed at improving teaching quality. These centres employ certified

tutors who deliver interdisciplinary modules and provide support in such areas as interpersonal skills, self-assessment and student personal development. Tutoring involves academic staff who receive additional remuneration and training within institutional tutoring programmes. However, there is a potential for expanding the availability of training related to teaching and learning , including forms of support that help students develop effective learning strategies.. The ability and motivation to engage in self-directed learning is one of the most important competences of the twenty-first century, enabling individuals to respond effectively to the challenges of a changing world.

What universities offer in addition can vary substantially across institutions and is often insufficiently visible to students. Participation in training programmes and other forms of professional development remains limited. Language courses are the most frequently attended form of additional training. What is concerning and needs to be addressed is **the high proportion of students who are unaware of training opportunities available**; for example, in the case of a question about courses in research design nearly half of the respondents reported that they did not know whether such courses were offered at their home university.

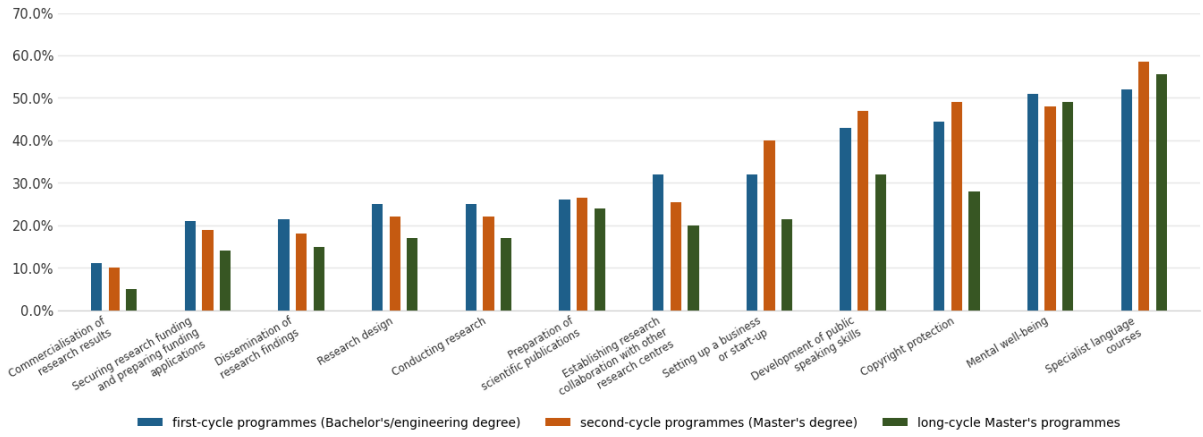
Fig. 2. Types of courses, training programmes and specialist workshops offered by universities



Source: the "Research Activity of Students" study.

While students recognised content related to research design and implementation within their study programmes, these topics appeared considerably less frequently among the courses, training sessions, and workshops offered by universities. Additional educational opportunities available to students, outside the formal study programme, primarily concerned specialist foreign-language skills , mental wellbeing, copyright protection, and the development of public speaking skills, each of which was indicated by more than 40% of respondents. Therefore, if a study programme does not include courses providing the knowledge and skills necessary for conducting research, the university's supplementary educational offer in this area remains relatively limited from the students' perspective.

Fig. 3. Types of courses, training programmes and specialist workshops offered by universities, by type of study programme



Source: the "Research Activity of Students" study.

Students' perceptions of the availability of specialist courses and training opportunities also appear to vary depending on the type of study programme and the field of study.

Apart from introductory training concerning students' rights and responsibilities , which is intended to support students in adapting to university life, most additional training opportunities are perceived as supplementary to the formal curriculum. However, this perception is only partial, as such training often includes information that is important for academic development and pursuing selected academic trajectories. As one respondent explained: "We run a training session on students' rights and obligations […]. There is a section on various types of exchanges or Erasmus."

Students enrolled in first- and second-cycle programmes were more likely to be aware of additional educational opportunities offered by universities than students enrolled in long-cycle Master's programmes. This may be related to the specific nature of such programmes as psychology, law, veterinary medicine, and medicine, which are

characterised by intensive curricula that often limit opportunities for participation in supplementary educational activities.

Students in the humanities were relatively more likely to report access to additional educational opportunities beyond their formal study programme, including specialist language courses, mental wellbeing support, public speaking skills training, and collaboration with external centres and institutions. Medical students, by contrast, more frequently referred to workshops, training sessions and courses related to research design and the preparation of academic publications than students from other disciplinary areas.

Students drew attention to yet another issue, namely the way in which information about training opportunities, projects, and research initiatives is communicated... Many students referred to the experience of information overload: "The volume of information […] causes information overload". **This suggests that communication concerning training sessions, research projects or academic competitions should be clear, concise, and visually accessible, potentially combining digital communication with more traditional formats such as posters and leaflets.**



II.3.2. Recommendations

Expanding additional training opportunities supporting students' research competences

It is recommended that universities expand their supplementary training offer in the area of students' research competences, in particular by organising workshops and courses devoted to research design, academic writing and publishing , and research funding acquisition . The findings indicate that these topics remain underrepresented

within the current portfolio of university training programmes, despite their importance for preparing students for research and academic careers

Strengthening academic tutoring and mentoring

It is recommended that academic tutoring and mentoring be further developed as a complement to traditional forms of academic education. Individual collaboration between students and academic staff can enhance the development of research competences, strengthen motivation for academic engagement, and support the planning of individual academic and research trajectories. .

Improving communication about development and training opportunities

It is recommended that universities improve communication regarding available training sessions, workshops, and courses supporting students' research development. The high proportion of 'don't know' responses observed in the survey indicates the existence of a substantial information barrier. Universities should consider developing centralised information platforms or regular communication channels that provide students with clear and up-to-date information about development opportunities.

Tailoring training provision to the characteristics of study programmes

It is recommended that supplementary educational provision be tailored to the specific characteristics of individual study programmes and students' academic workload. In programmes with particularly demanding curricula, universities should consider introducing more flexible forms of participation, such as shorter workshop modules or online courses.

Reducing information overload in communication with students

It is recommended that universities streamline communication concerning training opportunities, competitions, and research initiatives addressed to students. Excessive and fragmented communication may contribute to information overload and reduce students' ability to access the most important information. More coherent communication strategies and a more selective approach to information dissemination may significantly improve the effectiveness of informing students about available development opportunities.

II.4. Students' research experience and participation in study visits

II.4.1. Analysis of study findings

Only one in ten students taking part in the survey (11%) had studied, completed an internship or work placement abroad, and one third of those respondents reported that they had conducted research during their international mobility period. Students enrolled in second-cycle programmes (21%) and those in the later years of study were significantly more likely to participate in international mobility. For example, among first-cycle students, only 1% of first-year students, 6% of second-year students, and 14% of third-year students had participated in study abroad opportunities. The higher participation rate among students in advanced years of study is likely attributable both to greater academic experience that allows them to combine mobility with their studies more effectively, and to a better understanding of the opportunities available.

Students in the humanities (18%), engineering and technology (14%), and science and natural sciences (13%) were relatively more likely to participate in international mobility than students in social sciences and medical and health sciences (9% each). The reasons for these differences cannot be determined conclusively. They do not

appear to result from differences in the distribution of respondents across years of study, and are more likely related to the specific characteristics of individual study programmes and the opportunities available to students. Medical programmes, as well as several programmes in the social sciences (including psychology and education), are regulated by legal regulations and national education standards... Participation in international mobility programmes, such as Erasmus mobility schemes, often requires students to subsequently complete learning outcomes that were not achieved during their period abroad, and this creates an additional academic burden.

Detailed data on student mobility are provided in the tables below.

Table 1. Field of study by discipline and participation in international mobility programmes (internships, work placements, study exchanges) due to small sample sizes, the following fields were excluded from the analysis: theology n = 4, agriculture n = 10, arts n = 38)

Did you take part in an international mobility?	Field of study					Total
	Humanities	Engineering and technology	medical and health sciences	social sciences	exact and natural sciences	
Yes	**18.3%**	13.6%	9.3%	9.4%	12.9%	11.0%
No	81.7%	86.4%	**90.7%**	90.6%	87.1%	89.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Students" study.

Table 2. Type of study programme and participation in international mobilities (internships, work placements, study exchanges)

Did you take part in an international mobility?	Type of study			Total
	First-cycle studies (Bachelor's/ (engineering)	second-cycle studies (Master's)	Long-cycle Master's programmes	
Yes	7.7%	**20.7%**	8.7%	11.5%

No	**92.3%**	79.3%	91.3%	88.5%
Total	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Students" study.

Table 3 presents detailed data on the year of study of students participating in international mobility. The data show that participants are predominantly students in the final stages of their degree programmes, particularly those preparing their theses.

Table 3. Participation (in percentage points) in international mobility programmes, internships and work placements by type and year of study

Type of study	Year of study					Total
	1	2	3	4	5 and 6	
First-cycle studies	1.4%	5.9%	**14.4%**	2.3%	-	7.6%
Postgraduate studies	16.6%	**24.6%**	-	-	-	20.7%
Long-cycle studies	4.9%	3.4%	7.9%	12.1%	**13.2%**	8.7%

Source: the "Research Activity of Students" study.

A comparison of international mobility participation by institutional type reveals an interesting pattern. The highest participation rates were observed among students at **universities of technology**, i.e. higher education institutions offering programmes in engineering, technology, and scientific disciplines, where project-based work and applied problem-solving are inherent elements of the curriculum... Conversely, the lowest mobility participation **was** recorded among students enrolled at **public universities of applied sciences**. This may reflect **lower levels of internationalisation at these institutions**, as well as economic **factors,** such as a higher proportion of students who combine studies with employment, or **family-related constraints**.

Table 4. Institutional type and participation in international mobility programmes, internships and work placements

Have you taken part in an international mobility?	Type of institution				Total
	university	University of technology	public university of applied sciences	Other	
Yes	11.8%	**14.0%**	7.7%	10.0%	11.3%
No	88.2%	86.0%	**92.3%**	90.0%	88.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Students" study.

These quantitative findings help explain the observations expressed by students and experts. Students often described international mobility less as an academic opportunity and more as an organisational challenge that can complicate the course of their studies. Cases still occur in which students returning from mobility programmes are required to complete examinations and course-related assignments associated with the home university study programme. At the same time, some respondents reported positive experiences in which **course requirements could be fulfilled through work completed during the mobility period**. As one participant stated: "Did you have to pass even part of the programme? – I was able to pass the whole module […]" and "I was able to pass it on the basis of that project".

A significant challenge concerns the recognition of ECTS credits. As one respondent observed: "ECTS credits should be awarded for this […], then you return to your university with those ECTS credits and suddenly the dean's office says: it's a non-standard situation, so it's always a problem". This illustrates a long-standing systemic issue related to the incomplete formal integration of international mobility into programmes.

By undertaking research projects rather than conventional courses during their stays abroad, some students were able to achieve the full set of learning outcomes. One respondent noted: "All the learning outcomes I actually achieved through this month-long project were everything I needed for that course."

These findings suggest that international mobility is increasingly becoming research-oriented rather than teaching-oriented, and that elements of mobility may also be implemented in hybrid format: "It was entirely research-based. […] It lasted a month, three weeks to be precise, and then continued remotely from home." Such projects are often interdisciplinary, allowing students abroad to earn academic credits as part of their coursework and attend extracurricular activities connected with the project they are carrying out.

The experts interviewed, however, emphasised the substantial academic, research and personal potential associated with international mobility. One interviewee observed: "They are, however, very much encouraged, and indeed this mobility is immense. Believe me, this mobility has extended far beyond Europe, because our doctoral students go to the US, Canada and Australia – it really is the whole world. Furthermore, this is a consortium of European universities, so several times a year there are some group trips, but students also travel to these partner universities and complete part of their study programme there."

Alongside international mobility, an important element of students' research experience is the independent conduct of research projects. Turning to students' research experience, it should be noted that only **one in five students had**

undertaken a research project unrelated to the preparation of a thesis or the completion of coursework[12] .

Students who undertake their own projects are primarily those who are also active in other areas. One in five in this group had undertaken study or work placements abroad, whereas among those who had not carried out an independent research project, this proportion was 9%. As in the case of international mobility, students' experience gained through the educational process appears to play an important role in enabling students to engage in additional research activities. While the proportion of first-cycle students who had carried out or were currently carrying out an independent research project was 14%, it rose to 31% among second-cycle students. In more general terms, the higher the year of study, the greater the proportion of students undertaking independent research projects unrelated to the preparation of a thesis or course requirements.

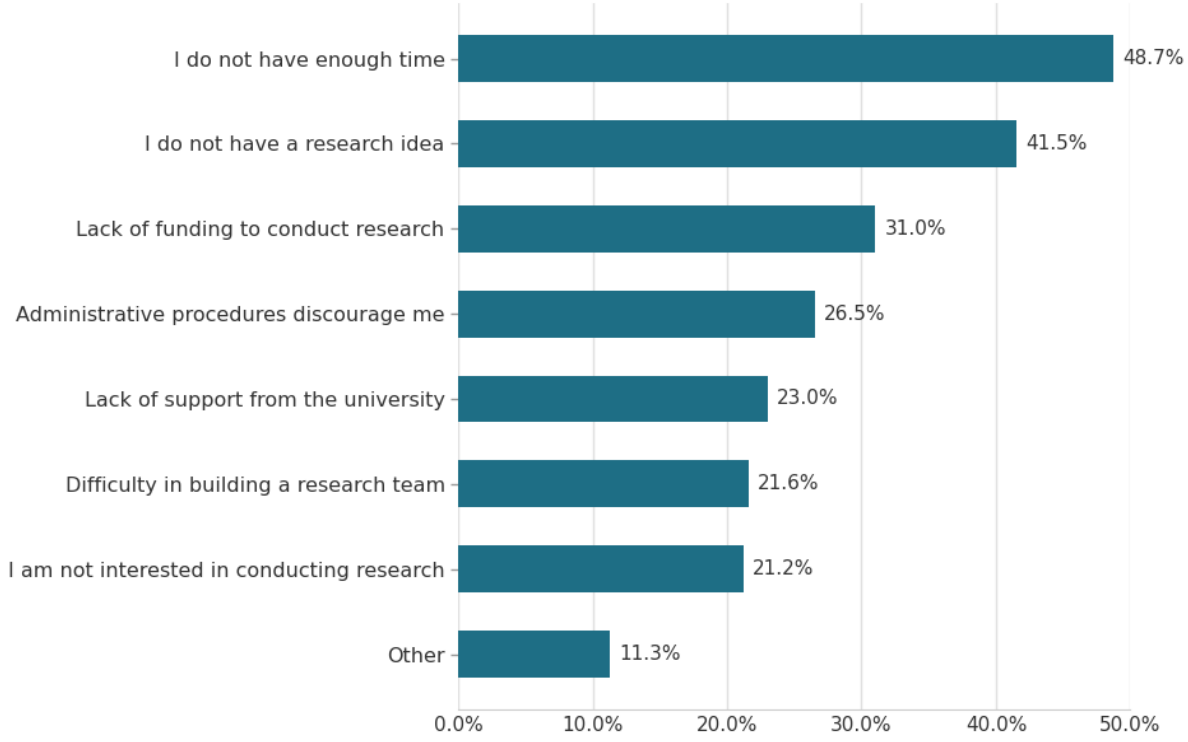
At the same time, the vast majority of students do not choose to undertake independent research projects during their studies. For this reason, it is important to examine the factors that limit their engagement in research activity.

A lack of time and a lack of ideas for conducting an independent research project are the main reasons why students do not engage in research activities (49% and 42% respectively). **At the same time, one in five students participating in the survey stated that they were simply not interested in this type of activity.** This may suggest that, for a substantial proportion of respondents, the limited engagement in research is not primarily the result of institutional barriers, but rather of other priorities related

[12] However, this finding should be interpreted with some caution, given the characteristics of the study population resulting from the research methodology employed. The study primarily involved students who were relatively more engaged in their studies and in all initiatives related to higher education.

to the day-to-day realities of student life, including attending classes, preparing for examinations and enjoying their free time. Only then do institutional constraints emerge as significant factors discouraging students from engaging in research activities appear, such as a lack of funds for independent research (31%), existing administrative procedures (27%) or insufficient from the university (22%). Difficulties in engaging other students in collaborative research projects also constitute a significant barrier (22%).

Fig. 4. Reasons why students do not engage in research activity



Source: the "Research Activity of Students" study.

Certain differences can be observed in the reasons for not undertaking an independent research project among students enrolled in different types of study programmes. **First-cycle students are slightly more likely to cite a lack of time and ideas,** whereas **second-cycle and long-cycle Master's students more frequently**

identify insufficient university support and administrative procedures as factors discouraging them from undertaking independent research projects.

These differences partly correspond with other reasons why students do not undertake independent research projects, which were not included in the survey response options, as illustrated by the following statement:

"Honestly, as a first- or second-year student, you feel terribly lost when it comes to many of the university's processes. We only found out about the opportunities to carry out research (other than a bachelor's or master's thesis) at a very late stage of our studies. By then, I was already personally focused on industry and those career paths, because during my studies I hadn't been shown the research process and the fact that we actually can (and even should) be involved in these things throughout our studies."

The students participating in the study most frequently identified two reasons for not engaging in research projects. The first, primarily common among first-year students, is **the process of 'getting used to' a new reality**, including a different rhythm of study, and the university's operating procedures. The second reason is **a lack of information about the existence of research opportunities** (assuming such opportunities are available), communicated either by academic staff or research societies. Among the statements explaining why students did not become involved in academic research or undertake independent projects were the following:

- "I have no knowledge of such projects; **I don't know how to get started**."
- **"**A lack of awareness that I can do something myself, **and on the other hand – what's the point?"**

- "There is a lack of information from the university about specific research problems that could be addressed. **A course like this, even on Moodle**, **would be useful**."
- **"I didn't know who to turn to** or what the process involved."
- **"It doesn't have much to do with my studies (sculpture)."**
- **"I didn't know it was possible."**
- **"Lack of opportunity."**
- "Sometimes **there** simply **isn't time**, in the sense that an undergraduate degree programme lasts only three years. In the first year, it's hard to find your feet and develop your own ideas, because you're only just entering the world of academia. In the second year, there might be a six-month or one-year placement. In the end, there's roughly a year left for the entire research project, from its design to writing the article, which might not be enough, because you're doing this kind of research on your own for the first time, so everything will probably go a bit slower than for experienced researchers."
- "Nobody told me about this possibility."
- "I'm studying graphic design at the Academy of Fine Arts; **there isn't really any research in my field**."
- **"I haven't looked into** how to start a research project."
- **"Lack of 'clout'.** It's easier for more popular students with connections to pursue academic work. Unfortunately, not everyone is involved in the student council and has that sort of 'backing'."
- **"Personal issues."**
- "Lack of awareness of opportunities; **lecturers saying that only they are responsible for conducting research and publishing**; restricted access to university research equipment. **Lecturers ordered it for the Department but**

treated it as their own private property. A positive recommendation from the supervisor was required for publication, and even though I was one of the top students in my year, there were no takers. **Lecturers were hostile towards students whose research area was similar to their own**."

- **"I took it on, but on my own."**
- **"Lack of self-confidence** – the belief that conducting research is reserved for a select group of the most outstanding individuals, and at the same time, that I lack the knowledge and skills to carry out such projects. Hence – no attempt was made."
- "But I do conduct research, just not as part of a team, but on my own, and I help postgrads and a doctoral student. **I'm just not interested in working with undergrads, because they'd be more of a burden than a help."**
- **"Social anxiety, alienation, lack of belief in one's own abilities."**
- **"A lack of willingness on the part of research teams to collaborate with students."**
- "I only conducted the **research** necessary for my thesis and **presented some of the findings at a conference**."
- **"A lack of commitment from the university towards my study programme**; **there isn't even a research society."**
- "I never received **a 'knowledge** package' explaining how this is done, i.e. where research is published, how it works, how to do it; I did have a class on preparing for academic work, but after two hours the lecturer said that was all that was needed, and no further sessions took place."
- **"I don't feel like someone the society considers worthy of conducting research.** I'm a foreigner and a man to boot, which makes me doubly unwelcome in any team. I wouldn't even be trusted to hand out markers. In

lectures, I often find myself avoiding discussions, even though they interest me and I have something to say. I get the impression that I see this kind of suffering in the eyes of most of the group. Everyone also has their own reasons, similar to mine: someone feels out of their depth because of their gender, background or marital status; someone is a woman with a young child and feels ill-prepared; someone comes from the countryside or a poor family and doesn't believe they can get involved; someone has a settled private life and is afraid of taking risks; someone feels overwhelmed by an excess of responsibilities; someone doesn't know the language of instruction well enough; someone is afraid of the group's judgement; someone simply lacks experience and prefers to remain silent. We have people in the group who have already completed their medical studies or have just finished their A-levels — I know they've got it all down pat, and yet, when the lecturer asks: 'What functions does the mitochondrion perform?', no one speaks up, even though everyone knows the answer. They don't want to make a sound, because automatically everyone will look in that direction and pass judgement on what they see and hear; since this bothers them, they don't expect the mark to be a pass. A massive crisis of faith, like after the earthquake in Portugal, only now regarding our own right to exist. Interestingly, when someone full of potential and ambition appears, the rest are more likely to want to drag them down to their own level than to be inspired by them. With all this, no one is consciously a bad person, but this is simply how we behave, and we suffer so deeply that no one talks about it. We want to do things differently, but we don't know how, and time is running out. Older generations of scientists would probably scoff at this confession."

- "The lack of a research society in the topic of my interest."

The idea for an independent research project most frequently (33%) originated from the respondents' involvement in a student research society. One in five students engaged in additional research activities indicated that the project resulted from an initiative proposed by an academic staff member (21%), a collaborative idea developed with other students (19%), or their own initiative (17%). By contrast, projects initiated by external organisations (4%) or representatives of other research centres and institution (2%) were relatively rare.

The implementation of research projects is presented in detail in the tables below. These data confirm that first-year students in first-cycle programmes are the least likely to undertake independent research projects, as are students in the humanities, social sciences, and medical and health sciences.

Table 5. Field of study by discipline and participation in independent research projects during studies (due to small sample sizes, the following fields were excluded from the analysis: theology n = 4, agriculture n = 10, arts n = 38)

Did they conduct their own project?	Field of study					Total
	Humanities	Engineering and technology	medical and health sciences	social sciences	exact and natural sciences	
Yes	19.2	21.0	15.3	17.1	**27.9**	19.8
No	80.8	79.0	**84.7**	82.9	72.1	80.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: the "Research Activity of Students" study.

Table 6. Type of degree programme and participation in independent research projects during studies

Did they conduct their own project?	Type of study			Total
	First-cycle studies (Bachelor's/ engineering)	Second-cycle studies (Master's)	Long-cycle Master's programmes	
Yes	14.0%	**30.9%**	18.8%	19.6%
No	**86.0%**	69.1%	81.3%	80.4%
Total	100.0%	100.0%	100.0%	100.0%

Source: 'the "Research Activity of Students" study.

Interestingly, the data on research project implementation correspond with the patterns observed in student mobility by year of study, level of study, and field of study.

Table 7. Percentage of students undertaking independent research projects by type and year of study

Type of study	Year of study					Total
	1	2	3	4	5 and 6	
First-cycle studies	8.2%	10.9%	19.3%	**25.6%**	–	14.0%
Second-cycle studies	27.3%	**34.2%**	–	–	–	30.9%
Long-cycle studies	4.9%	5.1%	19.0%	15.8%	**41.20%**	18.8%

Source: the "Research Activity of Students" study.

Table 8. Type of higher education institution and implementation of independent research projects

Did they carry out their own project?	Type of institution				Total
	university	Technical university	public vocational college	Other	
Yes	22.0%	**25.1%**	11.2%	15.5%	19.9%
No	78.0%	74.9%	**88.8%**	84.5%	80.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Students" study.

In summary, students undertake research projects through several distinct pathways. One of the most important is **participation in student research societies**, where, under the supervision of a supervisor or an academic mentor, students undertake a variety of initiatives, from constructing a Mars rover and launching rockets to conducting sociological research or analysing students' use of artificial intelligence. Another pathway involves projects carried out within **research conducted by academic staff, in which undergraduates and postgraduates participate as collaborators**. Such collaboration may result in academic publications, including articles, monographs or research reports. Research projects may also originated from **calls for collaboration**, to which undergraduates and postgraduates can apply.

The implementation of such projects is supported at several levels. Undergraduates and doctoral students can benefit from substantive **support provided by academic supervisors, including** mentoring, consultations and access to knowledge and research methodologies. **Financial support** is also available through internal grants for student research societies, funding from the IDUB programme and microgrants for academic staff and student teams. Additionally, **administrative support** is provided.

The level of students' preparedness for undertaking research projects varies. Some students achieve excellent academic results and enjoy academic success, while others require more extensive support in developing their research competences.

This is why incentives and a support system for research projects are so important. One expert explained: "We encourage all our grant recipients to include young people in their teams. In many grants, funding can be allocated, particularly for final-year undergraduates preparing their theses – that is, let's say, master's students' dissertations. We encourage this as widely as possible, obviously, by assigning them research tasks or involvement in research that is accessible and meaningful to them. Naturally, we will expect different things from an undergraduate than from a doctoral student or a young researcher at the highest level. So that is what we do. We encourage such activities in various ways; amongst other things, our internal grants facilitate this. A certain amount can be allocated from them, some funds to support young researchers, activities to employ young researchers, and this also includes students and doctoral students". What matters, therefore, is openness and setting clear objectives, an example of which is the inclusion of students in research work.

II.4.2. Recommendations

Integrating international mobility effectively into degree programmes

It is recommended that periods of study or research abroad be more closely integrated into degree programmes, so that international mobility is not perceived as a factor disrupting the continuity of studies. Particular attention should be paid to improving the recognition of learning outcomes and ECTS credits obtained during mobility periods. Reducing formal barriers may increase students' willingness to participate in international academic mobility.

Developing short-term and project-based forms of student mobility

It is recommended that universities develop mobility opportunities that are easier to combine with study requirements, in particular short-term research, project-based mobility and practical placements abroad. The findings indicate that students are more willing to participate in mobility when it has a clearly defined research purpose, produces tangible outcomes, and involves limited organisational risk. Such solutions may increase student participation in international activities.

Strengthening information and organisational support for international mobility

It is recommended that a system of information and organisational support be developed for students interested in international mobility. This should include clear guidance on available opportunities, application procedures, recognition of learning outcomes, and funding possibilities. Improved support mechanisms can reduce students' uncertainty and facilitate informed decisions regarding participation in mobility programmes.

Involving students early in research projects

It is recommended that universities create opportunities for students to become involved in research projects from the earliest stages of their studies. The survey findings show that participation in research projects increases significantly with both the level and year of study, suggesting the need to open up pathways for participation in research at an earlier stage. Early exposure to research practice can strengthen students' motivation and support the development of their academic research competences.

Strengthening student research societies as the primary environment for initiating student projects

It is recommended that the role of student research societies be further strengthened as the key environment for the development of students' research activity. The findings indicate that participation in student research societies is the most common pathway through which students undertake their own research projects. Support for these organisations should include both stable funding and appropriate substantive and organisational assistance.

Developing mechanisms for involving students in research projects carried out by academic staff

It is recommended that academic staff be systematically encouraged to involve students in their research projects. Such collaboration can provide students with their first meaningful research experience, especially when they are not yet ready and prepared to conduct independent research. Student participation should be developmental in character, rather than being limited to auxiliary tasks.

Reducing barriers to students' participation in research activities

It is recommended that measures be taken to reduce the barriers preventing students from undertaking independent research projects, in particular a lack of knowledge about available opportunities, a lack of ideas and uncertainty regarding how to begin research activity. Short introductory modules, 'how to start research' guides, orientation meetings and easily accessible consultation points may be helpful. This may significantly improve access to research, including students who are not yet involved in student research societies or research teams.

Strengthening financial and administrative support for student research projects

It is recommended that simple and accessible financial support instruments for student research projects be further developed, including microgrants, internal competitions, and dedicated funding for student teams and student research societies. At the same time, administrative procedures associated with the implementation of such projects should be simplified. Reducing formal barriers may increase students' willingness to engage in research and project-based activities.

Introducing a clearer institutional pathway into research activity

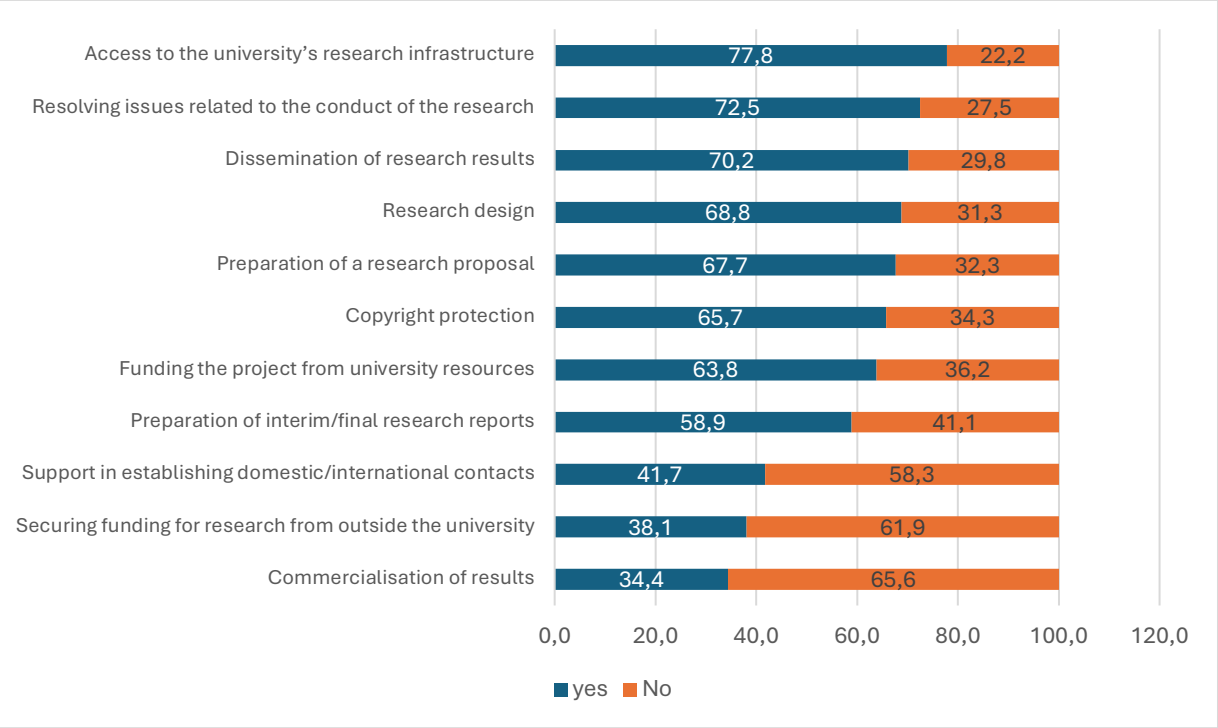
It is recommended that a more clearly defined institutional pathway be created for students to become involved in research activities. This should include clear information on opportunities to participate in research projects, available forms of support, contact persons and potential academic career pathways. The findings indicate that for many students the principal barrier is not a lack of interest but rather a lack of knowledge about whom to contact and how to begin.

II.5. Institutional support for research projects

II.5.1. Analysis of study findings

Nearly half of the students surveyed (46%) stated that they had carried out a research project in collaboration with a university staff member, 30% of respondents had conducted a project under the supervision of a university staff member, and 6% had collaborated with representatives of other academic institutions. By contrast, 19% of students reported having carried out a project independently (either individually or as part of a student team) without any involvement from university staff. Such significant involvement of academic staff in student research projects inevitably translates into institutional support for their implementation, although the findings suggest that this support cannot yet be regarded as fully sufficient.

Fig. 5. Forms of university support for student research projects



Source: the "Research Activity of Students" study.

The most common form of support reported by students undertaking research projects was access to research infrastructure, particularly among students in science, natural sciences, engineering and technology, and medical and health sciences. On the one hand, the high proportion of students reporting university support for research projects in terms of access to university infrastructure resources comes as no surprise.

The implementation of such projects, particularly in fields where this support was most emphasised, **depends on access to laboratories**. On the other hand, it is noteworthy that, one in five students (22%), despite undertaking a research project, **did not have access to research infrastructure**. It is difficult to determine how the project could have been implemented without access to the university's infrastructure resources. In

some cases, students may have had to modify the original scope of methodological initial assumptions of their research project.

To a significant extent, students were also able to rely on the university's support in research design, resolving issues related to its implementation, and preparing academic publications and conference papers based on the research findings.

Furthermore, as many as two in three students undertaking independent research projects reported that they had received institutional support in funding their project. A more significant challenge emerged when a project planned by a student is likely to require greater funding, which can be obtained from external sources. Among those interested in securing such funds, only 38% indicated the university could support them in the application process. The survey results do not allow us to determine to what extent this relatively lower level of support reflects limited demand for such assistance, or an actual shortage of institutional support mechanisms for obtaining external funding.

Despite a substantial proportion of students reporting limited university support in some areas in carrying out a project they had started, only one in four students (23%) experienced certain difficulties during the research project implementation. The most frequently reported obstacles were administrative procedures (65%) and insufficient or absent financial support (60%). These were followed by a perceived lack of institutional interest in the initiative (44%), limited access to research infrastructure (31%), reluctance on the part of academic staff to become involved in the project (25%), and limited willingness to cooperate with external organisations (12%).

II.5.2. Recommendations

Strengthening systemic institutional support for the implementation of student research projects

It is recommended that a more coherent and predictable support system be developed for students carrying out research projects. The survey findings show that, although a significant proportion of students receive assistance from academic staff, this support often depends on the commitment of individual researchers rather than on a consistent institutional framework.



„Support often depends on the individual commitment of particular academic staff members rather than on a uniform institutional model".

Young Science

Ensuring real and equal access to research infrastructure

It is recommended that access to university research infrastructure for students undertaking research projects be improved. Of particular importance here is the establishment of clear and transparent governing the use of laboratories, workshops and other research resources. This would help prevent situations in which students initiate a research project, yet they lack access to the basic infrastructure necessary for its completion.

Expanding institutional support for securing external funding for student research

It is recommended that mechanisms be developed to support students in applying for external funding for research projects. The findings indicate that institutional

assistance in this area is considerably less developed than support for internal funding. Universities should consider expanding consultation services, advisory support, and simplified application instruments to help students navigate the application process.

Reducing administrative barriers to the implementation of student research projects

It is recommended that administrative procedures related to the implementation of student research projects be simplified. The findings show that administrative formalities were among the most frequently reported obstacles encountered by students. Reducing bureaucratic burdens may increase students' willingness to engage in research activities.

Strengthening financial support for student research projects

It is recommended that instruments for funding student research projects be further developed, so that university support is both accessible and proportionate to the scale of the planned projects. Of particular importance are small grants, microgrants and flexible funding schemes that can enable students to undertake more ambitious research projects.

Enhancing academic staff involvement in supporting student research projects

It is recommended that measures be introduced encouraging academic staff to actively support student research projects. This may include both formally recognising this activity within teaching and organisational responsibilities, and fostering a culture of research collaboration between students and academic staff. The findings demonstrate that substantive support from academic staff remains one of the key factors determining the success of student research initiatives.

Developing cooperation with external organisations in the implementation of student research projects

It is recommended that universities strengthen their institutional support for students in establishing cooperation with external organisations. This may include creating clear cooperation pathways, document templates and organisational support for collaboration with external institutions and organisations. Such measures can enhance the practical dimension of student research projects and strengthen their relevance for the socio-economic environment.

Improving communication about available forms of support for student research projects

It is recommended that information on the forms of support available to students undertaking research projects be organised and disseminated more effectively. This applies to infrastructural, financial and administrative support, as well as opportunities to obtain specialist guidance. Greater visibility of the available support mechanisms may reduce the perception of limited institutional interest and increase student engagement.

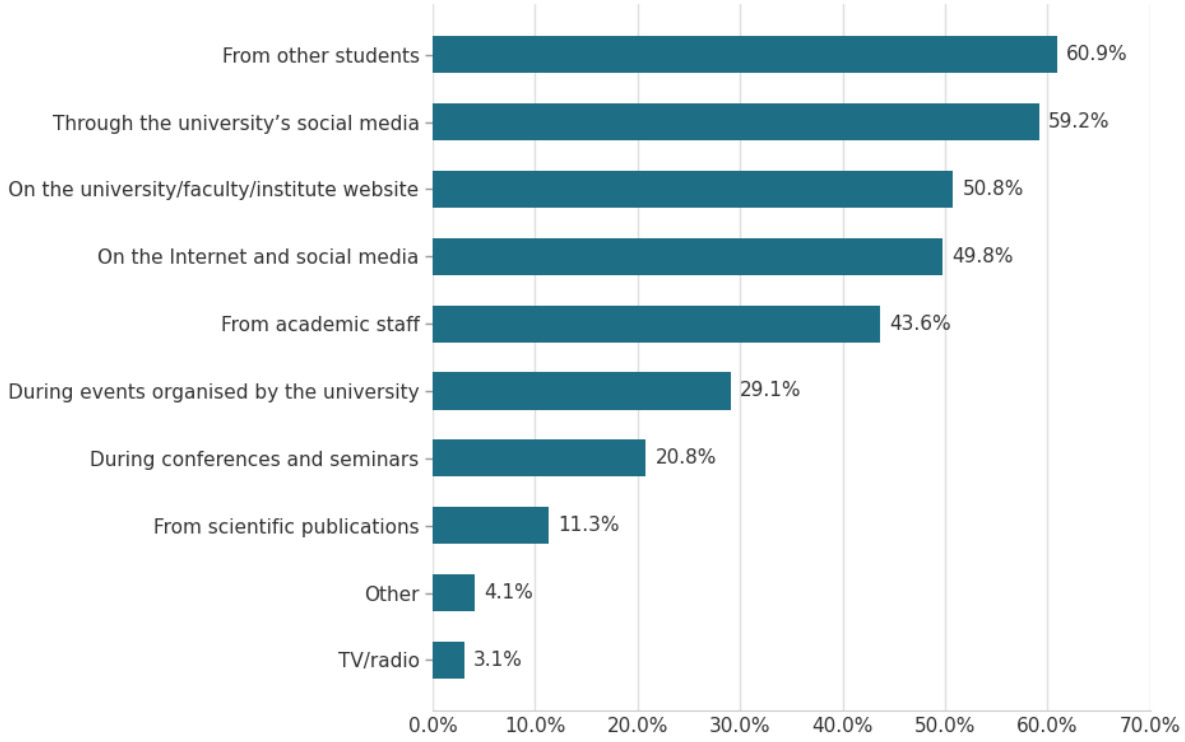
II.6. Communication and visibility of student research

II.6.1. Analysis of study findings

More than half (57%) of the survey participants had encountered information about research projects carried out by other students. While nearly two in three students at universities and universities of technology reported being aware of research activities, only one in three students at public universities of applied sciences did so. This variation is understandable given the different institutional profiles of the universities under comparison (general academic and of applied sciences), and consequently the different opportunities available for student engagement in research activity.

Master's students (64%) were more likely to have encountered information about student research projects than students enrolled in first-cycle and long-cycle programmes (54% each). Once again, a longer period of study at the university clearly translates into a better understanding not only of the educational offer, but also of the academic and research activities undertaken by other students. Information about student research projects also 'reached' students of science and natural science programmes slightly more frequently (68%), and students in the social science programmes relatively less frequently (54%).

Fig. 6. Responses to the question of where respondents encountered information about student research projects



Source: the "Research Activity of Students" study.

The primary sources of information about student research projects are other students and the university's social media, followed by university and non-university websites. This reflects the communication habits of the current student generation

and its strong engagement with digital media. Conversely, conferences, seminars and academic publications were among the least frequently mentioned sources of information on students' research activities, which – given the low level of student interest in this area – seems unsurprising. The situation is somewhat different with regard to academic staff and events organised by the university as sources of information on student projects, which were indicated by 29% and 20% of survey participants respectively. These findings suggest that, particularly in the case of academic staff, the potential for information is not being sufficiently utilised.

II.6.2. Recommendations

Strengthening institutional communication regarding students' research activities

It is recommended that a coherent system of institutional communication regarding students' academic and research activities be developed. Information about projects carried out by students should be regularly published through the university's main communication channels, such as websites, social media and academic newsletters. Increasing the visibility of such initiatives can strengthen students' interest in research activities and enhance the university's image as an environment conducive to academic development.

Harnessing the potential of social media to promote student research

It is recommended that communication activities on the university's social media platforms, which constitute one of the principal sources of information for students, be intensified. Presenting research projects, student achievements or academic initiatives in an engaging and accessible format can increase their visibility and encourage other students to become involved in similar activities.

Strengthening the role of academic staff in disseminating information about research opportunities

It is recommended that academic staff become more actively involved in informing students about opportunities to participate in academic and research activities. Academic staff can play a crucial role in communicating information about research projects, grants or research initiatives during lectures, seminars or meetings with students. Strengthening this role could significantly increase students' awareness of the available opportunities available for academic development.

Developing events promoting student research activity

It is recommended that universities organise events showcasing student research projects, including student seminars, conferences for early-career researchers, project competitions or university science days. These events can provide a platform for exchanging experiences and increase the visibility of student-led research within the academic community.

Creating more transparent channels of information on academic initiatives

It is recommended to organise and standardise communication channels relating to students' research activity. A central information platform or a regular newsletter dedicated to students could facilitate access to information about research projects, competitions, grants or academic events. Reducing the fragmentation of communication can improve the effectiveness of disseminating information to the student community.

Promoting good practices and successful student research projects

It is recommended that examples of successful research projects carried out by students be presented on a regular basis. Showcasing specific achievements, publications or research collaborations can serve as a source of inspiration and

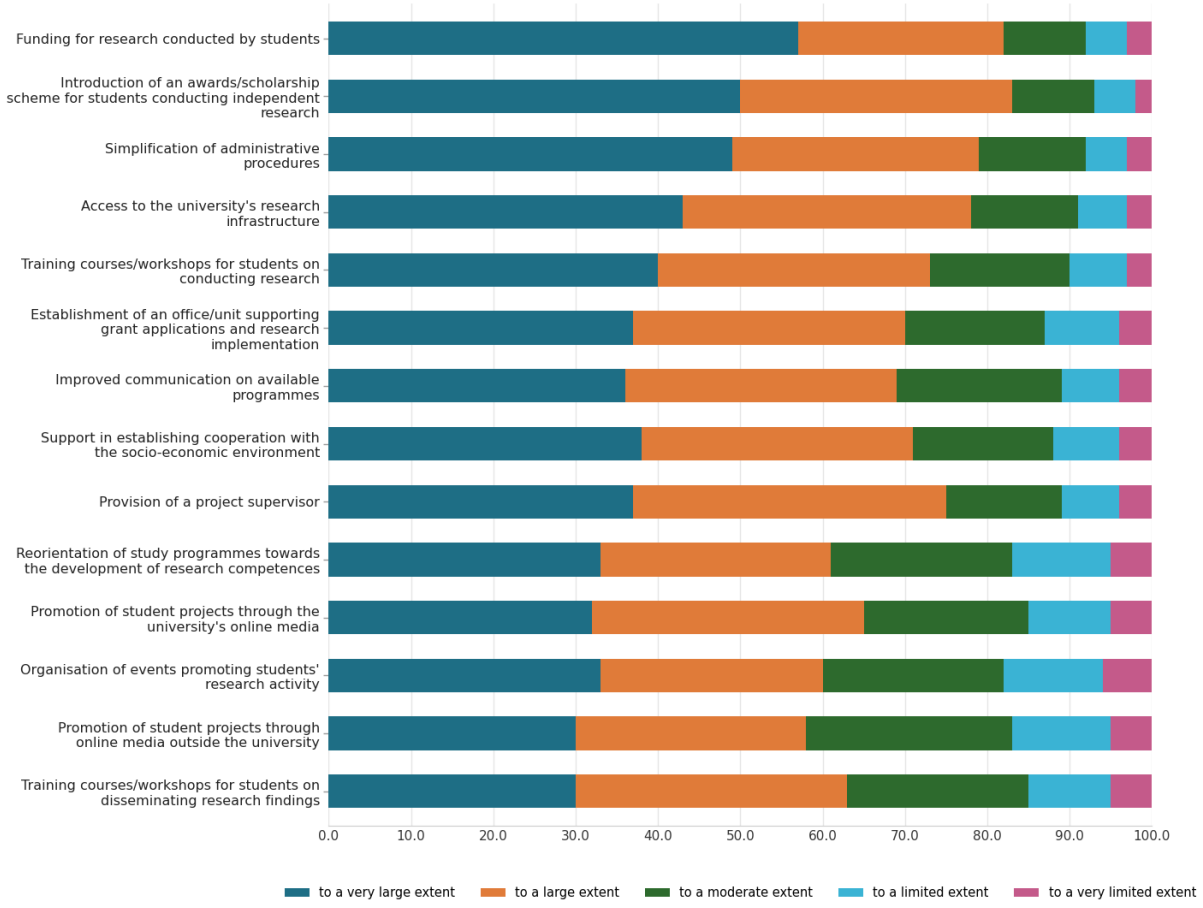
motivation for other students, while strengthening an institutional culture that values and promotes scientific activity.

II.7. Measures to enhance students' research activity

One of the survey questions asked students to assess the extent to which selected university measures could contribute to increasing their research activity. At least half of the respondents rated each of the proposed measures as having the potential to stimulate student research engagement. The highest effectiveness was attributed to measures related to funding students' independent research, introducing a reward system for particularly active individuals, and providing access to the university's research infrastructure. More than 80% of students assessed these measures as having a 'very high' or 'high' potential impact. A similarly high proportion of respondents considered the provision of a research project supervisor to be an important factor enhancing their research activity, particularly in terms of conducting independent research.

By contrast, measures such as organising training sessions, workshops on the dissemination of research findings, events promoting student research projects, or publicising such projects through university and non-university online media were rated relatively lower in terms of their potential to stimulate students' research activity.

Fig. 7. Measures that could potentially contribute to increasing students' research activity



Source: the "Research Activity of Students" study.

Generally, students' assessments of individual measures that could potentially contribute to increasing their research activity do not vary according to their basic characteristics, such as year of study or type of degree programme. Minor differences can be observed among students at universities of technology and, consequently, among those enrolled in engineering and technology programmes, who are somewhat less optimistic about the effectiveness of engaging students through outreach activities or the provision of a project supervisor. However, the factor differentiating students' assessments in this regard is gender: women consistently rate the potential effectiveness of all the proposed measures more highly than men, which could potentially contribute to increasing students' research activity.

II.8. Summary

The study presents a complex picture of students' research activity and the factors influencing their engagement in research. On the one hand, a substantial proportion of students report participation in courses developing methodological competences, and one in five respondents declares having undertaken an independent research project. On the other hand, study programmes relatively rarely include content related to securing research funding, identifying the needs of the socio-economic environment, disseminating research findings or commercialising research results. **This points to a certain gap between preparation for conducting research and effective participation within the academic research ecosystem.**

At the same time, students' research activity varies considerably across the surveyed population. The findings show that engagement in research increases with both the level and year of study: master's students and students in later years are more likely to carry out independent research projects and participate in international mobility. **Academic experience therefore appears to be one of the key factors encouraging engagement in research activity**.

The additional support provided by universities to develop students' research competences remains relatively limited. The most commonly available forms of support include language courses, training related to mental wellbeing, public speaking or copyright protection, whereas courses directly related to research practice, such as research design, research project implementation or the preparation of academic publications, are offered much less frequently. This limits opportunities for students to develop research competences beyond the core curriculum.

Student research societies and collaboration between students and academic staff play an important role in stimulating students' engagement in research activity. In many cases, participation in student research societies or support from academic staff provides the impetus for undertaking a first research project. Students rarely initiate research projects entirely independently. Universities most commonly support student projects by providing access to research infrastructure, assistance with research design, and support in addressing methodological or organisational challenges that arise during project implementation, whereas support for securing external funding is provided less frequently.

The barriers most commonly reported by students include a lack of time, a lack of project ideas, and insufficient knowledge about available research opportunities. Among students in later years, administrative procedures and a lack of institutional support are also reported more frequently. At the same time, students who have undertaken independent research projects rate the support received from the university positively. **This indicates considerable potential for strengthening student research activity through systemic, informational, and organisational measures, in particular by expanding financial support mechanisms, improving communication about research opportunities, and reinforcing the role of academic supervisors.**

Qualitative research also demonstrates that the quality of research training varies substantially across universities and depends on many institutional factors. The type of institution and the characteristics of the academic discipline play a particularly important role. **Large research universities are more likely to offer extensive programmes and institutional mechanisms supporting the development of students' research competences.** Differences are also visible across disciplines: in

the exact and natural sciences, laboratory-based teaching naturally creates opportunities to foster the development of research skills.

The findings further indicate that international student mobility is not a widespread experience, especially when mobility programmes are poorly organised or lack clearly defined objectives. The absence of a structured programme, an academic supervisor or clearly defined research objectives significantly reduces students' interest in participating in such initiatives. In addition, students' decisions are influenced by practical considerations, including the duration of the mobility period, associated costs or the availability of financial support. Students are more likely to engage in international mobility when programmes are clearly defined and offer the opportunity to acquire new research experiences and skills.

The study also indicates that students sometimes perceive participation in research projects as an additional burden, requiring considerable effort, which is not always accompanied by adequate recognition or institutional support. At the same time, the lack of involvement in research projects does not appear to result from a lack of ambition, but rather from organisational barriers and individual pathways within the academic environment. **In this context, the role of mentors, student research society supervisors, and academic staff supporting students in undertaking their first research initiatives is of key importance.**

Institutional communication also remains a significant factor affecting the development of students' research activity. The flow of information regarding research opportunities, available projects or support programmes is often fragmented, and access to such information is frequently limited to selected groups of students, including members of the student union or student research societies. As

a result, a substantial proportion of students remain insufficiently informed about opportunities for academic development.

The findings indicate considerable potential for further strengthening students' research activity. Student research societies play a vital role as incubators of research engagement, providing opportunities for students to gain their first research project experience and become involved in academic life. Strengthening this form of activity, together with developing more transparent communication regarding opportunities, available grants and projects, could significantly increase students' engagement and strengthen their sense of belonging to the academic community. Equally important is the promotion of good practices and diverse academic career pathways, which can encourage students to engage in research and consider future careers in science and research.

III. Support for doctoral students' academic development: study findings

III.1. General remarks

In recent years, the doctoral education system in Poland has undergone profound changes. The reform of higher education and science introduced by the Act on Higher Education and Science (PSWiN) established doctoral schools as the primary form of doctoral education. At the same time, the development of international academic cooperation initiatives, including the European Universities alliance network, has intensified research collaboration, academic mobility and the internationalisation of doctoral education. As a result, doctoral students now operate within an academic environment that offers a wide range of opportunities for scientific development. These include participation in research projects, collaboration with research teams at home and abroad, applying for research funding, and engaging in the commercialisation and dissemination of research results. The range of instruments available to support the scientific development of doctoral students is currently extensive. At the same time, questions continue to be raised within the academic community regarding the extent to which doctoral students actually make use of these opportunities and the effectiveness of institutional mechanisms that support the development of their research activities. In the authors' view, the research potential of doctoral students and the available support instruments are not always fully utilised, which may result from both systemic and organisational factors affecting the functioning of doctoral schools.

In particular, the study sought to determine the extent to which the current model of doctoral education prepares doctoral students to conduct independent research, apply for research funding, commercialise research results and disseminate them.

Another important objective was to establish whether universities provide doctoral students with additional forms of support for the development of research competences, such as training, workshops, mentoring or access to research infrastructure. The study also aimed at identifying barriers that hinder research activity and at examining the views of doctoral students on measures that could contribute to increasing their research activity.

The findings presented later in this chapter provide a better understanding of how doctoral students assess the conditions for conducting research in doctoral schools and which elements of the support system require further development.

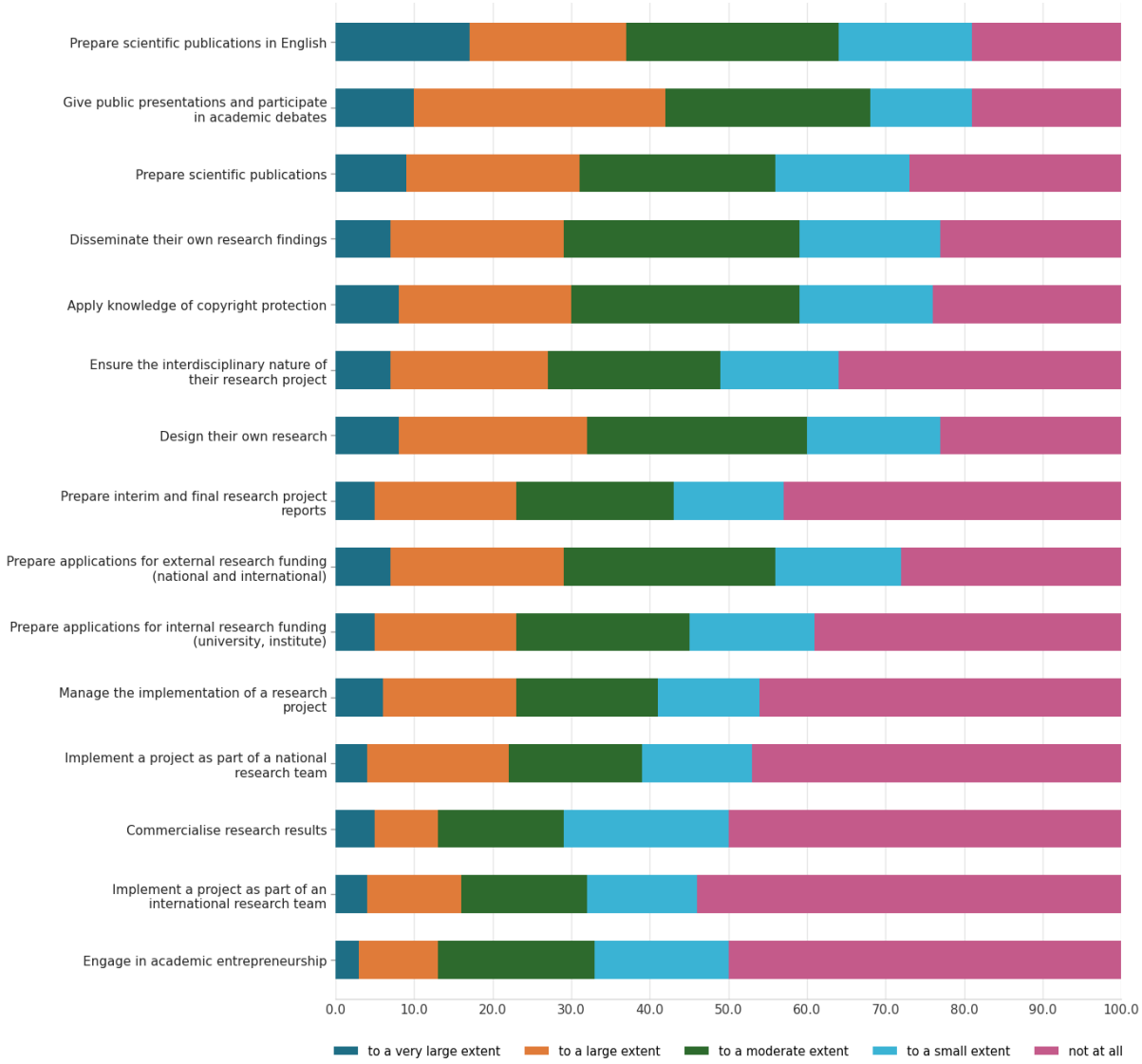
III.2. Doctoral school curricula and the development of research competences

Given the project's primary objective—which is to assess doctoral students' research activity and identify factors that may either facilitate or hinder it —it is appropriate to first examine the extent to which doctoral schools' curricula help students acquire the competences required to carry out independent research projects.

The findings indicate that the majority of respondents assess doctoral school curricula critically with regard to the inclusion of content directly related to research activity.

It is noteworthy that, among the elements of doctoral education analysed in the study, none was identified which, in the opinion of at least half of the respondents, contributed to a very large or large extent to the development of competences and skills related to research activity.

Fig. 8. To what extent does the doctoral school curriculum prepare students to:



Source: the "Research Activity of Doctoral Students" study.

Analysis of the survey results indicates that assessments of the adequacy of doctoral school curricula in preparing doctoral students for research vary depending on both the type of institution and the academic discipline represented.

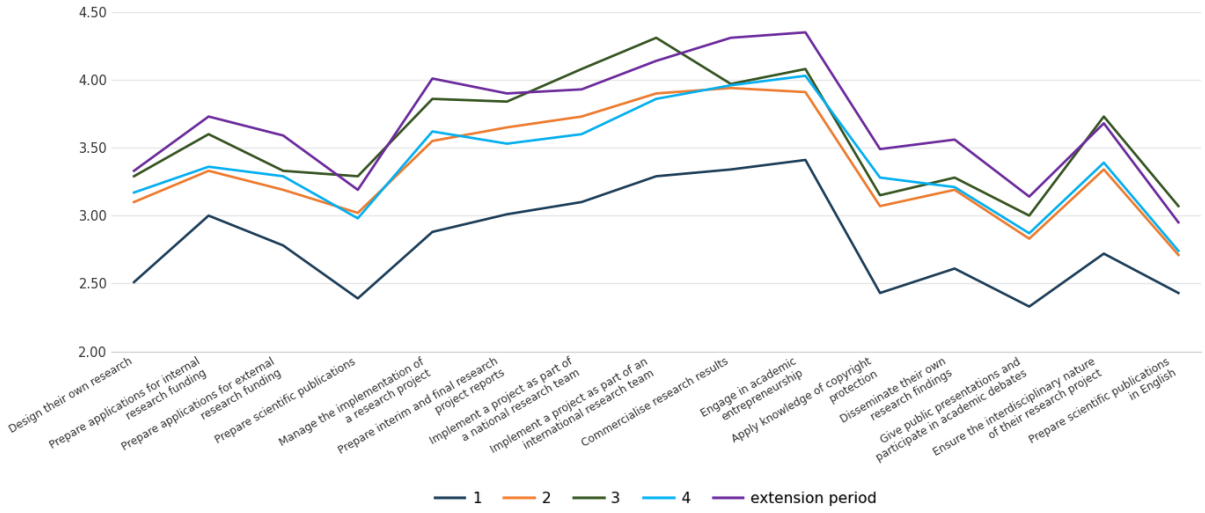
The least critical assessments were expressed by doctoral students studying at universities of physical education, academies of fine arts and universities of economics, i.e. institutions classified in the study under the "other" category.

Conversely, doctoral students at institutes of the Polish Academy of Sciences and universities were the most critical of their study programmes. In the case of doctoral students at PAS institutes, the extent to which study programmes prepare them to acquire competences related to commercialisation of research results and the development of academic entrepreneurship was rated particularly low. Doctoral students at universities, on the other hand, pointed primarily to insufficient preparation for conducting research projects in national and international teams, project management and the preparation of research reports.

Differences in assessments are also visible across fields of science represented. The most critical opinions regarding the adequacy of curricula were expressed by doctoral students preparing their dissertations in disciplines belonging to the fields of arts, humanities and agricultural sciences. While in the case of the first two fields such assessments can be partly explained by the specific nature of the research conducted within them and the distinctive character of academic career pathways, the result observed in agricultural sciences the result is more surprising and cannot be clearly explained on the basis of the available data.

Another factor influencing assessment of the extent to which doctoral programmes prepare doctoral students to acquire the competences and skills necessary for conducting research activity is the year of study in the doctoral school. The figure below presents the profiles of average ratings by year of study.

Fig. 9. Arithmetic mean ratings of the extent to which the doctoral school programme prepares students to acquire skills and competences, by year of study at the doctoral school (1 – to a very large extent, 5 – not at all)



Source: the "Research Activity of Doctoral Students" study.

First, the profiles reveal a high degree of similarity in the assessment provided by doctoral students from different cohorts regarding the extent to which doctoral programmes prepare students to acquire competences and skills across various areas of research activity. The convergence of assessments is particularly evident among second- and fourth-year doctoral students.

In contrast, third-year doctoral students and those who have completed the four-year programme and have been granted an extension of their doctoral studies provide slightly more critical assessments regarding their preparation for research activity. This may be related to the pressure associated with the advanced stage of doctoral dissertation preparation in the case of third-year doctoral students, as well as to a degree of disappointment experienced by those whose doctoral studies had to be extended.

At the same time, first-year doctoral students stand out for their markedly more optimistic assessment of the programmes' capacity to develop the competences

required for academic and research work. Such positive assessments may result from the fact that students at the beginning of their doctoral education tend to evaluate programmes primarily on the basis of declared curricula, course titles and syllabuses, rather than on their own experiences of the programme's implementation.

To deepen the analysis of doctoral students' assessments of their preparation for research activity, the results were examined by fields of science within which doctoral theses are being prepared. The table below presents the arithmetic mean ratings for individual areas of research competence, where 1 indicates a very high level of preparation and 5 indicates no preparation. This allows for a comparison of the assessments of doctoral students representing different fields of science and the identification of areas in which doctoral school curricula are perceived as more or less effective in developing specific research competences.

Table 9. Field of study and the extent to which doctoral school programmes prepare students for:

	Field							
	Humanities	Engineering and technology	Medical and health sciences	Agricultural	social sciences	exact and natural sciences	arts	Total
Designing independent research	3.17	2.97	2.91	3.44	3.06	3.07	3.54	3.10
Preparation of applications for internal research funding	3.43	3.45	3.15	3.76	3.27	3.41	3.77	3.40
Preparation of external grant applications (domestic and international)	3.21	3.38	3.12	3.60	3.17	3.24	3.42	3.26
Management of research project implementation	3.60	3.47	3.38	3.72	3.78	3.53	3.81	3.60
Preparation of interim and final reports on project implementation	3.79	3.41	3.41	3.92	3.75	3.54	3.92	3.62
Project implementation as part of a national research team	4.05	3.55	3.53	3.84	4.02	3.46	4.31	3.71
Project implementation as part of an international research team	4.26	3.78	4.00	4.04	4.17	3.74	4.35	3.95
Research commercialisation	4.05	3.52	3.88	3.72	4.06	3.98	4.23	3.94

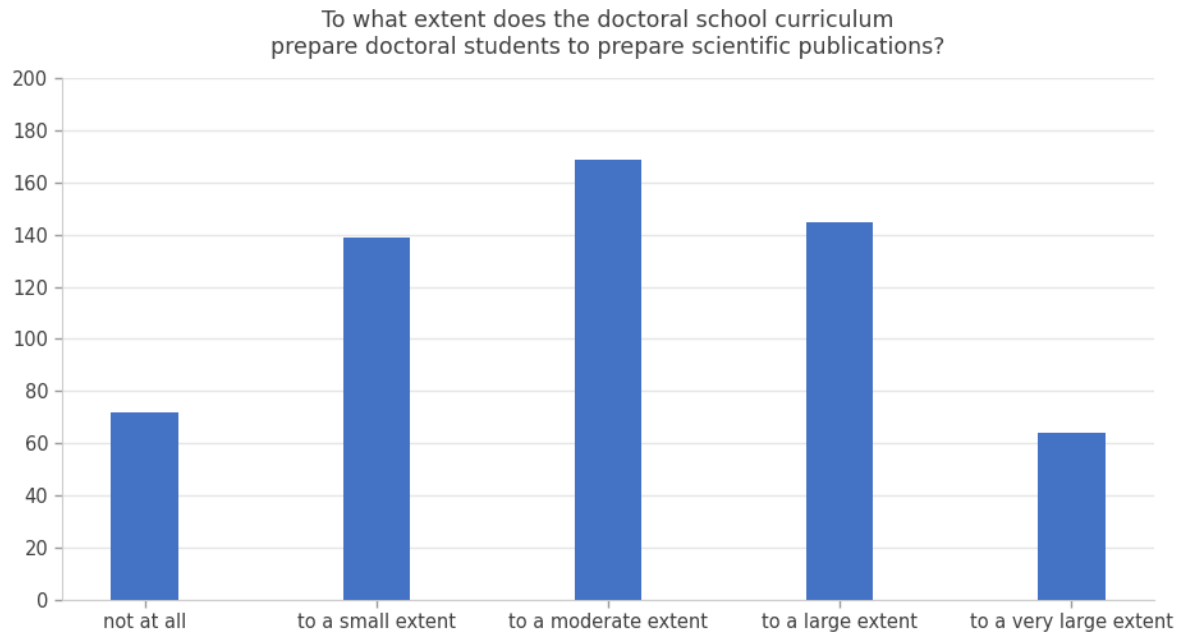
Source: the "Research Activity of Doctoral Students" study.

The remainder of this chapter presents a detailed analysis of selected components of doctoral school curricula in the context of their significance for the development of the competences necessary for conducting research activity.

III.2.1. Academic writing

Doctoral students' assessments regarding preparation for the writing academic publications are relatively diverse. The largest group of respondents indicated a moderate level (28.8%). At the same time, the proportion of positive and negative assessments is almost identical – a total of 35.5% of respondents stated that the doctoral school programme prepares them for writing academic publications to a large or very large extent, whereas 35.8% rate this preparation as minimal or entirely absent (Fig. 10).

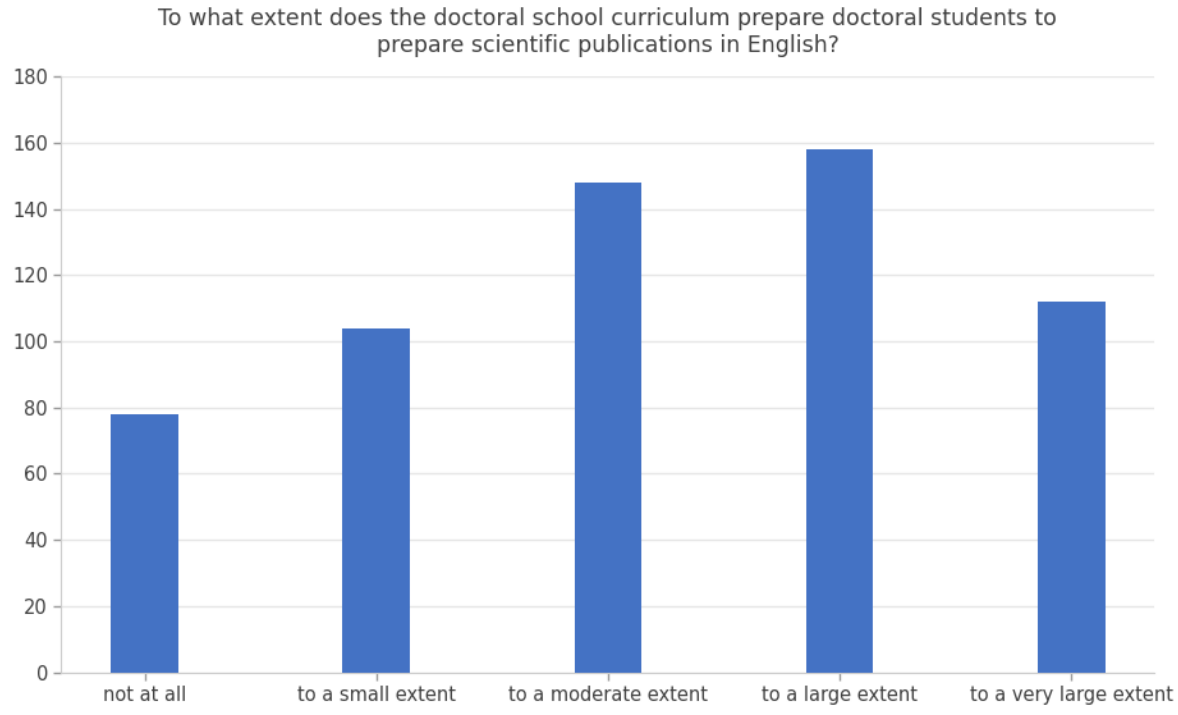
Fig. 10. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to write academic publications



Source: the "Research Activity of Doctoral Students" study.

Assessments of preparation for writing academic publications in English are slightly more favourable. In this case, 45.2% of respondents indicate that the programme prepares them for this to a large or very large extent, while 30.6% assess the level of preparation as low or report that such preparation is entirely absent. The largest share of responses falls into the category "to a large extent" (26.4%), suggesting that competences related to writing academic texts in English are developed more effectively within doctoral programmes than general academic writing skills (Fig. 11). These findings may indicate that aspects related to the internationalisation of academic activity – including publications in English – are emphasised more strongly in doctoral curricula than wider publishing skills.

Fig. 11. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to write academic publications in English

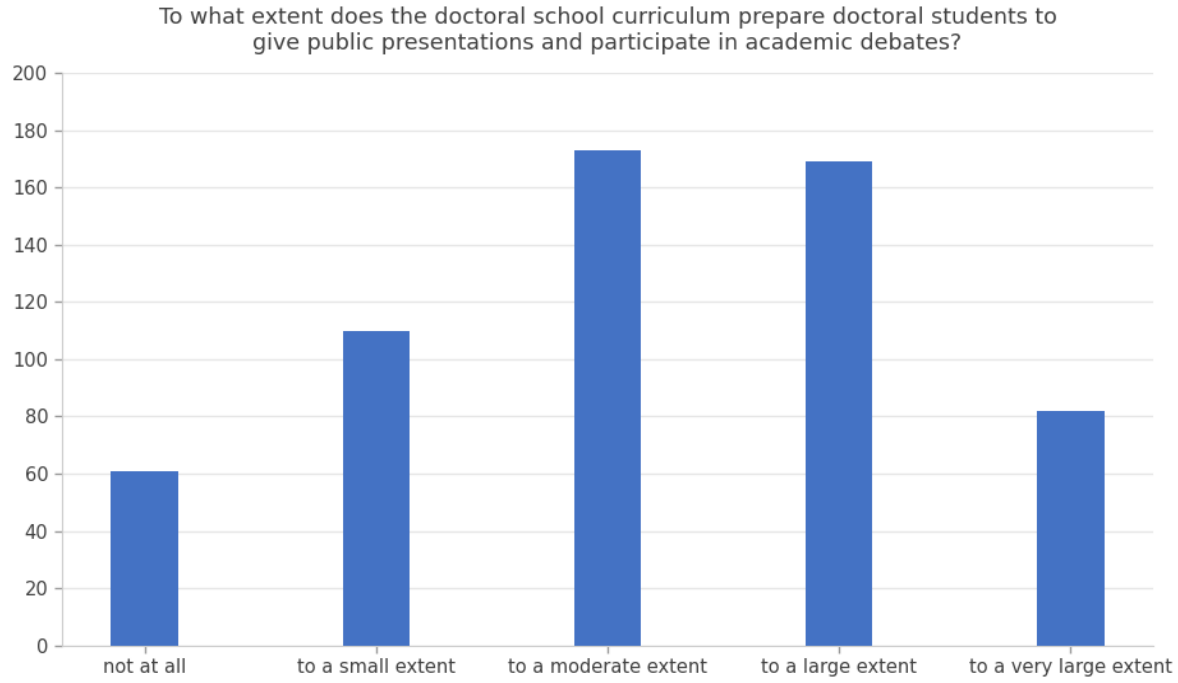


Source: the "Research Activity of Doctoral Students" study.

III.2.2. Public speaking and academic debates

Doctoral students' assessments of their preparation for public speaking and participating in academic debates are relatively positive. The largest group of respondents indicates a moderate level of preparation (29.0%), while the proportion of positive assessments is also substantial: a total of 42.3% of respondents state that the doctoral school curriculum prepares them for public speaking and academic debates to a large or very large extent. At the same time, 28.7% of respondents assess their level of preparation as low or indicate that it is lacking (Fig. 12). These results suggest that competences related to scientific communication and the presentation of research findings are relatively well represented in doctoral school curricula, although a considerable proportion of doctoral students still do not perceive them as being sufficiently developed during their studies. This issue is addressed in detail later in the report in the section on science communication.

Fig. 12. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students for public speaking and participating in academic debates

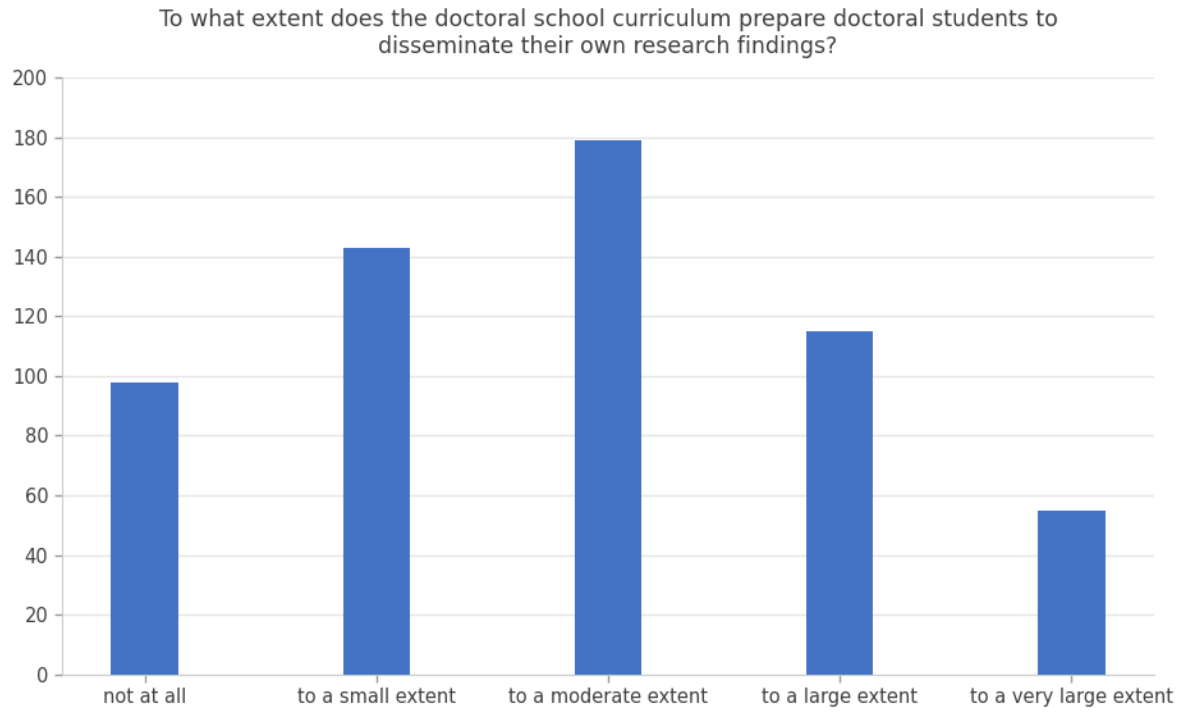


Source: the "Research Activity of Doctoral Students" study.

III.2.3. Dissemination of research findings

With regard to preparation for disseminating one's own research results, respondents' answers vary, although ratings indicating a limited level of preparation predominate. A total of 40.4% of respondents state that the doctoral school programme prepares them for this to a small extent or not at all (144 and 99 responses, respectively). A further 30.0% of respondents (180 persons) assess their level of preparation as moderate, whilst 28.6% of respondents report that it is high or very high (116 and 56 responses, respectively) (Fig. 13).

Fig. 13. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares them to disseminate the results of their own research



Source: the "Research Activity of Doctoral Students" study.

These findings suggest that competences related to scientific communication are more strongly represented within the doctoral education system than those associated with implementation activities, yet they still do not constitute a consistent and widespread educational experience. For a substantial proportion of doctoral

students, such competences remain dependent on local practices within individual doctoral schools or institutions. It is worth noting that in these data, the 'centre of the distribution' (30.0% of mean ratings) is relatively high, which usually indicates that relevant elements are present within the curriculum but are not sufficiently emphasised. Doctoral students are exposed to certain tools (e.g. occasional courses), but these do not build comprehensive capacity in terms of planning dissemination activities, selecting communication channels, developing outreach materials, and conducting communication in a strategic manner. This interpretation is reinforced by the correlation analyses. Doctoral students who report participating in dissemination-related training are considerably more likely to assess their preparedness for promoting research results positively, whereas the absence of such training is associated with a substantially higher share of low ratings. This suggests that a structured training component functions as an infrastructural factor supporting the development of dissemination competences.

Additional interpretative context is provided by the focus group interviews, which point to a *strictly* organisational barrier. This means that even if a university has communication channels, their effective functioning depends on available resources and the efficiency of internal information ("there aren't enough people to do the work", "it's hard to encourage doctoral students to submit their achievements"). This shifts the interpretation from the level of "lack of individual competence" to the level of "absence of an institutional process". Effective research communication requires not only individual skills, but also a consistent institutional workflow encompassing information gathering, editing, approval, publication, and archiving. Without such procedures, communication channels remain irregular and cannot be scaled effectively across the entire doctoral population. Consequently, improvements in

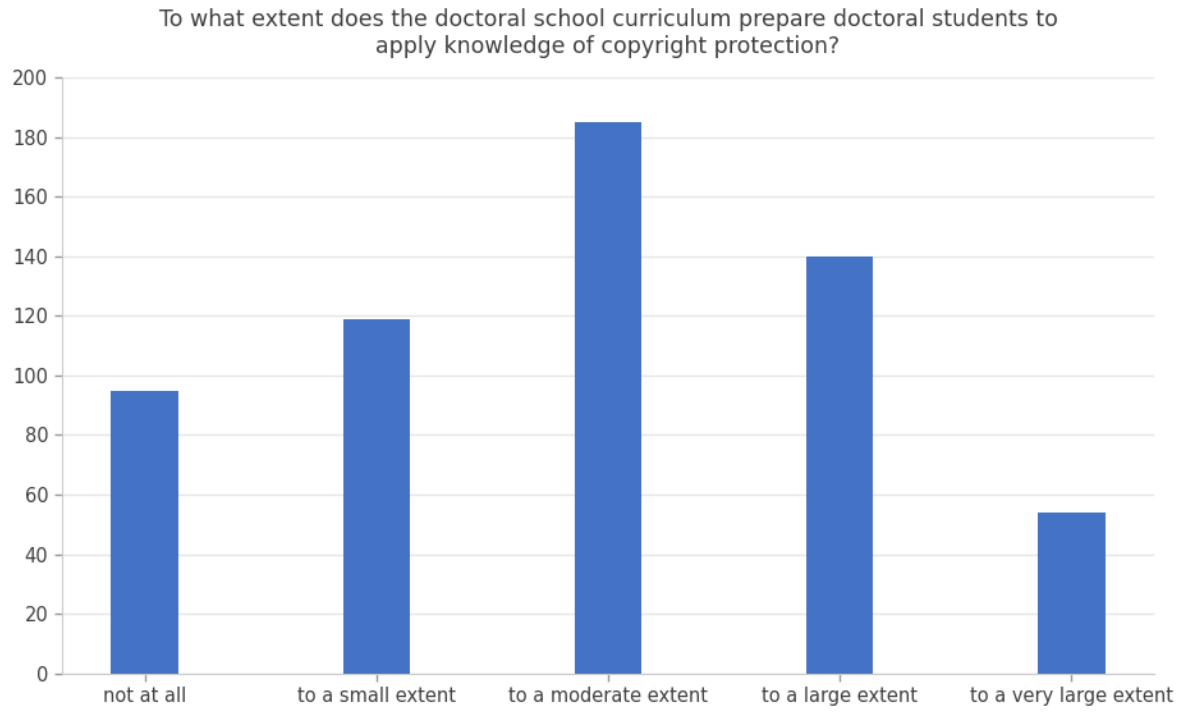
preparation assessments are unlikely to result solely from the introduction of additional courses; they also require the integration of training with communication support and institutional procedures that enable the regular and systematic dissemination of research achievements.

III.2.4. Application of copyright protection

The distribution of assessments concerning preparedness to apply knowledge of copyright protection is clearly polarised. A total of 32.8% of respondents report a 'high/very high' level, 30.9% indicate a 'moderate' level, and 35.8% assess their preparedness as 'low/none at all' (Fig. 14). This distribution suggests that legal issues are present in doctoral school curricula, but do not translate into a widespread sense of confidence in applying copyright protection in practice. A substantial proportion of doctoral students do not perceive themselves as possessing the competence required to apply this knowledge independently in real academic contexts. In terms of curriculum design, these findings suggest that legal content is delivered in a fragmented manner (e.g. one-off sessions, a general overview of regulations), without systematic engagement with situations typical of doctoral studies and academic work. Copyright competence is inherently practical: it involves not only an understanding of the fundamentals of the law, but also the ability to identify risks and make informed decisions in specific contexts (e.g. co-authorship arrangements and attribution of contribution, publishing licences, the use of third-party materials in publications and presentations, rights relating to images/photographs/data, preparation of teaching and public engagement materials). Where doctoral curricula fail to connect legal knowledge with authentic cases studies and institutional procedures (model agreements, recommended licencing practices, and access to legal consultation), doctoral students may remain at the level of declarative knowledge. This is reflected

in the relatively high proportion of 'low/none' ratings observed in the survey. The distribution of these responses is also significant for other areas analysed. Limited confidence in the application of copyright protection may constrain both science communication (e.g. concerns about potential infringement when publishing content online) and collaboration with the wider community (e.g. uncertainty regarding the circulation of information and ownership of research results). In this sense, insufficient legal competence may become a limiting factor for activities outside the traditional academic pathway, even where doctoral students have strong presentation skills or experience in academic publishing.

Fig. 14. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to apply knowledge of copyright protection



Source: the "Research Activity of Doctoral Students" study.

III.2.5. Fostering interdisciplinarity in research projects

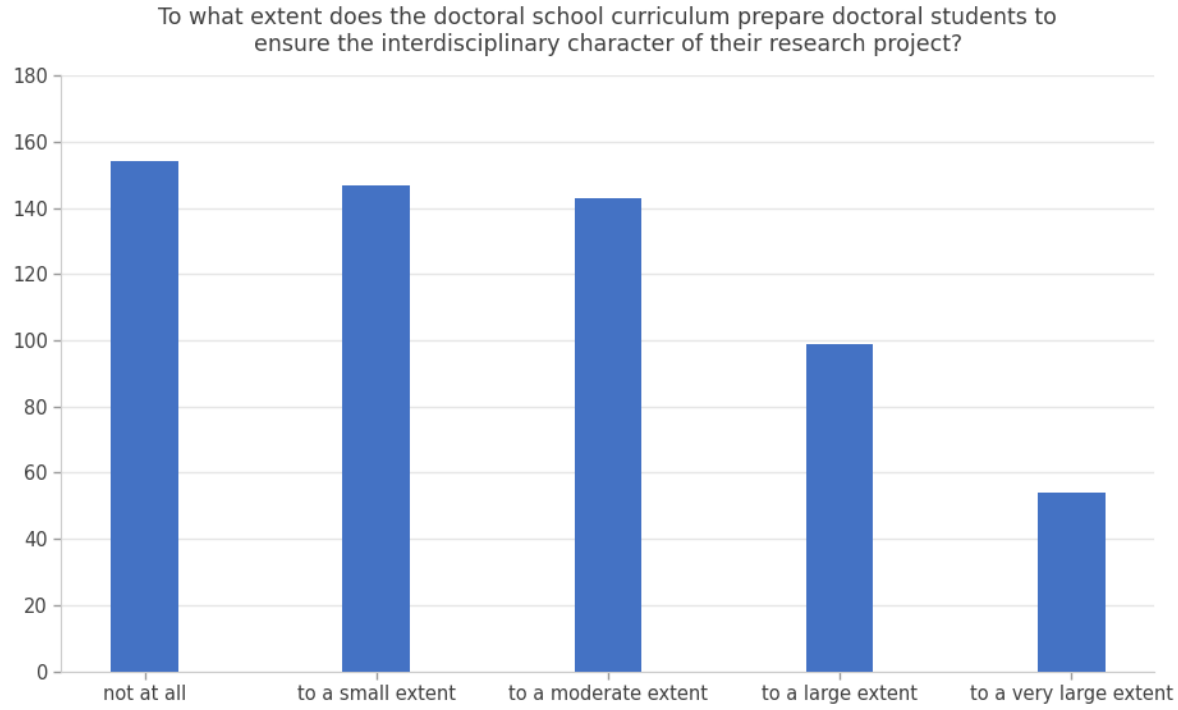
Doctoral students' assessments of their preparation for ensuring the interdisciplinary character of their research projects are less favourable than those presented in the preceding sections. Over half of the respondents (50.3%) indicate that the doctoral school curriculum prepares them for this to a small extent or not at all.

Only 25.8% of respondents rate the level of preparation as high or very high, while almost one in four respondents indicate a moderate level (23.9%) (Fig. 15). These findings suggest that, although interdisciplinarity is widely recognised as a defining feature of contemporary scientific research, doctoral programmes do relatively little to develop the competences required to conduct interdisciplinary research effectively.

The distribution of responses may indicate that, although interdisciplinarity is frequently emphasised in contemporary research policy and organisation, in practice it is not always reflected in doctoral school curricula. The implementation of interdisciplinary projects requires not only collaboration across disciplinary boundaries, but also appropriate methodological and organisational competences that enable the integration of diverse research perspectives.

The findings of the study may suggest that, in many cases, the development of interdisciplinary competences depends more on doctoral students' individual initiative and their collaboration within research teams than a systematically designed educational process within doctoral schools.

Fig. 15. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to ensure the interdisciplinary character of a research project

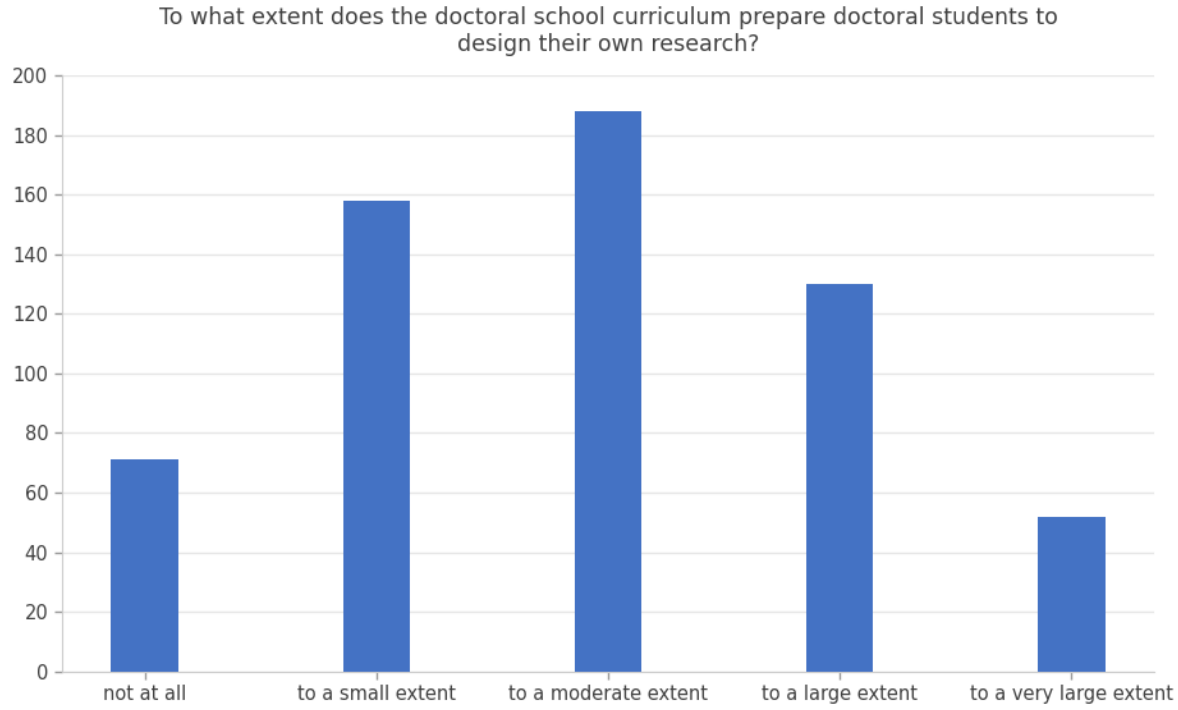


Source: the "Research Activity of Doctoral Students" study.

III.2.6. Research design

The distribution of responses obtained in the quantitative study to the question of the extent to which the doctoral school curriculum prepares students to design their own research exhibits a pattern similar to that observed in the previous section, with a predominance of moderate assessments.

Fig. 16. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to design their own research



Source: the "Research Activity of Doctoral Students" study.

A total of 30.3% of respondents report a high level of preparation ("to a large extent" – 22.1% and "to a very large extent" – 8.2%), with the dominant response category being "moderate" (31.9%). The proportion of extremely negative assessments ("not at all") amounts to 12.4% (Fig. 16). This shift indicates that doctoral students perceive a gap regarding the development of one of the core research competences, namely the independent design of scientific research. This competence is therefore not perceived as being developed systematically and consistently throughout the doctoral school programme.

Cross-tabulation by type of institution reveals some institutional variation. The highest proportions of positive assessments are observed among doctoral students at institutes of the Polish Academy of Sciences (PAN) and in other higher education

institutions, whereas universities of technology show a relatively high proportion of 'to a small extent' responses (35.4%). Universities are characterised by a more balanced distribution of responses, although moderate ratings remain prominent. From the perspective of supporting early-career researchers, these findings suggest that the methodological component of training is relatively stable.

The qualitative study shows that support in this area does exist, but it is rather fragmented and ad hoc. The respondents report that research design and external grant applications are addressed in selected courses, frequently linked to the preparation of applications for competitions organised by the National Science Centre, but they are not common practice.

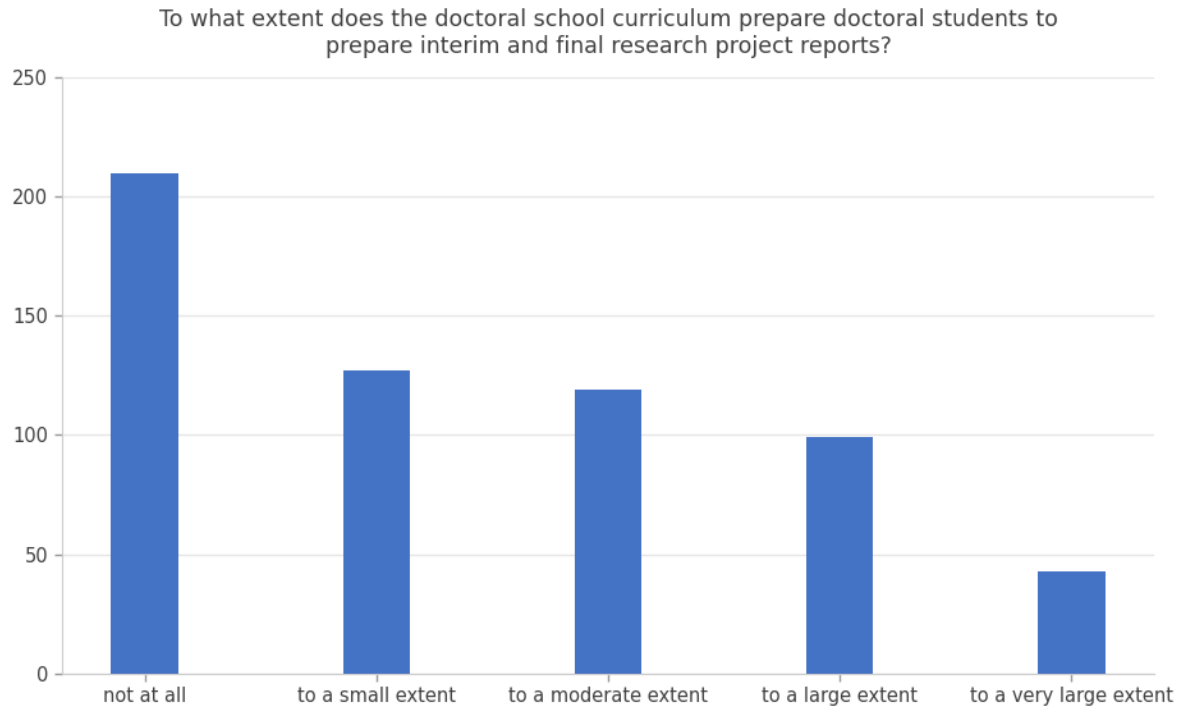
As respondent X6 from the doctoral school of medical sciences noted, courses on research design are optional and are taught by a lecturer who discusses the topic primarily through the lens of their own research experience. Despite their optional character, these courses are highly popular among doctoral students: "around 60 people registered and attended these lectures, so there is a great deal of interest".

Taken together, the quantitative and qualitative findings indicate that doctoral students have the opportunity to receive support in research design, yet this support often results from additional initiatives, the commitment of individual lecturers, and the personal initiative of the doctoral students rather than from a coherent curricular structure. Consequently, doctoral curricula appear to include methodological and theoretical components, but they do not integrate them in a way that would make independent research design a central and systematically developed research competence.

III.2.7. Drafting interim and final reports

One of the key challenges in the implementation of externally funded research projects is the proper preparation of interim and final reports. The findings concerning preparation for the drafting of interim and final reports on project implementation indicate a substantial competence gap in this area. A total of 57.6% of respondents assess their level of preparedness as low ('not at all' – 36.6% and 'to a small extent' – 21.0%), while only 23.8% report a high level ('to a large extent' – 16.8% and 'to a very large extent' – 7.0%). The most frequently selected response category is "not at all", suggesting that project reporting – a key component of grant accountability – is not a systematically reinforced component of doctoral school curricula (Fig. 17).

Fig. 17. Responses from participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to draft interim and final project reports



Source: the "Research Activity of Doctoral Students" study.

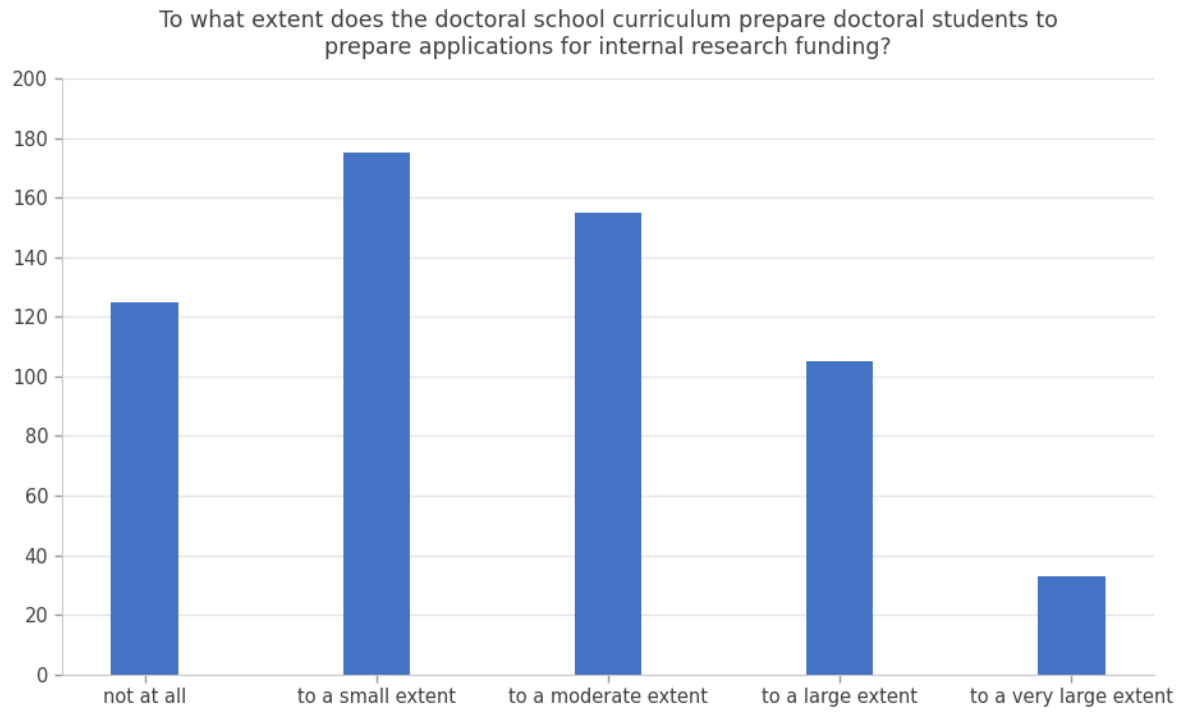
Cross-tabulation by type of institution reveals considerable variation: the most critical assessments are reported by doctoral students at universities (40.8% selected the

response "not at all"), whereas doctoral students at institutes of the Polish Academy of Sciences (PAN) and other higher education institutions report relatively higher levels of preparation (higher percentages of "to a large extent" and "to a very large extent" responses). These differences indicate that competences related to project reporting are not developed in a uniform and systematic manner, but rather depend on the institutional environment. From the perspective of supporting early-career researchers, this represents a potential limitation on their preparedness to independently manage and account for research projects funded from national and international sources.

III.2.8. Preparation of external and internal grant applications

Doctoral students' assessments of their preparation for drafting research funding applications indicate a relatively limited level of institutional support in this area. With regard to applications for internal funding, more than half of the respondents (50.3%) report that the doctoral school programme prepares them for this to a small extent or not at all. Only 23.8% of respondents assess their level of preparation as high or very high, while 25.8% indicate a moderate level (Fig. 18).

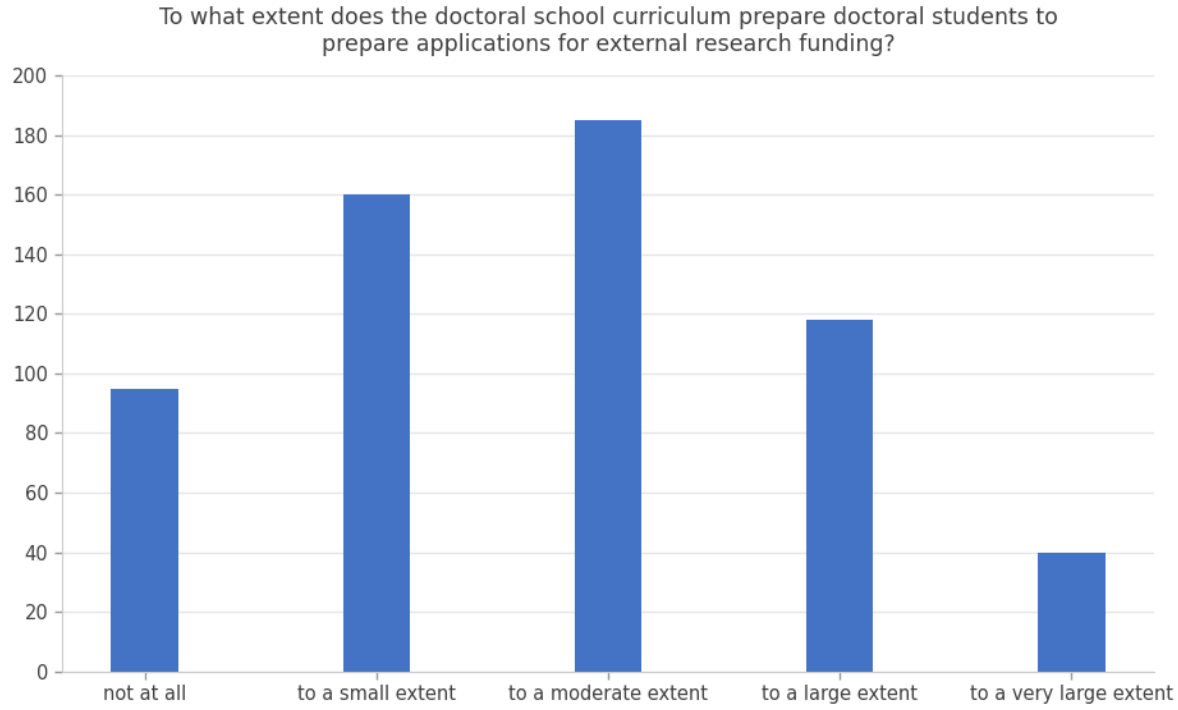
Fig. 18. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares them to draft applications for research funding from internal sources



Source: the "Research Activity of Doctoral Students" study.

Assessments regarding preparation for drafting grant applications from external sources, both national and international, are slightly more favourable. In this case, 26.5% of respondents state that the doctoral school programme prepares them for this to a large or very large extent, whilst 42.5% assess their level of preparation as low or indicate that such preparation is entirely absent. The most frequently selected response category is "to a moderate extent" (30.8%) (Fig. 19).

Fig. 19. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares them to draft applications for research funding from external sources



Source: the "Research Activity of Doctoral Students" study.

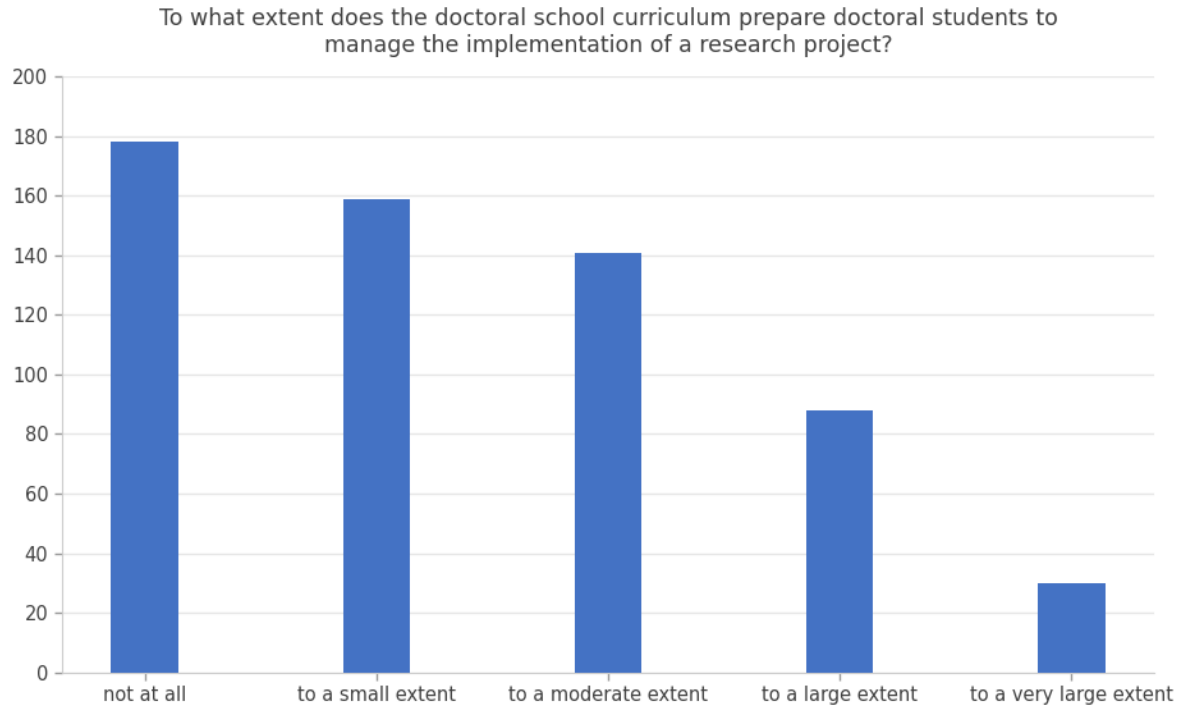
The findings suggest that, although the ability to prepare grant applications is one of the core competences required for a contemporary academic career, it is not always developed systematically within doctoral school curricula. In practice, experience in preparing grant applications is often acquired through participation in research projects conducted by research teams or through doctoral students' individual initiatives, rather than through formal curriculum components.

III.2.9. Research project management

The results indicate that doctoral school curricula are perceived as providing insufficient preparation for managing research projects. A total of 57.5% of respondents report a low level of preparation for research project management ("not at all" or "to a small extent"), while only 21.2% provide positive assessments ("to a large extent" or "to a very large extent") (Fig. 20). This indicates a substantial

competence gap in research project management, which is crucial for developing early-career researchers' grant independence. Cross-tabulation by type of institution indicates considerable institutional variation. The most critical assessments are reported by doctoral students at universities, while relatively higher levels of preparedness are reported at institutes of the Polish Academy of Sciences (PAN) and other higher education institutions. This suggests that there is no uniform and widely adopted model of project management training across doctoral schools, and that the quality of support is heavily dependent on the institutional environment. These findings point to a clear need to strengthen the formal and structured components of project management within doctoral school curricula.

Fig. 20. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students to manage the implementation of a research project

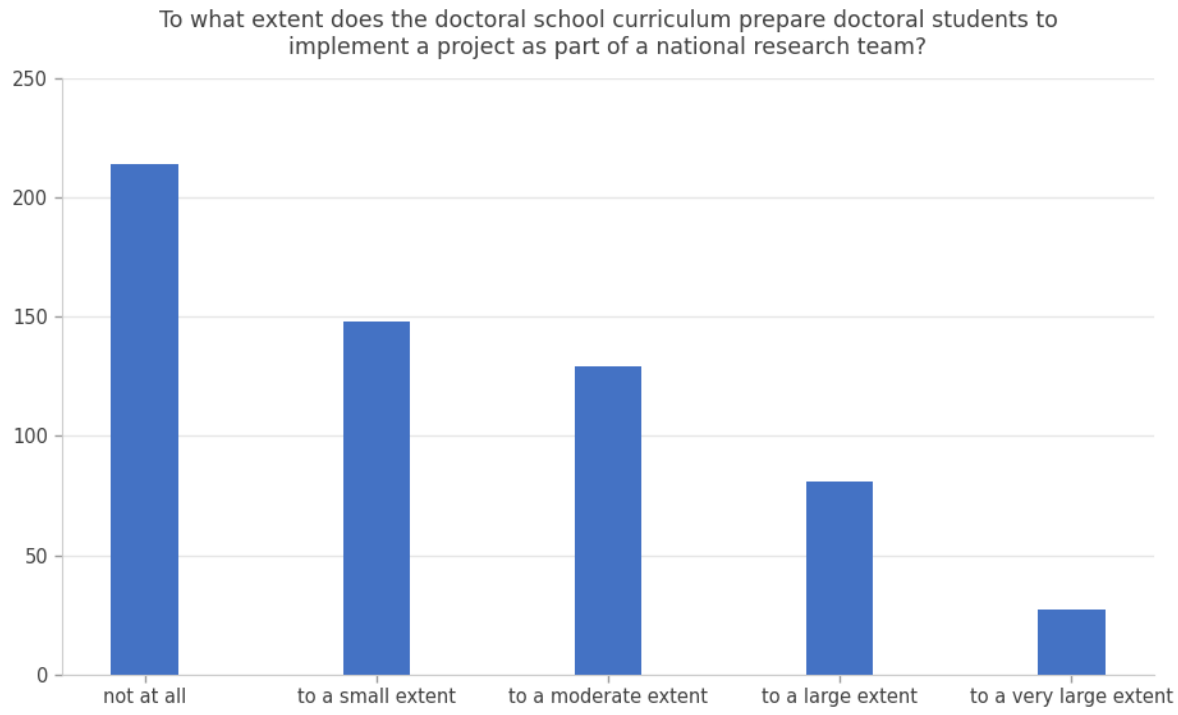


Source: the "Research Activity of Doctoral Students" study.

III.2.10. Project implementation within the research team

The results concerning preparation for project implementation within national research teams indicate a clear deficit in collaborative research competence. As many as 60.2% of respondents assess their level of preparation as low ('not at all' – 37.4% and 'to a small extent' – 22.8%), while only 19.3% rate it as high ('to a large extent' – 14.9% and 'to a very large extent' – 4.4%). The most frequently selected response category is "not at all", suggesting that competences related to collaborative project work within research teams are insufficiently embedded in doctoral school curricula (Fig. 21).

Fig. 21. Responses from participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students for project implementation within a national research team



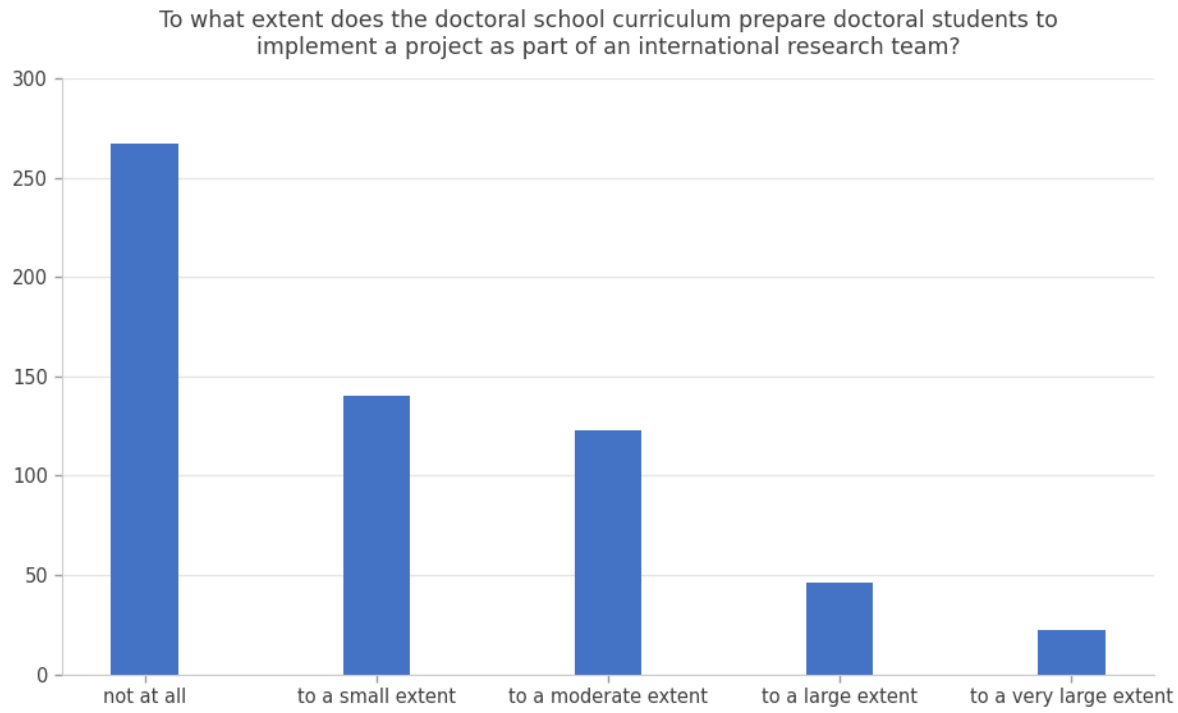
Source: the "Research Activity of Doctoral Students" study.

Cross-tabulation confirms institutional variation: the most critical assessments are reported by doctoral students at universities (42.0% "not at all"), whereas relatively

higher levels of preparation are observed at institutes of the Polish Academy of Sciences and other higher education institutions (higher percentages of "to a large extent" responses). Universities of technology, on the other hand, are characterised by a relatively high proportion of "to a small extent" responses (26.6%). From the perspective of supporting early-career researchers, these findings indicate insufficient development of project work competences within national research consortia, which may limit doctoral students' preparedness to work within team-based grant structures and to build national research partnerships.

The results regarding preparation for project implementation within international research teams indicate one of the most significant shortcomings identified in the study. In total, as many as 67.4% of respondents rated the level of preparation as low ("not at all" – 45.3% and "to a small extent" – 22.1%), while only 13.1% report a high level of preparation ("to a large extent" – 9.1% and "to a very large extent" – 4.0%). The predominance of the 'not at all' response suggests that the internationalisation component of project practice is not systematically embedded in doctoral school curricula, despite the growing importance of collaborative projects carried out within international consortia (Fig. 22).

Fig. 22. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students for project implementation within an international research team



Source: the "Research Activity of Doctoral Students" study.

Cross-tabulation confirms that the problem is widespread, although its severity varies across institutions. The most critical assessments are reported by doctoral students at universities (49.8% "not at all"), while relatively higher – though still low – indicators of preparedness are observed at institutes of the Polish Academy of Sciences and other higher education institutions (higher proportions of "to a large extent" and "to a very large extent" responses). Universities of technology also display a high proportion of negative assessments (40.5% "at all"). From the perspective of supporting early-career researchers, these findings indicate insufficient development of competences required for collaboration in international environments, which may limit doctoral students' ability to participate effectively in projects funded from European and international sources.

III.2.11. Research commercialisation

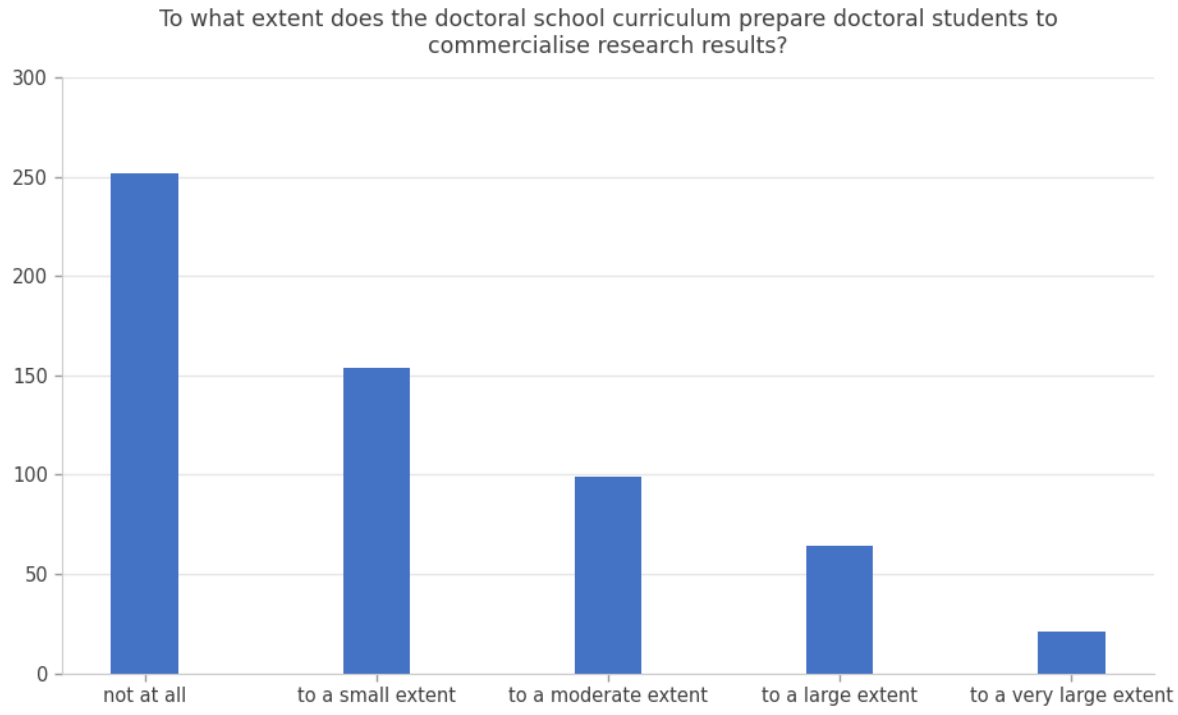
Assessments of preparation for commercialisation of research results are clearly unfavourable. As many as 42.3% of respondents (254 individuals) reported that the doctoral programme did not prepare them at all for activities related to commercialisation of research results, while a further 25.8% (155 individuals) assess the level of preparation as low. Consequently, 68.1% of respondents perceive their preparation in this area as insufficient. Only 15.0% of respondents assess their level of preparation as "high" or "very high" (66 and 24 responses, respectively) (Fig. 23).

This response pattern is characteristic of a situation in which commercialisation is not embedded within a coherent process pathway – covering successive stages from identifying the application potential of research results, through intellectual property issues, to the validation of the solution and the selection of an implementation model – but instead appears as a set of fragmented issues addressed only sporadically within the curriculum[13] . OECD analyses indicate that effective knowledge transfer between academia and the economy depends on a complementary set of financial, regulatory and organisational instruments, and that fragmentation and isolated implementation reduce the overall effectiveness of the system while increasing its complexity from the perspective of researchers. Research on the development of transferable skills demonstrates that the most effective educational approaches are based on practical experience and learning by doing rather than on the transmission of theoretical knowledge alone.

13 https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/04/science-industry-knowledge-exchange_de2b8676/66a3bd38-en.pdf

In this context, the low level of preparedness for commercialisation may reflect a lack of practical educational components and limited access to institutional support mechanisms, such as technology transfer centres, consultations on intellectual property protection, or *proof-of-concept* instruments. These findings also confirm that the quality of the university's institutional ecosystem and the effectiveness of specialised technology transfer units significantly influences doctoral students' propensity to engage in commercialisation and implementation activities. Preparation for commercialisation therefore appears to depend largely on the functioning of the entire institutional support ecosystem, rather than on curricular content alone[14] .

Fig. 23. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students for the commercialisation of research results



Source: the "Research Activity of Doctoral Students" study.

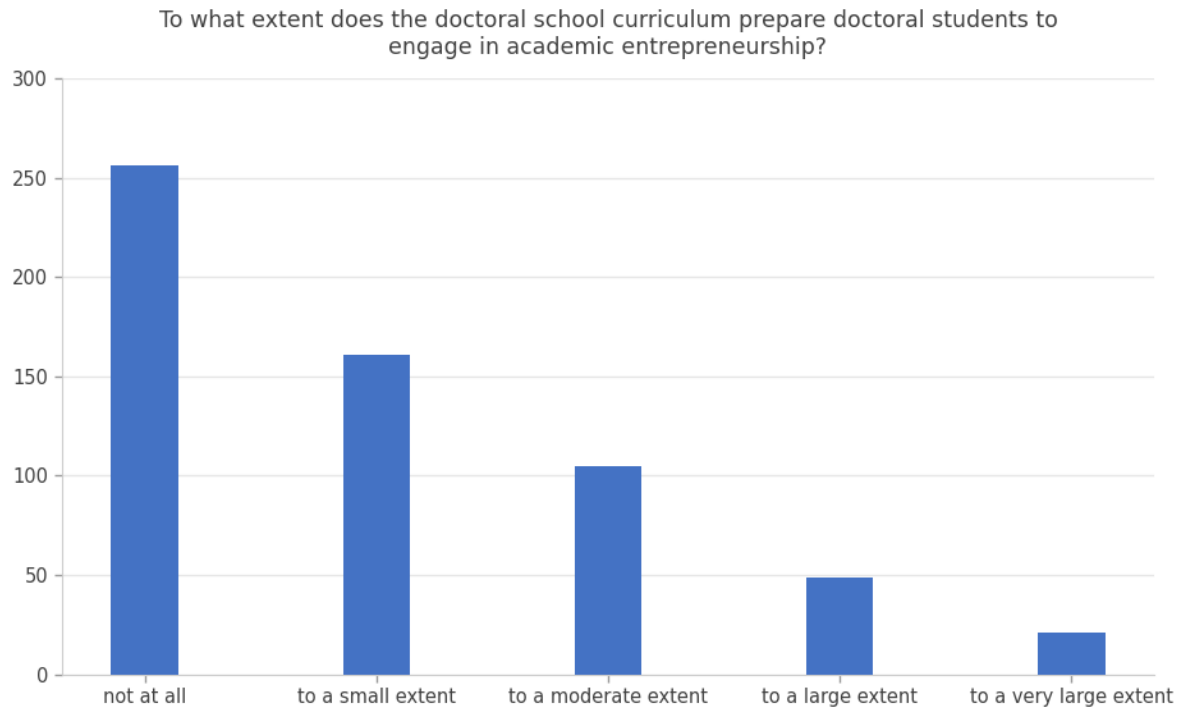
[14] https://www.sciencedirect.com/science/article/abs/pii/S0048733311000916

III.2.12. Academic entrepreneurship

The assessment of doctoral students' preparation for developing academic entrepreneurship is almost a mirror image of their assessments regarding preparation for commercialisation of research results. In this area as well, perceptions of insufficient preparation within the doctoral school programme clearly predominate. As many as 42.8% of respondents (257 individuals) report that the doctoral programme does not prepare them at all for undertaking entrepreneurial activities, while a further 27.0% (162 individuals) rate the level of preparation as low. Consequently, 69.7% of respondents perceive their preparation in this area as insufficient (Fig. 24). Such a high proportion of negative assessments suggests that academic entrepreneurship is not recognised by doctoral students as a competence developed systematically within doctoral education. Rather, it is treated as an optional area that depends heavily on local institutional conditions. In practice, this pattern of responses usually indicates the absence of a coherent 'competence pathway' based on action-oriented learning and the development of one's own projects, encompassing activities such as developing a business idea, validating a solution, selecting a collaboration or commercialisation model, and obtaining legal and financial support. Parallel findings concerning the availability of training opportunities and of financial support instruments reinforce this interpretation. Where the curriculum provides only limited preparation, and the institutional ecosystem lacks clear support mechanisms, academic entrepreneurship becomes a pathway associated with high risk and significant transaction costs for doctoral students. Cross-sectional analyses also show that support for entrepreneurial activities – particularly in the area of funding start-up initiatives – is considerably stronger at universities of technology and natural sciences, while it is weakest at institutes of the Polish Academy of Sciences. This suggests that the extent to which academic entrepreneurship is

'embedded' in the educational process depends primarily on the type of institution, rather than a common standard applicable across the entire system. Consequently, the result obtained – 69.7% of responses reporting a low level of preparation – can be interpreted a as an indicator that, at the national level, academic entrepreneurship remains one of the least structured components of the competences associated with the so-called third mission of universities. .

Fig. 24. Responses of participants in the quantitative survey to the question of the extent to which the doctoral school curriculum prepares students for academic entrepreneurship



Source: the "Research Activity of Doctoral Students" study.

III.2.13. Recommendations

Based on the findings presented above, the following recommendations can be formulated with regard to improving doctoral school curricula in the area of research-related competences.

Introducing compulsory courses on research design

It is recommended that a comprehensive compulsory module on research design be incorporated into the curriculum, covering both methodological and practical aspects of research, including problem formulation, methodological choices, research planning, scheduling and budgeting.

Preparing systematically for the comprehensive implementation of a research project

It is recommended that a coherent educational model be introduced that covers all stages of a doctoral research project, from research design, through securing funding, to project management and financial reporting.

Expanding the practical dimension of training on research funding

It is recommended that courses on research funding be expanded in both scope and practical orientation. Training should be based on real grant applications and the experiences of successful grant holders, with sufficient time allocated for in-depth discussion of various issues.

Integrating research design with external funding

It is recommended that research design be systematically integrated with the issue of external funding. Courses should integrate research design with the preparation of grant applications (e.g. for National Science Centre competitions), so that doctoral students perceive these areas as complementary components of a single research process.

Replacing ad hoc initiatives with a coherent educational pathway

It is recommended that fragmented and ad hoc initiatives be replaced with a coherent educational pathway. Research design should not be addressed only in isolated

courses or optional initiatives, but should form a logically structured, multi-stage component of doctoral education developed over successive years of study.

Capitalising on doctoral students' high level of interest

It is recommended to capitalise on doctoral students' high level of interest in additional educational activities. High attendance at optional courses indicates a genuine need and motivation among doctoral students. It is worth harnessing this potential by transforming existing optional initiatives into the permanent curriculum.

Involving practitioners with grant experience

It is recommended that courses be taught by researchers with substantial grant experience. It should become standard practice for courses to be conducted by individuals with experience in carrying out research projects and securing funding, while ensuring that the programme is organised around clearly defined learning outcomes rather than relying solely on individual experience.

Increasing the use of workshops and project-based work

It is recommended that lecture-based teaching be supplemented with workshop formats in which doctoral students develop their own research concepts and receive regular feedback.

Linking learning outcomes to the doctoral student's actual research project

It is recommended that assessment within research design modules be based on the doctoral student's preparation of an actual research project or a draft grant application related to their doctoral dissertation.

Establishing a minimum standard for the 'Commercialisation and Technology Transfer' module in doctoral schools

It is recommended that a standardised module (e.g. 15–20 hours) be introduced, delivered through a project-based approach and culminating in three tangible outcomes: a technology profile, an intellectual property protection plan and a validation plan/implementation pathway. Reporting on the implementation of this module should be standardised (number of participants, number of technology profiles produced).

Developing competences for research teamwork

It is recommended that doctoral school curricula include structured training in collaborative research, including work in national and international research teams. Such training may include workshops on research teamwork organisation, communication in research projects, task management and participation in research consortia. It is also advisable to promote the participation of doctoral students in active project teams implementing projects funded from national and European sources.

Strengthening research project management skills

It is recommended that modules on research project management be introduced into doctoral school curricula, covering work schedule planning, project budget management, the organisation of research team work, and the preparation of project progress reports. These skills are fundamental to research autonomy and are essential in project-based research funding models.

Expanding institutional support for the preparation of grant applications

It is recommended that institutional mechanisms be developed to support doctoral students in preparing research funding applications, including consultations with

experts, grant-writing workshops, and mentoring by experienced researchers. This support should be integrated into the doctoral programme and linked to actual grant competitions.

Connecting education with real-world research projects

It is recommended that the educational process be linked to real-world research problems. It is worth developing project-based learning models in which doctoral students complete curricular elements through work on their own research projects. This approach enables the integration of methodological, organisational and grant-related competences and fosters the development of practical research skills.

Monitoring and evaluating the effects of the changes introduced

It is recommended that the effects of the changes introduced be monitored and evaluated. Following the implementation of the changes, it is worth conducting a systematic evaluation to determine whether doctoral students increasingly perceive the programme as supporting the development of this key research competence.

III.3. Additional courses, training and workshops for doctoral students

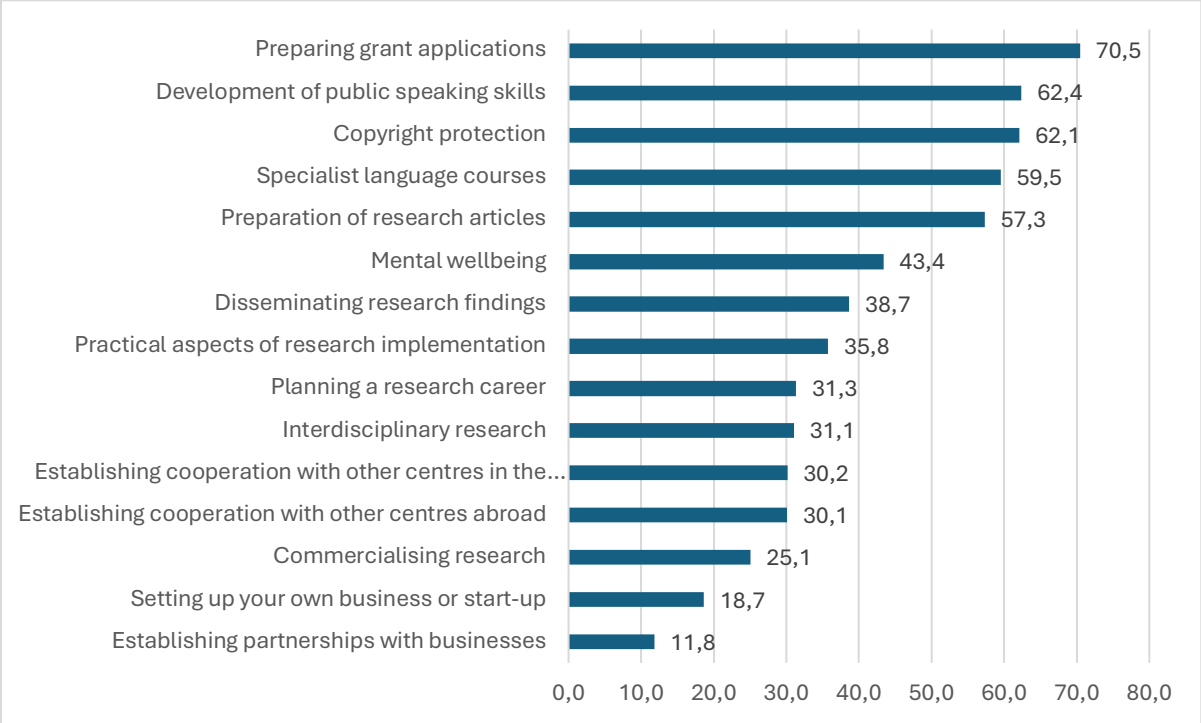
III.3.1. Analysis of study findings

The findings presented above indicate that doctoral school curricula are not always perceived by doctoral students as fully meeting the needs associated with conducting research activity. In this context, additional forms of education offered by doctoral schools, such as courses, training programmes or workshops designed to develop research skills, become particularly important. The question therefore arises as to whether these additional forms of education effectively address the shortcomings

identified by doctoral students with regard to preparation for independent research. The survey results, however, show that they do so only partially.

Respondents most frequently reported additional training opportunities dedicated to preparing grant applications and research projects (70% of responses). However, the next most frequently mentioned activities were those which, in the respondents' view, largely overlap with content already present in doctoral school curricula. These included the development of public speaking skills, specialist language courses supporting the preparation of academic publications in English, courses on writing academic papers, and training in disseminating one's own research findings (Fig. 25).

Fig. 25. Topics of courses, training sessions and workshops offered by the university/institute



Source: *the "Research Activity of Doctoral Students" study.*

The primary factor differentiating doctoral students' assessments on the availability of additional educational opportunities enabling the development of competences and skills related to conducting research is the nature of the doctoral dissertation being

prepared. Doctoral students pursuing implementation-oriented or applied doctoral projects are more likely to report the availability of additional forms of education that support the development of research-related competences.

Perceptions of the availability of additional educational opportunities also vary across years of doctoral study. First-year doctoral students more often point to the availability of courses, training sessions and workshops related to practical aspects of research, commercialisation of research results, cooperation with national and international research centres, science communication, interdisciplinary research and academic career planning. This may partly reflect the so-called novelty effect and the limited experience of doctoral students at the beginning of their doctoral education. In contrast, doctoral students in later years, having accumulated greater research experience, are more likely to point to the limited usefulness of some of the courses and training offered in relation to the actual demands of scientific work.

An in-depth analysis of specific areas of the supplementary educational provision, such as courses related to commercialisation of research results and science communication, is presented in the following sub-sections of this report.

III.3.2. Recommendations

Based on the study findings presented, the following recommendations can be formulated regarding additional courses, training programmes and workshops dedicated to doctoral students.

Better alignment of the topics of additional courses and training with the actual needs of doctoral students conducting research

It is recommended that the training needs of doctoral students be regularly assessed and that the range of additional courses and workshops be adapted to the current

challenges associated with conducting research, particularly in research design, research project management and securing external funding.

Minimising duplication of content covered in doctoral school curricula

It is recommended that additional training programmes be designed in such a way that they genuinely complement the doctoral school curriculum.

Differentiating the training programme by the stage of doctoral students' education

It is recommended that a modular range of courses and workshops be developed, tailored to various stages of doctoral education. Doctoral students at the beginning of their studies may require support in the fundamentals of research work organisation, while those in later years may require more advanced skills related to managing research projects, publishing research findings, or establishing international scientific collaboration.

Developing training provision on the practical aspects of conducting research

It is recommended that the range of courses and workshops on the practical aspects of conducting scientific research be strengthened, including the organisation of research work, collaboration within research teams, research project management, and the functioning of research funding systems.

Monitoring the quality and usefulness of additional training provision

It is recommended that the quality and usefulness of additional courses, training programmes and workshops offered to doctoral students be systematically monitored and evaluated. Regular feedback from participants will enable the training provision to be adapted to the changing needs of the doctoral student community and increase its real impact on the development of research competences.

III.4. Funding for research activities and doctoral student mobility

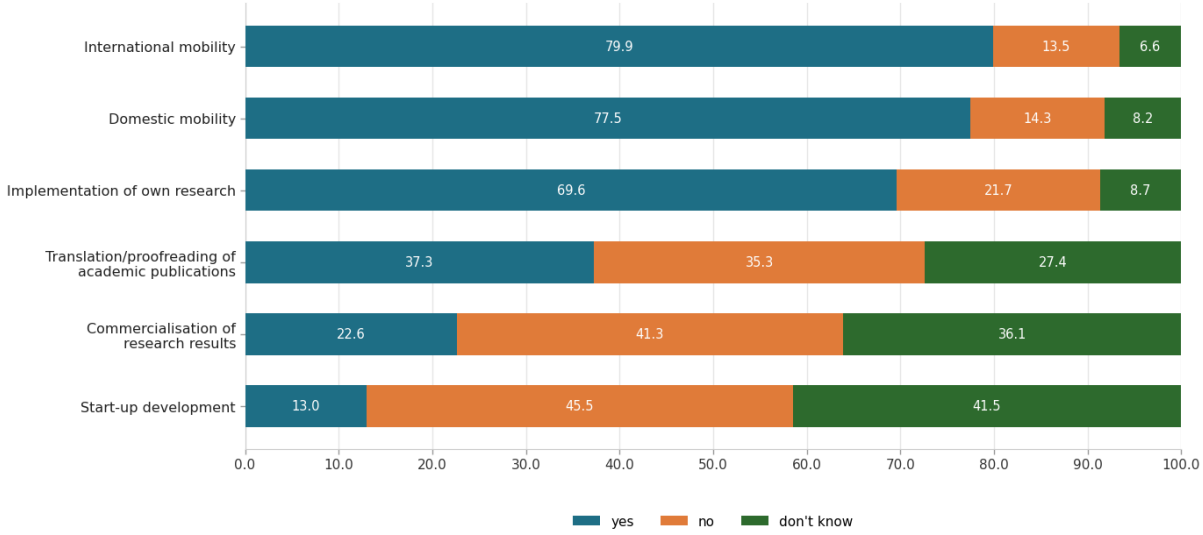
III.4.1. Analysis of study findings

Funding for research activities is one of the key factors determining whether doctoral students are able to conduct independent research and actively participate in academic life. Access to funding influences both the scope of research projects undertaken and participation in academic conferences, publication of research results, and the establishment of collaboration with other research centres. For this reason, a key element of the analysis was to determine the extent to which doctoral students have access to the resources enabling them to conduct independent research and which sources of funding are most commonly used for this purpose.

The vast majority of survey participants reported that their university or institute provides funding for domestic and international mobility and for conducting independent research. However, with regard to funding for conducting independent research, a substantial proportion of doctoral students (22%) indicated that the institution where they are preparing their doctoral dissertation does not allocate funds specifically for doctoral research projects. This situation primarily affects doctoral students enrolled at doctoral schools operating within institutes of the Polish Academy of Sciences, among whom as many as 45% reported a lack of funding for their own research, compared with 24% at universities of technology and sciences , and 16% at universities. Respondents also assessed the availability of funding for the translation or proofreading of academic publications, research commercialisation and start-up development less favourably. Once again, funding for commercialisation and start-up development was reported as relatively less available by doctoral students at

institutes of the Polish Academy of Sciences (PAN) and universities classified as 'other' (Fig. 26).

Fig. 26. Availability of university/institute funding for doctoral students' research-related expenses



Source: the "Research Activity of Doctoral Students" study.

However, the interviewees' comments provide a better understanding of how these support mechanisms operate in practice and the extent to which they are integrated into doctoral school curricula, particularly in the area of domestic and international mobility. In some doctoral schools, mobility is institutionalised. Respondent X11 emphasised that her individual research plan includes a compulsory internship during the second year of study, which may be completed at any institution in Poland or abroad. The respondent also noted that, in the case of domestic travels, the doctoral school reimburses accommodation and subsistence costs. Other respondents point to similar arrangements. Respondent X3 explained that applications submitted to the director of the doctoral school most frequently concern funding for conference travel, both domestic and international. Respondent X7 highlighted considerable flexibility of the system, noting that funding can be requested for "everything related to the completion of the doctoral dissertation, i.e. […] travel". With regard to international

mobility, the situation appears more diverse. Respondent X11 referred to limited financial support (up to approx. PLN 1,500), which necessitates seeking additional funding, e.g. through the Erasmus or BIP programmes, Rector's funds, or relying on the supervisor's international contacts. At the same time, respondent X4 describes internal mobility competitions and Research Travel Grants that made it possible to obtain funding for an overseas placement in the United States without major difficulty. Respondent X6 indicated that international mobility is recommended rather than compulsory, and reported having participated in Erasmus programmes and a scholarship in Japan. In the case of respondent X3, international mobility is compulsory, and the overseas placement is required to last three weeks. A different situation is presented by Respondent X10, who indicates that in his doctoral school no formal requirement exists to undertake placements, and international travels, although encouraged, remain entirely independent of the curriculum.

A comparison of these statements with the quantitative survey results leads to the conclusion that academic mobility is an area where financial support is declared relatively frequently and is actually available, particularly with regard to domestic mobility. At the same time, the organisation of this support and its integration into the doctoral school curricula vary considerably across institutions. In some doctoral schools, mobility is a systemic component of the educational process, while in others it depends on the doctoral student's individual initiative, the financial capacity of the home institution, or the supervisor's professional network. Consequently, mobility – both domestic and international – emerges as a tangible instrument supporting doctoral students' research activities; however, its implementation is neither uniform nor systematically regulated across doctoral schools.

When analysing the availability of funding, several noteworthy relationships emerge. In the case of internal institutional funding, doctoral students declaring access to funding ("YES") reported substantially higher levels of preparedness for preparing funding applications (a total of 27.7% of responses indicating "to a large extent" and "to a very large extent") than those reporting no access to such funding ("NO"), among whom the responses "to a small extent" (36.9%) and "not at all" (32.3%) predominated. This means that a lack of real access to internal funds is associated with a lower assessment of competence in applying for funding.

A similar pattern is observed with regard to preparation for applying for external funding (from domestic and international sources). Among doctoral students with access to funds for independent research, the proportion of "to a large extent" and "to a very large extent" responses (30.9% in total) is higher than in the group without access to funding (13.1%). In the latter group the responses "to a small extent" (38.5%) and "not at all" (23.1%) were the dominant responses.

This comparison suggests that access to funding is not merely a consequence of existing competences, but may also function as a factor reinforcing the development of grant-related skills. The experience gained through actually applying for and utilising funds, even at the institutional level, appears to strengthen doctoral students' sense of agency and project-related competence. Conversely, limited access to funding may reduce exposure to the grant application practices and reinforce the perception of inadequate preparedness. Consequently, these results support the earlier conclusion that the project-related competences and access to funding form a feedback loop. Where viable funding instruments exist, grant-related competences are more likely to develop; conversely, where access to funding is

limited, low levels of perceived preparedness become entrenched. This mechanism may contribute to institutional inequalities in doctoral students' grant independence.

Respondents' statements illustrate the diversity and flexibility of existing support mechanisms. Respondent X8 describes a scheme in which each doctoral student is awarded an annual, fixed allocation ("pocket money from the rector") of 3,000 PLN, which can be used for any expenditure supporting work on the doctoral dissertation. A similar mechanism was reported by respondent X11, although in his case the amount was PLN 1,000 per doctoral student. These arrangements take the form of lump-sum support, which gives doctoral students considerable freedom to allocate funds according to their individual research needs. Another form of support is internal university grants, referred to by respondent X6 as 'young researcher's tasks', available to doctoral students and early-career researchers. This mechanism allows for the acquisition of additional funding through an internal competition, earmarked for research funding.

„Access to funding is not merely the result of existing competences, but may also act as a factor reinforcing the development of grant-related skills".

Young Science

An analysis of the respondents' statements indicates that funding for independent research is one of the areas where institutional support is perceived by doctoral students as tangible. At the same time, it takes a wide variety of forms, ranging from lump-sum allocations for doctoral students, through flexible applications for funds, to internal grant competitions. This diversity demonstrates the university's significant organisational capacity, but also points to the absence of uniform standards across institutions.

At the opposite end of the spectrum of financial support, participants in the qualitative study highlighted funding for translation and proofreading of academic publications (37.3% 'YES' responses), research commercialisation (22.5% 'YES' responses) and the development of start-ups (13% 'YES' responses).

There is a clear institutional variation in the area of research commercialisation. Cross-tabulation analysis shows that the situation is rated most highly at universities of technology and natural sciences (36.7% of 'YES' responses), which significantly exceeds the overall average and the results for universities (18.4%) and institutes of the Polish Academy of Sciences (15.5%). This may reflect the stronger implementation- and application-oriented profile of these institutions, their closer links with the socio-economic environment, and the presence of well-developed technology transfer structures. At the same time, institutes of the Polish Academy of Sciences (PAN) once again fall below the system average, with more than half of respondents (55.2%) reporting no available funding, which suggests limited opportunities for developing commercialisation capabilities within these institutions.

Even more pronounced disparities are visible in the area of support for start-up development. The findings suggest that academic entrepreneurship is not yet a systematically developed component in doctoral schools. At universities of technology and natural sciences, the proportion of positive responses (29.1%) is more than double the overall average, which may again be a consequence of their practical and implementation-oriented profile. The situation is least favourable in the institutes of the Polish Academy of Sciences (PAN), with only 6.9% of 'YES' responses and as many as 63.8% 'NO', which indicates very limited instruments for supporting entrepreneurship in this group of institutions. Issues related to commercialisation of

research results and academic entrepreneurship are discussed in detail later in the report.

With regard to funding for translation and proofreading of academic publications, the distribution of responses is more balanced, although institutional differences remain evident. The highest proportion of positive responses was reported by universities (46.9%), whereas universities of technology and natural sciences (19.0%) and institutes of the Polish Academy of Sciences (25.9%) remained below the average. This may indicate stronger publication support in institutions with a more humanities- and social sciences-oriented or general academic profile.

Overall, the findings indicate that support mechanisms extending beyond basic funding for mobility and independent research – such as commercialisation, start-up development, and publication support –are characterised by considerable institutional variation. Universities of technology and natural sciences offer more favourable conditions for commercialisation and entrepreneurship, whereas the institutes of the Polish Academy of Sciences (PAN) remain below the system average in most of the analysed areas. Consequently, opportunities for doctoral students to develop implementation and entrepreneurship-related competences depend to a significant extent on the type of institution, which creates structural disparities in the conditions for completing a doctoral dissertation and the career trajectories of early-career researchers.

The respondents' comments help to understand the reasons for this situation. In the case of research commercialisation, doctoral students referred to the existence of formal structures, such as research offices or business incubators, but these are not perceived as a real source of support for their activities. As respondent X9 notes: "We have a research office and a business incubator when it comes to this

commercialisation of research". At the same time, respondent X6 observed that commercialisation tends to appear more as a formal component of project documentation: "In our case, most applications […] indicate whether commercialisation of the patent is planned".

A similar picture emerges with regard to the development of start-ups. Despite the existence of business incubators, doctoral students encounter practical and organisational barriers. As respondent X5 explained: "This is also a topic that […] I had to think through carefully […], because it simply involves a whole series of problems." In other words, formal infrastructure does not necessarily translate into effective and accessible support for doctoral students interested in entrepreneurial activity.

In the area of translation and proofreading, however, support is provided on an ad hoc and discretionary basis. Respondent X9 referred to grants available which may cover the costs of publications and translations: '[…] there will also be grants […] for academic publications, translations and related academic matters'.

Additionally, the responses include examples of dispersed and informal support mechanisms that do not originate directly from the doctoral school curricula but rather from initiatives of individual units or the doctoral students themselves. Respondent X3 referred to funding for "art supplies", X7 noted that "doctoral students can generally apply to the department" for publication-related support, and respondent X11 mentioned a "competition organised by the University Council of the Doctoral Student Union". **This indicates that support mechanisms are available, but they are fragmented, insufficiently visible, and often require additional knowledge and initiative on the part of the doctoral student.**

The qualitative findings also confirm that **the availability of funding for doctoral research is strongly linked to university-level research programmes, in particular excellence initiatives and research support programmes such as IDUB**. Interviewees indicated that these funds are used primarily to support international mobility, participation in research projects, and the development of doctoral students' individual research projects. At the same time, they emphasised that the scale of available funding differs considerably across universities and academic disciplines.

III.4.2. Recommendations

Based on the study findings presented above, the following recommendations regarding the funding of doctoral students' research activities and mobility can be formulated.

Strengthening systemic support for doctoral students' academic mobility

It is recommended that stable funding mechanisms be developed for the domestic and international mobility of doctoral students, in particular for conference participation, research placements, and research visits to other research institutions.

Ensuring an adequate level of funding for international mobility

It is recommended that a minimum funding standard for doctoral students' international mobility be established, which will correspond to the actual costs of travel and enable the completion of research placements at foreign centres.

Reducing institutional inequalities in access to research funding

It is recommended that measures be taken to reduce disparities in access to research funding for doctoral students across different types of institutions, in particular between universities and research institutes.

Introducing a minimum research allowance for doctoral students

It is recommended that an annual lump-sum research allowance be introduced to support doctoral students' day-to-day research needs and increase their autonomy in planning and conducting research.

Developing funding instruments for doctoral research

It is recommended that internal competitive grant schemes for doctoral students be developed, enabling them to gain experience in preparing project proposals and conducting research funded through competitive grants.

Simplifying procedures for applying for and managing research funds

It is recommended that administrative procedures governing access to funds allocated for doctoral research be simplified in order to reduce formal barriers to accessing funding.

Introducing systematic publication support

It is recommended that permanent institutional mechanisms be established to finance professional translation and proofreading of academic publications prepared by doctoral students.

Organising and disseminating information on available funding opportunities

It is recommended that doctoral students be provided with clear, consolidated and easily accessible information on available funding opportunities, mobility schemes and other research support instruments offered by universities and institutes.

III.5. Academic and administrative support for doctoral students

III.5.1. Analysis of study findings

Academic and administrative support constitutes another key component of the doctoral school system and one of the factors influencing the effectiveness of doctoral students' research activities. This encompasses both academic supervision provided by supervisors and research teams, and organisational support related to the implementation of research projects, applications for research funding, and the administrative management of the educational process. For this reason, the study sought to assess the extent to which doctoral students make use of the available forms of support and how they evaluate their importance for their own research activities.

The doctoral students' accounts portray a system of support that formally exists, yet in practice is often uneven, fragmented and highly dependent on the individual commitment of lecturers, supervisors and local practices within individual doctoral schools. Completing a doctoral project requires doctoral students not only to possess subject-specific expertise, but also to have competences in research design, securing funding, project management, administrative procedures and teamwork. Support in these areas, however, is often fragmented rather than systematic.

As respondent X7 observed: "They can come up with 100 hours of classes, but if no one reveals their secrets about what is actually important in an application right now." This statement aptly captures the distinction between the formal study programme and the practical preparation required to develop and implement an independent research project. Doctoral students emphasised that courses on research funding and

grant application preparation are available and are rated as useful, but their duration is insufficient to address all relevant issues. As respondent X6 noted: "These classes are there, they're useful, but […] I think it's only 30 hours, and that's a bit too little to cover all the topics." At the same time, where courses are practical, based on real-life examples and informed by the lecturers' experience, their value increases substantially. Respondent X7 explained s: "This person opened up to the participants and started sharing their tips […]. Picking up on such small details, I can see that it's actually starting to work, because I've also started being awarded grants."

Organisational and administrative support also emerged as a significant issue. This is particularly evident in the case of implementation doctorates. As respondent X9 pointed out: "The problems start at the stage of administration and accounting, because the doctoral school does not necessarily know […], how to handle certain financial matters." Thus, even the successful implementation of a research project may encounter procedural barriers resulting from a lack of clear guidance and standardised administrative procedures.

The doctoral students' comments also reveal a tension between the declared objective of training independent researchers and the reality of substantial dependence on the supervisor. Respondent X2 noted: "Very often, the supervisor overwhelms us and tells us what we are to do." Similarly, respondent X8 stated: "We have a slight feeling that sometimes we are being trained, for example, as laboratory technicians, rather than as researchers who are supposed to be independent in the future." Respondent X5 highlighted research isolation: "Each of us has our own very narrow field, and in reality only we and our supervisor know exactly what we're working on."

When it comes to teamwork, doctoral students largely agree that it is insufficiently represented in their education. As they reported: "There wasn't a single course where we worked in groups" (X2), "There was no such option" (X3), "We didn't have any such teamwork assignments" (X4). At the same time, whenever collaborative work is incorporated into the programme, it is rated very positively. Respondent X6 stated: "The coolest subject, in my opinion, is the one where we do teamwork […] at the simulation centre" and added "To feel your place in the team […], I really recommend it".

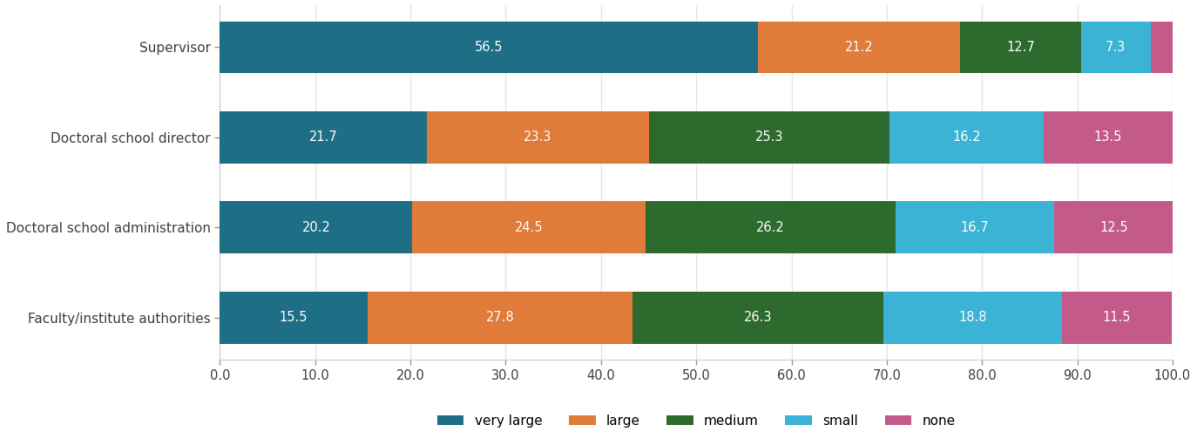
Some units have also developed particularly effective practices in mentoring and project support. Respondent X4 emphasised: "Every doctoral student can be assigned a mentor and all applications are reviewed", while respondent X9 added: "The application is checked by a member of staff […], so there is a certain level of support when it comes to submitting the application". These examples, however, represent local institutional practices rather than universally applicable standards.

This picture is reinforced by the quantitative survey results concerning perceived institutional support for research opportunities. The results show considerable variation in assessments depending on the source of support. Supervisor support received the highest ratings, with "very high" responses clearly exceeding those recorded for any other category. This indicates that access to research opportunities, infrastructure and ongoing substantive support is most closely associated with the doctoral student–supervisor relationship. Support provided by doctoral school directors, doctoral school administration was, however, rated noticeably lower. Responses on this issue range from "none" and "low" to "moderate". Support from the faculty or institute authorities was rated relatively higher, though it is still not as directly experienced as that provided by the supervisor.

Support from the faculty/institute authorities and the doctoral school administration was assessed significantly lower and displayed a more balanced distribution of responses. In the case of the authorities of these units, 44% of respondents indicated "high" or "very high" support, while 30.3% rate it as "low" or "none". Support from the doctoral school administration was rated as moderate, with 'high' and 'medium' responses predominating, although a substantial proportion of low ratings (28.9%) is also noticeable.

Support from doctoral school directors was perceived as relatively weaker – although 45.7% of respondents rated it as "high" or "very high", as many as 29.4% assessed it as "low" or "none". This suggests that systemic institutional support is experienced as less consistent than individual support provided by the supervisor (Fig. 27).

Fig. 27. Support for doctoral students provided by supervisors, doctoral school directors, doctoral school administration and faculty/ institute authorities:



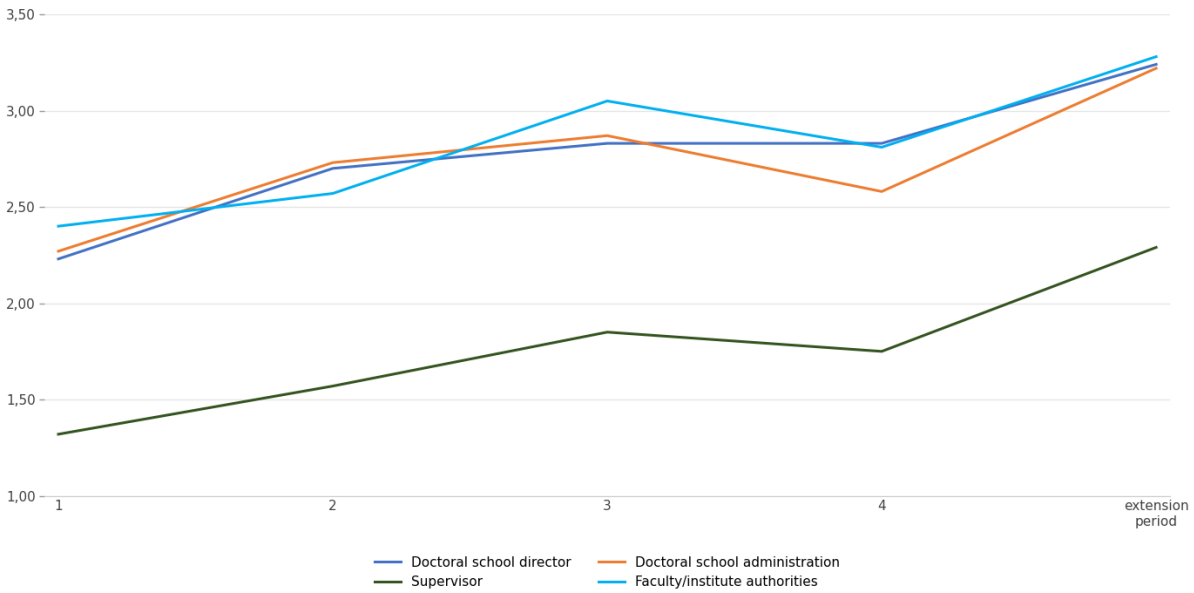
Source: the "Research Activity of Doctoral Students" study.

The above findings raise the question of the extent to which doctoral school directors, administration and the authorities of faculties or institutes actually have the institutional capacity to support doctoral students' research activity, and whether the ratings reported partly reflect the limited scope of these institutions' competences in relation to doctoral students' research activities. An attempt to answer this question

will be made later in the report in the section devoted to barriers encountered by doctoral students during the implementation of their research projects.

Assessments of support from supervisors, directors and administration of doctoral schools, and the faculty or institute authorities become progressively more critical as the years of doctoral study advance. For example, among first-year doctoral students, the average rating of support from the supervisor was 1.3 (where 1 indicated very high support), whereas among doctoral students whose study period had been extended, it rose to 2.3. A slight shift in this trend is visible in the assessments provided by fourth-year doctoral students. This may be associated with the intensification of dissertation work during the final stage of doctoral education, and the resulting increase in interactions between doctoral students and their supervisors, the authorities and the administration of doctoral schools, and the units where the dissertation is being prepared. Such circumstances may encourage greater engagement from all parties involved in supporting the completion of the doctoral dissertation (Fig. 28).

Fig. 28. Mean ratings of support received during research by year of study (1 – very high, 5 – no support)



Source: the "Research Activity of Doctoral Students" study.

Doctoral students enrolled at universities of physical education, fine art academies and institutions classified in the survey as "other" reported relatively higher levels of support from the management and administration of doctoral schools. The most critical assessments of supervisor support were expressed by doctoral students at institutes of the Polish Academy of Sciences. In this group, nearly one in five respondents rated supervisor support as minimal or reported receiving no support. This demonstrates that doctoral students at PAS institutes are in a relatively less favourable position. Firstly, they have more limited access to funding for independent research; secondly, they can rely to a lesser extent on their supervisor's support in the research process.

At the same time, within the institutes of the Polish Academy of Sciences (PAN), the support provided by supervisors is clearly more varied than in other types of institutions. The proportion of 'very high' ratings (52.6%) is lower than the overall sample average, whereas the proportion of 'low' responses (17.5%) is more than twice as high as that observed across the entire respondent population (7.7%). This indicates a higher degree of polarisation in doctoral students' experiences: alongside respondents reporting declaring very strong support, there is a relatively large group of respondents who perceive it as insufficient. The findings therefore suggest that the quality of supervisor support is strongly dependent on the individual supervisor or research team.

Just over 40% of doctoral students participating in the survey stated that their university or institute had an organisational unit (e.g. a research office or support centre) dedicated to assisting doctoral students in their research activities. The absence of such a unit was noted by 31% of respondents, while 26% were unable to determine whether such support structures existed. The presence of dedicated

support units within the university's organisational structure was most frequently indicated by doctoral students at universities of physical education, fine arts academies and business schools (52%), i.e. institutions classified in the survey as 'other'. Such indications were slightly less common among doctoral students at comprehensive universities, and universities of technology and natural science universities (46% each), and least common among doctoral students at institutes of the Polish Academy of Sciences (PAN) (33%).

Among respondents who stated that their university or institute had a unit supporting doctoral students' research activities, the vast majority—nearly two-thirds of those surveyed—rated its functioning as very good or good, while 30% of respondents assessed it as average. Doctoral students at universities of technology and natural sciences expressed relatively more critical views on the activities of such units.

The findings indicate that support for doctoral research remains primarily personal rather than systemic in nature. The supervisor occupies a central position, whereas institutional support provided by the administration, doctoral school management or the unit's authorities is more variable and less directly experienced. As a result, the quality of the doctoral student's research experience depends largely on the supervisor and local organisational practices. The absence of a coherent and standardised support model may lead to inequalities in access to resources, project-related knowledge and administrative assistance. Consequently, the doctoral school system functions less as a uniform mechanism for strengthening research autonomy and more as a structure in which individual relationships are of key importance.

The findings demonstrate that the development of systematic academic and administrative support for doctoral students remains a major challenge for doctoral schools. In particular, there is a need to strengthen institutional support mechanisms

that can complement the relationship between the doctoral student and the supervisor, and reduce inequalities arising from local organisational practices.

III.5.2. Recommendations

Based on the study findings presented above, the following recommendations concerning administrative and academic support for doctoral students can be formulated.

Standardising and streamlining administrative procedures related to research

It is recommended that clear and accessible procedures be developed for financial settlements, the implementation of research projects, and other administrative matters related to doctoral students' research activities.

Strengthening systemic institutional support for doctoral students

It is recommended that institutional mechanisms supporting doctoral students' research activity be strengthened so that they are not dependent solely on the relationship with the supervisor or on local practices within individual units.

Supporting the development of doctoral students' research independence

It is recommended that doctoral school programmes should do more to strengthen doctoral students' capacity to independently plan and conduct research. In particular, it is important to create conditions that encourage doctoral students to initiate their own research projects and develop project management skills.

Incorporating teamwork into the curriculum of doctoral schools

It is recommended that courses based on teamwork be systematically incorporated into the curriculum to develop skills in collaboration, communication and participation within research teams.

Expanding mentoring and project office support for doctoral students

It is recommended that mentoring programmes be expanded and that doctoral students be provided with access to support from project offices in the preparation and consultation of grant applications. These solutions, currently available only in selected institutions, should become a standard component of the doctoral student support system.

III.6. Research commercialisation and academic entrepreneurship

III.6.1. Analysis of study findings

Commercialisation of research results and academic entrepreneurship has already been addressed in previous sections of this report in the context of doctoral school curricula and additional courses, training programmes and the funding of doctoral students' research activities. Many respondents highlighted the need to develop competences related to the practical application of research results and collaboration with the socio-economic environment.

Research commercialisation and technology transfer are now widely recognised as key components of the university's mission and the quality of education in doctoral schools. In accordance with the logic underpinning the Act on Higher Education and Science, doctoral schools should prepare doctoral students not only to conduct research, but also to use research outcomes responsibly beyond the academic sphere. The learning outcomes specified for Level 8 of the Polish Qualifications Framework reinforce this expectation by emphasising independence, innovation and decision-making under conditions of uncertainty. From this perspective, commercialisation should be understood as a process encompassing successive stages – from identifying

the application potential of research results, through intellectual property protection, to the selection of an appropriate implementation model.

From the perspective of the OECD's research and analysis of innovation policies, effective knowledge transfer depends on *a* coherent *policy mix* and institutional mechanisms that facilitate collaboration between science and the economy; in other words, it depends on a combination of competences, organisational instruments and incentives[15] . The European framework reinforces this approach through recommendations on *knowledge valorisation* and intellectual asset management, aimed at increasing the social and economic value of research and development (R&D) outcomes[16] . At the national level, the Ministry emphasises the need to strengthen knowledge and technology transfer within the research evaluation system and has been developing instruments for assessing transfer, which increases the importance of implementation-related competences both within institutions and in the career trajectories of early-career researchers[17] .

Consequently, within institutions operating in doctoral schools, the establishment of transparent support pathways for research commercialisation is becoming increasingly important, including the activities of technology transfer centres, special-purpose vehicles, intellectual property protection procedures and *proof-of-concept* instruments. The remainder of the report presents the findings concerning the extent to which institutions running doctoral schools support doctoral students in developing

[15] https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/04/science-industry-knowledge-exchange_de2b8676/66a3bd38-en.pdf

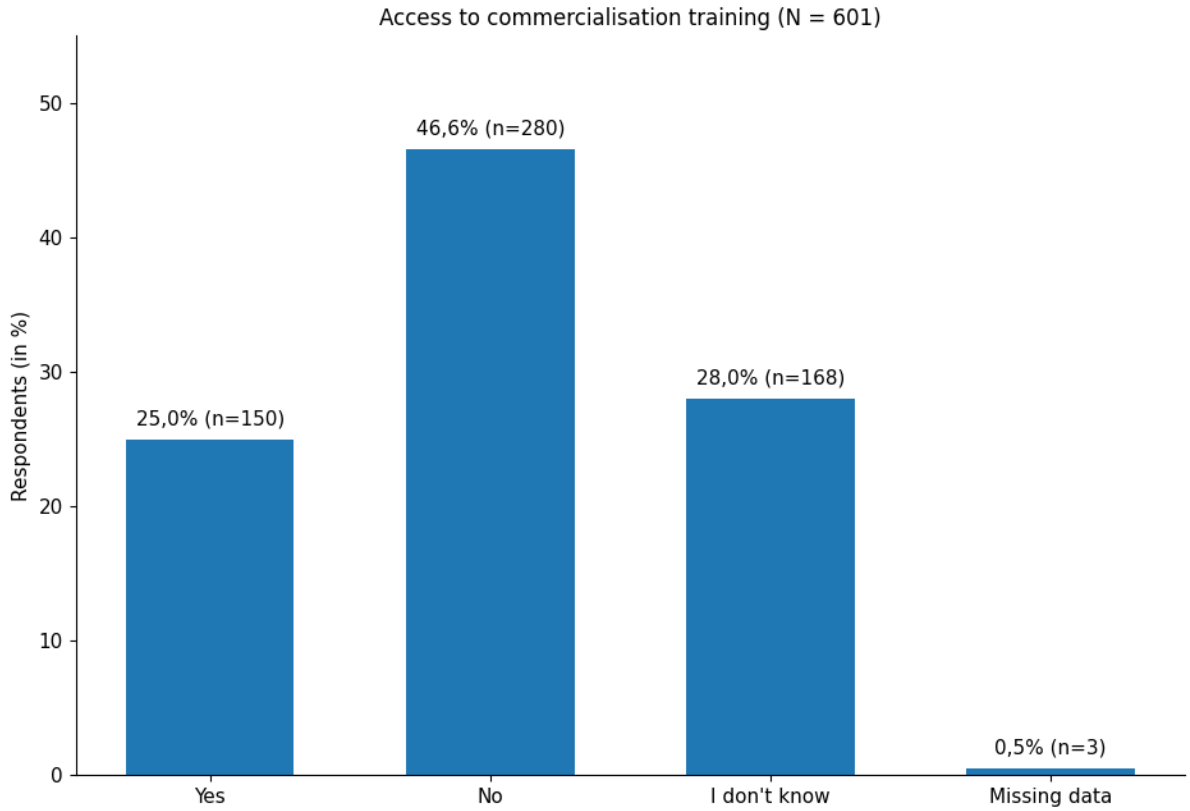
[16] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32022H2415

[17] https://www.gov.pl/web/nauka/wzmocnienie-transferu-wiedzy-i-technologii-w-ewaluacji-nauki

competences related to commercialisation of research results and academic entrepreneurship.

Across the entire sample, 25.0% (150 individuals) reported having access to commercialisation training, while 46.6% (280 respondents) answered 'no', and 28.0% (168 respondents) - 'don't know' (approx. 0.5% missing data) (Fig. 29). This distribution points both to the limited availability of commercialisation-related training and to significant information barriers, given that almost one in three respondents was unable to determine whether such training was offered. In the qualitative study, doctoral students described these courses as overly general and failing to translate the subject matter into practical steps, which explains the low ratings regarding preparation for the commercialisation process. The phrase "about everything and nothing" is explicitly used to characterise some of the courses. **These findings can be interpreted as a sign of an underdeveloped (or barely visible) institutional support component for commercialisation, which in practice reduces the practical usefulness of the educational provision in this area.**

Fig. 29. Access to commercialisation training

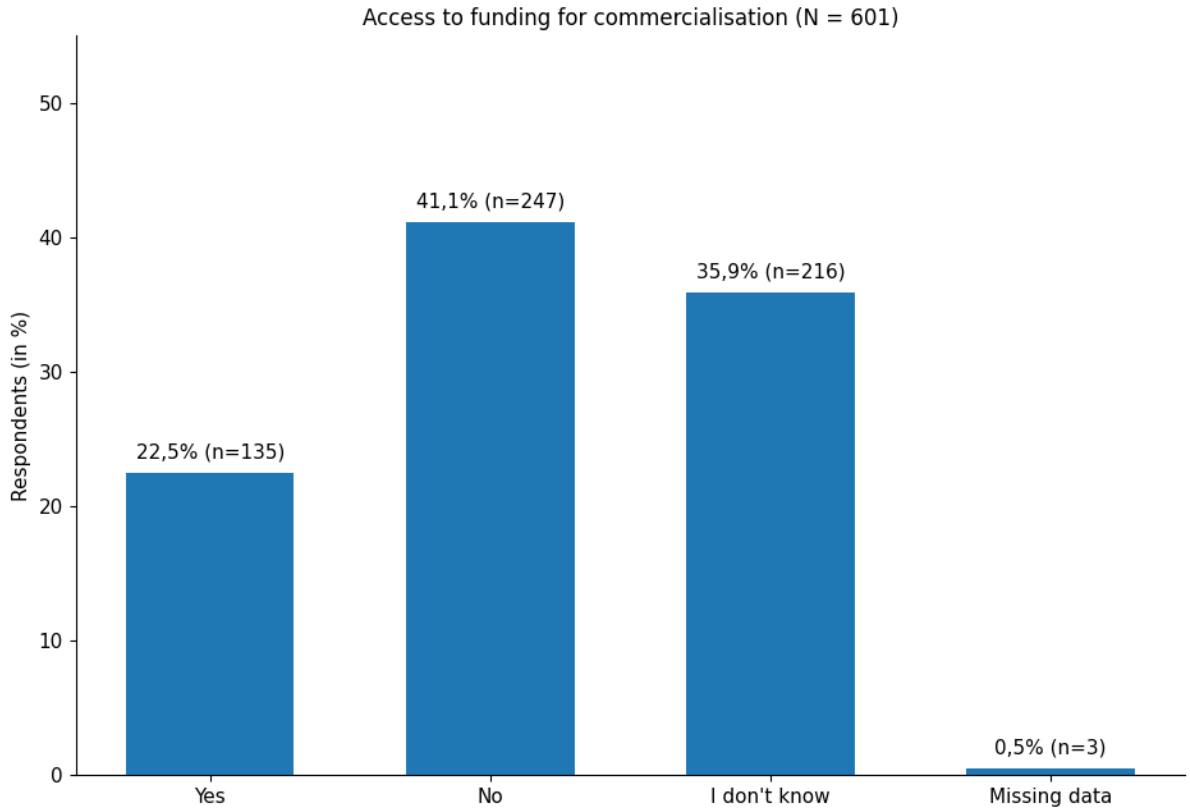


Source: the "Research Activity of Doctoral Students" study.

Another important issue concerns funding of doctoral students' commercialisation-related activities, which has been already discussed in earlier sections of this report.

When asked about the availability of funds earmarked for commercialisation of research results, only 22.5% of respondents (135 individuals) answered in the affirmative. At the same time, 41.1% of respondents (247 individuals) reported that such funding was not available at their university or institute, while as many as 35.9% (216 respondents) stated that they did not know whether such funding existed (with approx. 0.5% non-responses) (Fig. 30).

Fig. 30. Access to funding for research commercialisation



Source: the "Research Activity of Doctoral Students" study.

The high proportion of "don't know" responses may be interpreted as evidence of information barriers and high transaction costs associated with accessing support instruments. This means that potential users may fail to take advantage of existing instruments not because they are absent, but because they are fragmented, inadequately described or require considerable organisational effort to enter the support pathway. The findings therefore suggest that improving the effectiveness of the commercialisation support system may require not only increasing available funding, but above all, reorganising and standardising support instruments into easily identifiable support instruments or packages, based on transparent access procedures.

The results of the cross-tabulation analysis indicate a clear correlation between the reported availability of funds for commercialisation of research results and the assessment of the extent to which the doctoral study programme prepares students for implementation-oriented activities. Among respondents reporting that such funding was unavailable ("NO"), extremely low ratings predominated: 59.9% of respondents selected "not at all", while a further 24.3% chose "low". At the same time, the highest rating ("to a very large extent") appears only incidentally within this group (0.4%).

A markedly different response profile emerged among respondents reporting access to funds ("YES"). In this group, assessments shifted towards higher values: a total of 36.5% of respondents indicated that their doctoral school prepared them for commercialisation to a large or very large extent, while the proportion of "not at all" ratings fell to 12.7% (Table 10; Fig. 31 – heatmap).

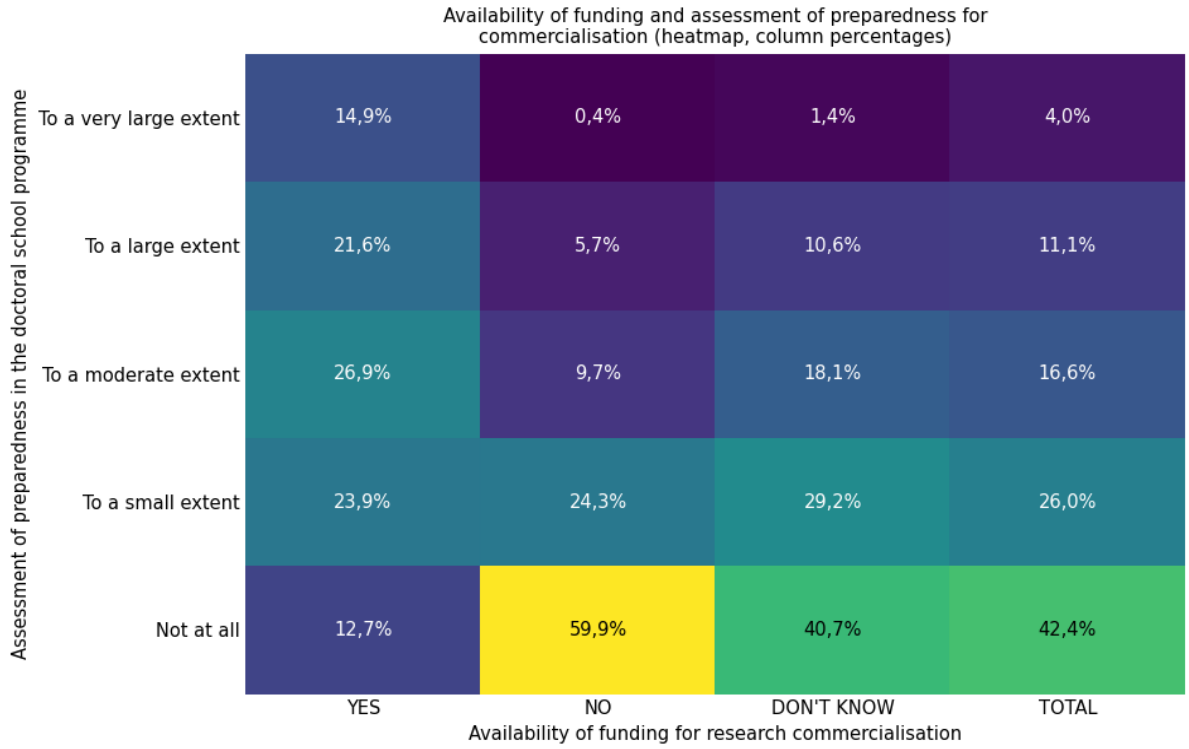
These findings suggest that the availability of funding in this case functions not only not only as a resource enabling the implementation of commercialisation activities, but also as an indicator of the institutional maturity of the entire commercialisation support ecosystem. The presence of dedicated funding instrument may indeed reflect a more developed implementation pathway encompassing the identification of application potential, effective communication of available support instruments, and access to specialist and expert organisational resources.

Table 10. Availability of funding allocated to research commercialisation and evaluation of the doctoral school curriculum in the area of research commercialisation

To what extent does the doctoral school curriculum prepare students for research commercialisation?	Availability of funding for doctoral students for research commercialisation			Total
	YES	NO	DON'T KNOW	
To a very large extent	14.9%	0.4%	1.4%	4.0%
To a large extent	21.6%	5.7%	10.6%	11.1%
To a moderate extent	26.9%	9.7%	18.1%	16.6%
To a small extent	23.9%	24.3%	29.2%	26.0%
Overall	12.7%	59.9%	40.7%	42.4%
Total	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 31. Availability of funding and assessment of preparedness for commercialisation (heatmap)



Source: the "Research Activity of Doctoral Students" study

The qualitative findings are consistent with this pattern and help explain the mechanisms underlying both low preparedness ratings and high levels of information uncertainty. As respondent X11 observed, the formal inclusion of commercialisation-related content does not necessarily translate into the practical usefulness of courses: "It covered everything and nothing." At the same time, respondent X6 emphasised that support related to intellectual property is often provided on an ad hoc basis rather than as a systematic competence-development programme: "If anyone wants to, they can contact the intellectual property officer individually." In the same statement, respondent X6 noted that funding for commercialisation is often provided "incidentally" alongside other instruments, which makes it difficult to be identified as a clear, separate pathway: "It's not a separate project." From the perspective of respondent X2, the key shortcoming is the absence of guidance for doctoral students through the procedures and instruments: "Many doctoral students had a lot of questions […], about where to apply, where to look for funding." Respondent X3 pointed out that the barrier is not limited to the mere availability of funding, but also concerns the lack of procedural clarity and the underdeveloped nature of the process: "There is a great deal of ambiguity and the process is underdeveloped." The procedural and accounting aspect is particularly prominent in the comments of respondent X9, who pointed to the absence of operational guidelines on the part of the doctoral school: "There are no clear instructions on how to account for […] financial matters." At the same time, the focus groups provided a counterexample of institutional agency: respondent X9 described a solution that works due to proactivity and a clear point of contact: "This incubator operates so proactively; it reaches out to students and doctoral students."

This correlation is also visible in a cross-tabulation comparing the reported availability of commercialisation funding with the reported availability of commercialisation-

related training courses or workshops. Among respondents declaring access to funding ("yes"), the majority (53.0%) confirmed that their university offered training in this area. At the same time, a substantial proportion of "no" (24.6%) and "don't know" (22.4%) was reported, which may indicate limited visibility or an uneven distribution of training provision, even where financial instruments supporting commercialisation are in place.

Among respondents reporting the absence of funding ("no"), however, a consistent picture of an institutional deficit emerges: as many as 69.1% of respondents indicated that no commercialisation training was available, while only 13.0% confirmed its existence. Among those who did not know whether funding was available ("don't know"), a clear information problem is evident – 43.5% of respondents were unable to assess whether training was offered, with 34.7% answering "no" and 21.8% answering "yes" (Table 11; Fig. 32).

In light of these findings, the "don't know" response can be interpreted as an indicator of a procedural barrier, resulting from the absence of a single and clearly identifiable starting point and a clearly defined sequence of actions linking competence development (training), access to financial instruments and organisational support in the implementation of the commercialisation process.

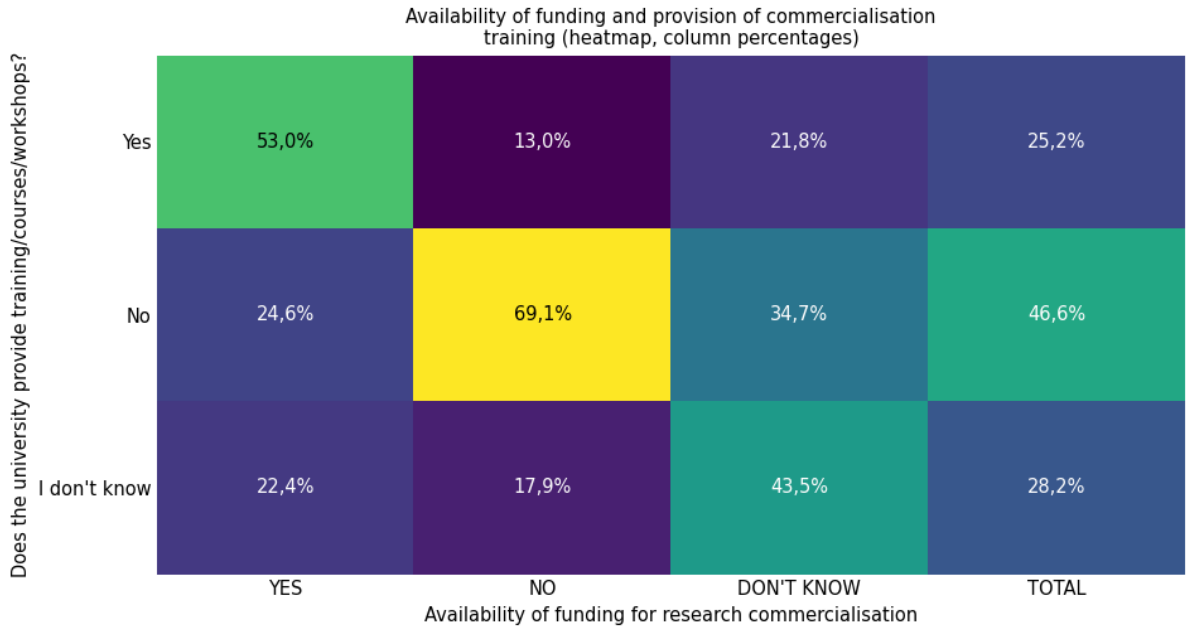
The findings indicate that the effective coherence of the entire institutional ecosystem – comprising a transparent range of competences, easily identifiable financial instruments and effective communication of the available support mechanisms – is of key importance for the effectiveness of the commercialisation support system. Where these elements remain fragmented, uncertainty among potential users increases, and the commercialisation pathway becomes accessible primarily to those who already possess institutional knowledge and relevant information resources.

Table 11. Availability of funding allocated to research commercialisation and the availability of commercialisation-related training/workshops/courses at universities/ research institutes

Does your university/institute offer training/courses/workshops etc. for doctoral students on research commercialisation?	Availability of funding for doctoral students for research commercialisation			Overall
	YES	NO	I DON'T KNOW	
Yes	53.0%	13.0%	21.8%	25.2%
No	24.6%	69.1%	34.7%	46.6%
I don't know	22.4%	17.9%	43.5%	28.2%
Total	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 32. Availability of funding and commercialisation training provision



Source: the "Research Activity of Doctoral Students" study.

At the same time, when analysing commercialisation of research results, it is also necessary to consider the collaboration between universities and research institutes and the socio-economic environment. It is precisely through relationships with

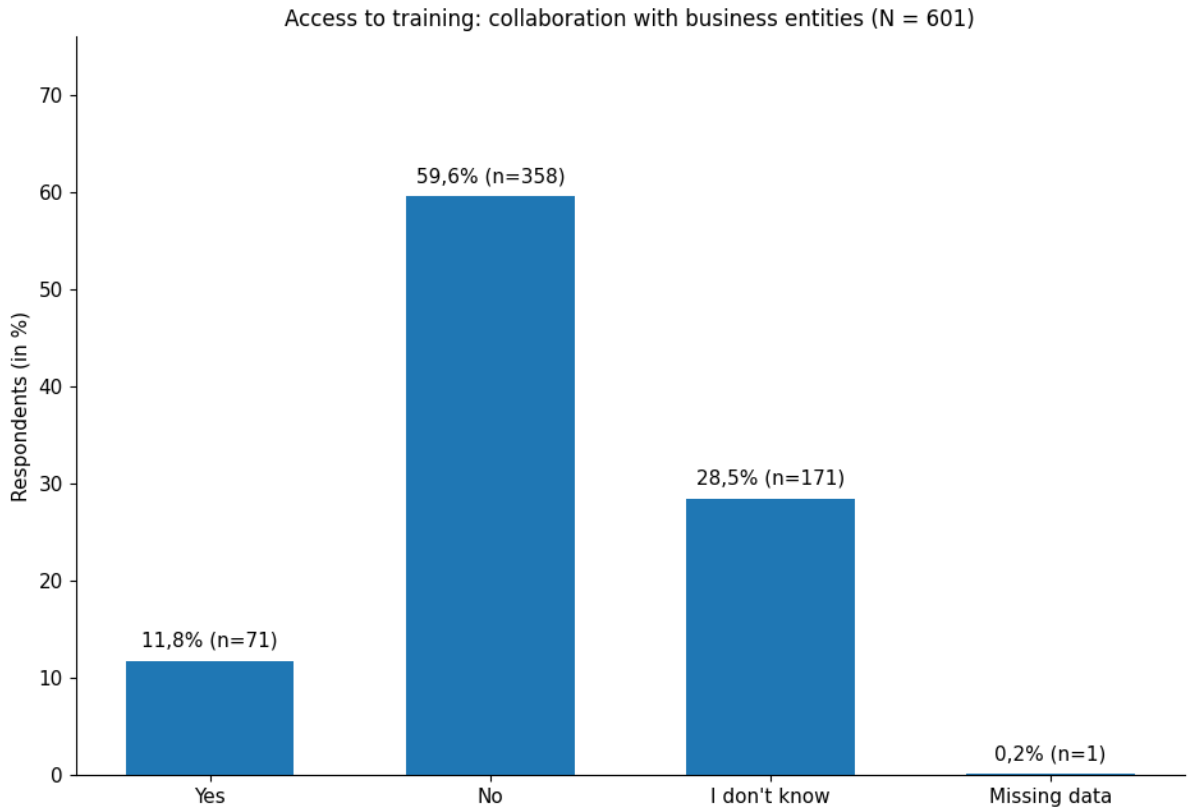
business entities, public institutions and social organisations that the practical implementation potential of ongoing scientific research is most frequently revealed. Consequently, the survey also included questions regarding doctoral students' experiences in establishing and developing cooperation with the socio-economic environment, as well as the institutional support available in this area.

Only 11.8% (71) of doctoral students reported having access to training on establishing cooperation with business entities, with 59.6% (358) answering 'no' and 28.5% (171) 'don't know' (approx. 0.2% missing data) (Fig. 33). The low reported training availability indicates that competences related to for cooperation with the business sector are not developed systematically, but remain largely outside the curriculum and the institution's regular educational offer. At the same time, the qualitative data indicate that cooperation does in fact occur, but is primarily based on individual relationships – dependent on the field, the individual researcher and existing professional contacts. This is characteristic of a situation in which scaling mechanisms such as contact brokering, cooperation standards, and procedural support are insufficiently developed. This interpretation is reinforced by findings of the literature review by Perkmann et al., where a substantial proportion of knowledge transfer occurs through various forms *of academic engagement* (including research collaboration, contracts, informal relationships), and the intensity of these activities is strongly correlated with organisational conditions and the institutional environment, not merely with the characteristics of individuals[18] . In practice, it is an indicator not only of a training gap, but also of an information and organisational gap. Doctoral students do not perceive a stable and repeatable pathway for 'how to attract and

[18] https://www.sciencedirect.com/science/article/pii/S0048733312002235

manage an external partner', so collaboration remains the domain of those already embedded within relevant professional networks.

Fig. 33. Access to training: collaboration with business entities



Source: the "Research Activity of Doctoral Students" study.

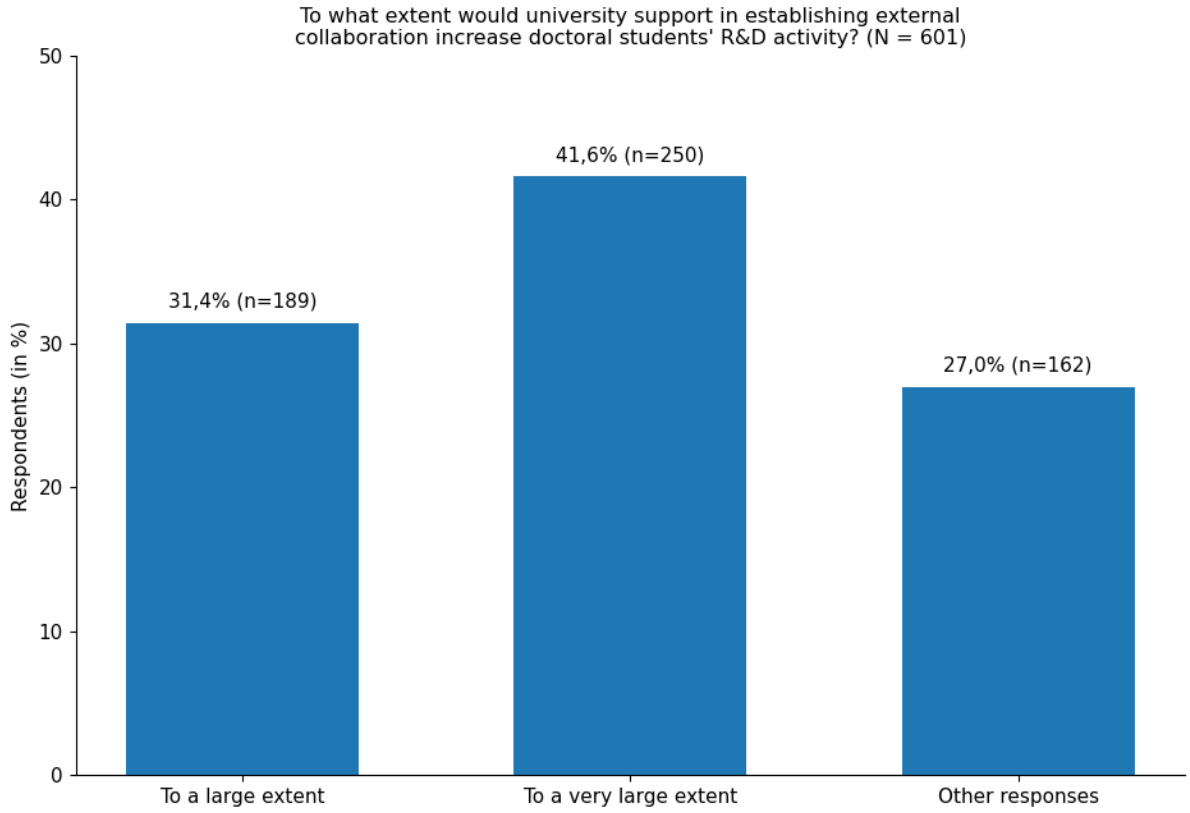
In response to the question regarding the importance of university support in establishing cooperation with the socio-economic environment to increase doctoral students' research activity, the results were very clear. As many as 73.0% of respondents indicated that such support could contribute to a large or very large extent to increasing their research activity (31.4% and 41.6%, respectively) (Fig. 34). This high proportion of responses should be interpreted as evidence of strong, yet largely untapped, potential for collaboration with the socio-economic environment. Doctoral students perceive this type of cooperation as a genuine driver of research

development, enabling access to new research problems, datasets, research infrastructure and additional sources of funding, as well as facilitating faster validation of the usefulness of research outcomes.

At the same time, the findings suggest that the barrier to undertaking this type of collaboration is primarily organisational and institutional. Doctoral students emphasised the absence of tools enabling the systematic and repeatable initiation and management of collaboration, including support in establishing contacts with external partners, transparent collaboration procedures, model agreements or administrative assistance in project implementation. The problem therefore lies not in a lack of willingness to cooperate, but rather in insufficiently developed institutional mechanisms that facilitate collaboration with the socio-economic environment.

These conclusions are consistent with OECD analyses, which indicate that effective knowledge exchange between science and the economy requires a complementary set of instruments encompassing skills development, intermediary structures, appropriate institutional incentives, and a transparent procedural framework. Research on academic *engagement* also shows that the intensity of collaboration with the wider community largely depends on organisational and institutional factors, such as the operating environment within the institution or the availability of specialised support structures. This may explain why doctoral students primarily expect practical and organisational support rather than merely general incentives to engage in cooperation.

Fig. 34. University support in establishing collaboration to enhance R&D activity

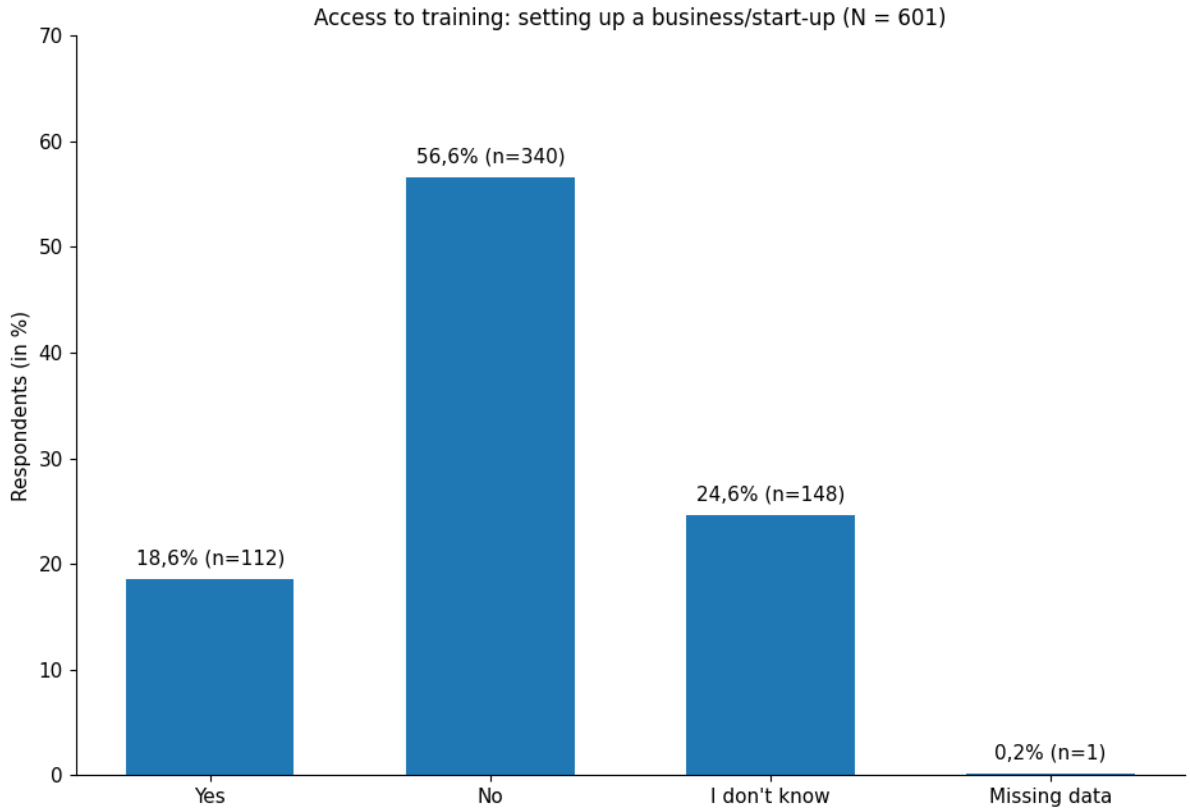


Source: the "Research Activity of Doctoral Students" study'.

Cooperation with the socio-economic environment may take various forms, ranging from participation in joint research and development projects with external partners to activities related to commercialisation of research results. One of the most advanced manifestations of such cooperation is the development of academic entrepreneurship, including the establishment of spin-off and spin-out companies and the development of start-up projects based on research results. For this reason, the survey also included questions regarding doctoral students' attitudes towards academic entrepreneurship and their experiences and plans related to launching start-up ventures.

Only 18.6% of respondents (112 individuals) reported having access to training on starting a business or establishing start-ups. At the same time, over half of the respondents (56.6%; 340 individuals) indicated that such training was not offered, while 24.6% (148 respondents) admitted that they did not know whether it was available (Fig. 35). This distribution of responses indicates that start-up skills are not treated as a standard component of doctoral education, and that existing support is selective and poorly communicated. This is consistent with comparisons to other areas: 232 respondents (38.6%) reported receiving training in science communication, and 373 respondents (62.1%) in public speaking, confirming that entrepreneurship occupies a considerably lower position within the hierarchy of available competence-development activities. As in the case of commercialisation, the high proportion of 'don't know' responses indicates a navigation barrier and a lack of a clearly identifiable support pathway.

Fig. 35. Access to training on starting a business/start-up



Source: the "Research Activity of Doctoral Students" study.

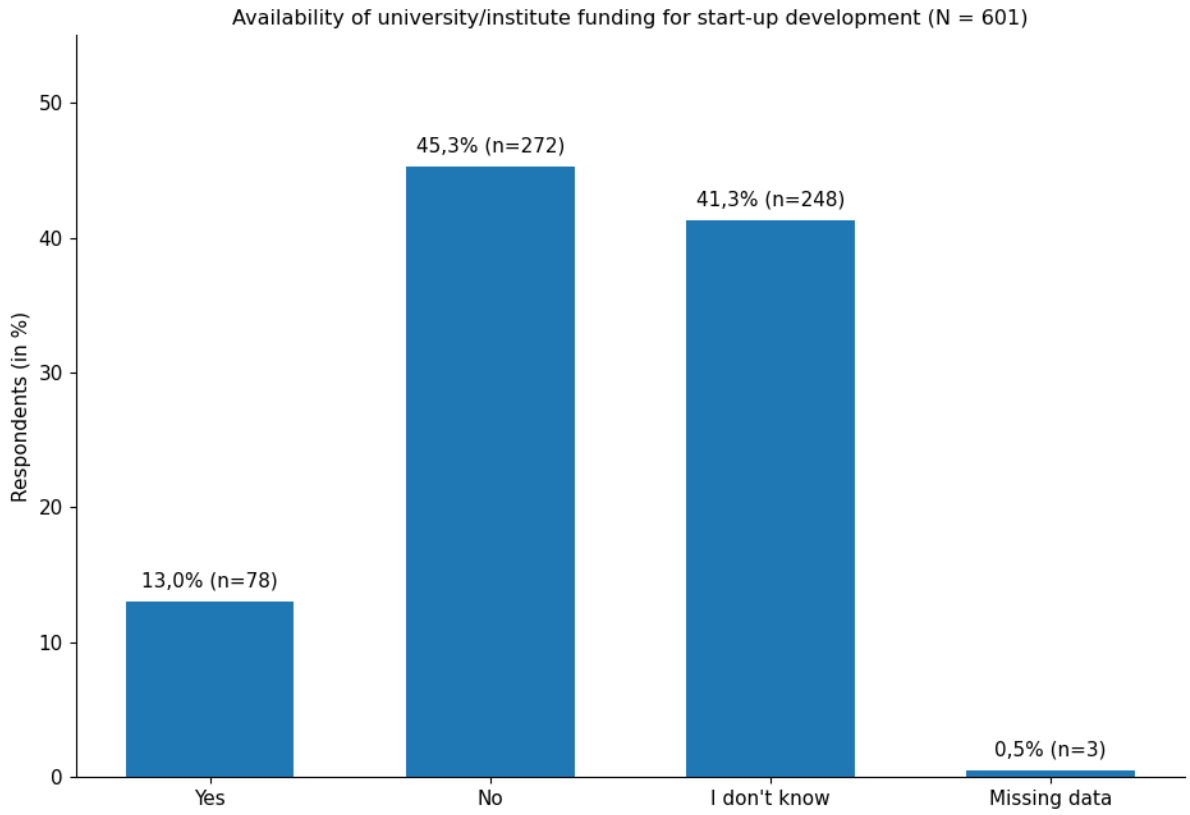
Only 13.0% of respondents (78) indicated that funding for start-up development was available at their university/institute, with 45.3% (272 respondents) answering "no" and 41.3% (248) "don't know" (Fig. 36). This distribution of responses shows that funding for start-up development remains largely "invisible" from the perspective of doctoral students. The entrepreneurial pathway does not function as a predictable element of the institutional support ecosystem, but rather as an incidental or selectively accessible option.

The cross-sectional results demonstrate that the problem also has a structural dimension related to the institutional type. Access to start-up funding is significantly higher at universities of technology/ natural sciences (29.1% "yes") than at universities

(10.6%) and at institutes of the Polish Academy of Sciences (PAN) (6.9%), where the "no" response predominates (63.8%). Importantly, the data indicate a comprehensive mechanism: where doctoral students report access to start-up funding, they are also significantly more likely to report the availability of start-up training (62.3% in the "funds: yes" group), whereas in the absence of funding, "no training" responses predominate (80.5%). This suggests that institutions which foster entrepreneurship do so through a coherent set of instruments (funding + competence development), whereas in other cases the start-up pathway remains unsupported both financially or organisationally.

The qualitative findings reinforce this interpretation. Even where business incubators formally exist, doctoral students describe the start-up pathway as burdened with practical and organisational difficulties ("a host of problems"), suggesting that the mere existence of infrastructure does not automatically translate into genuinely accessible support.

Fig. 36. Start-up development funding at the university/institute



Source: the "Research Activity of Doctoral Students" study.

The results of the cross-tabulation analysis indicate a strong correlation between the perceived availability of funding for start-up development and the assessment of whether the university/institute provides doctoral students with training, courses or workshops on setting up a business or a start-up (Table 12; Fig. 37 – heatmap). Among respondents declaring access to funding ("yes"), the majority also confirm the existence of training provision (62.3%), with a relatively low proportion of "no" (24.7%) and "don't know" (13.0%). This pattern suggests that where financial instruments are visible, the competence-development component is also more strongly developed, making the support system appear more 'tangible' and coherent.

Among respondents reporting the absence of funding ("no"), the opposite response pattern is observed, indicating a systemic deficit: as many as 80.5% of respondents simultaneously deny the existence of training programmes, while only 10.3% confirm their availability. This means that the absence of funding does not function solely as a lack of resources, but coexists with a lack of competence-development infrastructure, i.e. the elements that in practice together constitute an entrepreneurial pathway.

The findings indicate a clear correlation between the availability of financial instruments and the presence of entrepreneurship-related competence development. Where doctoral students report access to funding for start-up development, they are also more likely to confirm the existence of training courses and workshops, suggesting the presence of a more cohesive support ecosystem. A significant diagnostic indicator remains the high percentage of 'don't know' responses, which can be interpreted as a navigational barrier resulting from insufficiently clear communication about available instruments and support pathways. As respondent X2 observed: 'Many doctoral students had a lot of questions […], about where to apply, where to look for funding'.

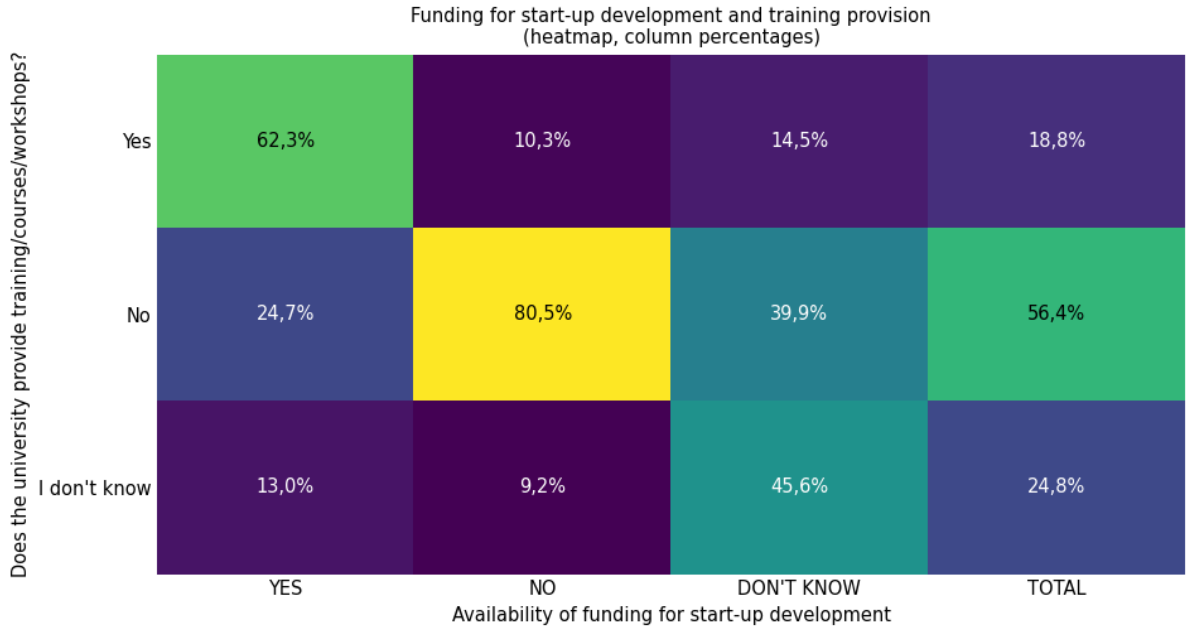
Table 12. Availability of funding allocated to start-up development and the availability of training/workshops/courses on setting up one's own business or a start-up

Does your university/institute offer training/courses/workshops etc. for doctoral students on setting up their own business or a start-up?	Availability of funding for doctoral students for start-up development			Overall
	YES	NO	I DON'T KNOW	
Yes	62.3%	10.3%	14.5%	18.8%

No	24.7%	80.5%	39.9%	56.4%
I don't know	13.0%	9.2%	45.6%	24.8%
Total	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 37. Funding for start-up development versus training provision (heatmap)



Source: the "Research Activity of Doctoral Students" study.

The overall findings suggest that, in many institutions, start-up entrepreneurship remains a path that is not so much "inaccessible" as insufficiently institutionalised: the absence of funding is accompanied by the absence of training opportunities, and uncertainty regarding funding is mirrored by uncertainty regarding available competence-development opportunities. From the perspective of designing institutional support systems, this implies the need to close the ecosystem in three dimensions: dedicated financial instruments, a clearly structured educational offer, and 'step-by-step' communication of the process (where, why and in what order), so as to reduce both 'no' and 'don't know' responses in future surveys.

III.6.2. Recommendations

Based on the findings presented above, the following recommendations regarding commercialisation of research results and academic entrepreneurship can be formulated.

Establishing a *one-stop-shop* for doctoral students in the area of commercialisation and entrepreneurship

It is recommended that each institution establish a single, clearly identifiable entry point for support related to research commercialisation and entrepreneurship (e.g., an online portal + a dedicated contact/coordinator), providing information on services, procedures and contact details. This solution should reduce the navigation barrier evident in the high proportion of 'don't know' responses and make it easier for doctoral students to begin the commercialisation process.

Organising and standardising a 'step-by-step' commercialisation pathway

It is recommended that a clearly defined sequence of actions be developed and disseminated, leading from the identification of the implementation potential of research results, through intellectual property protection, to the selection of an implementation model. The pathway should clearly indicate where and in what order a doctoral student obtains competence-based, organisational and financial support.

Introducing dedicated *proof-of-concept* microgrants for doctoral students

It is recommended that dedicated funding instruments be launched to support the 'first step' in commercialisation (e.g. prototyping, validation, intellectual property protection costs, and market assessment), with a short application process and simplified accounting. This mechanism should be easily identifiable as a separate instrument, rather than an incidental component of other programmes.

Integrating funding instruments with competence-development activities

It is recommended that support be designed in a package format, combining access to funding with available training and advisory services. The study's findings indicate that where financial instruments are recognisable, training provision is also more strongly developed, which results in a more coherent and accessible support ecosystem for doctoral students.

Providing regular expert consultations on intellectual property and implementation

It is recommended that regular expert consultation sessions (e.g. periodic consultations) be provided, covering the areas of intellectual property, preparation for commercialisation, and collaboration with external partners. The aim is to translate general educational content into practical process support and commercialisation decisions.

Standardising documentation and procedures for cooperation with the socio-economic environment

It is recommended to implement a set of document templates and a transparent approval process for collaboration (e.g. NDAs, research collaboration agreements, intellectual property ownership rules and publication policies). Such measures should reduce procedural ambiguities and make it easier for doctoral students to initiate and conduct collaboration in a consistent manner.

Strengthening institutional support for establishing cooperation with external stakeholders

It is recommended to develop intermediary mechanisms (contact brokering, matchmaking events, a database of partners and needs) and administrative support for managing external collaboration. The findings indicate that doctoral students have

very high expectations of such support as one of the most important factors increasing their research activity.

Introducing implementation and entrepreneurship mentoring for doctoral students

It is recommended to develop mentoring programmes involving practitioners (e.g. business representatives, R&D managers, implementation experts) that help translate research results into practical implementation models. The programme should support doctoral students in preparing an implementation package and navigating the institutional commercialisation process.

III.7. Science communication and outreach

III.7.1. Analysis of study findings

The popularisation and communication of science are regarded as integral responsibilities of academic institutions, as translating research findings into language that is accessible to audiences outside the scientific community helps build public trust in science and provides a rationale for public investment in research. This is reflected in national public policies, for example in the 'Social Responsibility of Science' programme, which supports initiatives that popularise and promote scientific achievements and demonstrate the practical application of knowledge in everyday life[19] . At the same time, the communication of research findings forms part of the broader framework of open science, including the expectation that publicly funded research outputs should be made more widely accessible[20] . From the perspective of doctoral education standards, Level 8 of the Polish Qualifications Framework (PRK) is

[19] https://www.gov.pl/web/nauka/spoleczna-odpowiedzialnosc-nauki-iii

[20] https://www.gov.pl/web/nauka/otwarty-dostep-do-publikacji-naukowych

also significant, as it emphasises social competences and responsibility, thus supporting the development of skills in engaging in dialogue with diverse audiences and communicating research findings accurately[21] . In this context, science communication in doctoral education should extend beyond self-presentation and encompass dissemination practices, including the selection of communication channels, adaptation of messages for different audiences, preparation of communication materials, and an understanding of the principles of credibility and transparency associated with open science)[22]. This requires integrating teaching with institutional support services (content editing, media support, access to communication channels, publishing standards) so that communication skills can be utilised systematically and consistently rather than on an ad hoc basis.

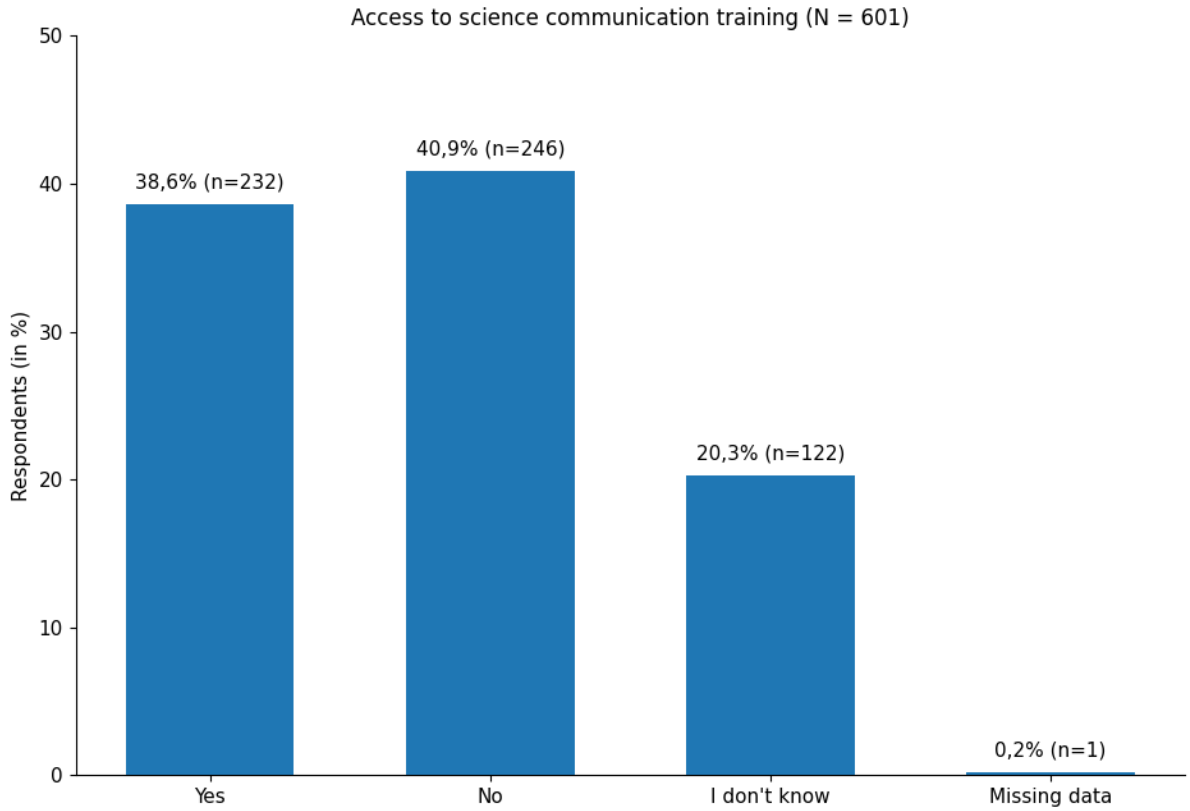
Access to science communication training is reported by 38.6% of respondents (232), the absence of access by 40.9% (246), and 'DON'T KNOW' by 20.3% (122) (Fig. 38). Compared with other implementation-oriented areas (commercialisation, collaboration with industry), this result is relatively more favourable. However, the distribution of responses indicates the absence of a uniform standard: almost half of the respondents either do not have access to training or are unable to confirm its existence, which should be interpreted as a result of the fragmented nature of the provision and limited visibility of information. Comments from the focus group discussions reinforce this interpretation by revealing considerable variation in doctoral students' experiences. Some respondents state directly that no science communication courses are available, while others refer to isolated forms of support

[21] https://kwalifikacje.gov.pl/images/downloads/materiały_do_serwisu_ZSK/tabele_PRK/PRK_tab5.pdf

[22] https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/open-science_en

(e.g. self-presentation training) and advocate the introduction of compulsory science communication modules. **This suggests that science communication functions more often as an activity dependent on the local practices of the doctoral school or organisational unit, rather than as a universally recognised and systematic component of education.** At the same time, quantitative data indicate a strong correlation between the availability of training and the respondents' assessment of the programme's effectiveness in preparing them to disseminate their own research results. In groups assessing preparedness as high, access to training was more frequently confirmed, whereas among those who assess it as low, the proportion of 'no' responses increases. Although these data do not establish a causal relationship, they consistently suggest that regular and practically oriented training functions as an element of the competence infrastructure that strengthens the sense of agency in science communication. In this sense, what matters is not only the existence of training courses, but also their format and practical applicability (editorial support, procedures for reporting achievements, access to communication channels), which is identified in the qualitative data as a barrier linked to a lack of resources and limited capacity for ongoing communication support.

Fig. 38. Access to science communication training



Source: the "Research Activity of Doctoral Students" study.

Detailed information on the preparation of doctoral students for the dissemination of research findings within doctoral school curricula is presented in the earlier section of the report devoted to doctoral school curricula.

The analysis reveals a clear and almost monotonic relationship between the respondents' assessment of the extent to which the doctoral programme prepares them to promote their own research findings and the reported availability of training in science communication. In the segments where preparedness is rated most highly, responses confirming the existence of additional training predominate: for the rating 'to a very large extent', 82.1% of respondents answered 'yes', and for 'to a large extent', and 69.0%. As the relevant rating decreases, the proportion of "no"

responses increases: for "to a small extent" it stands at 59.0%, and for "not at all" as high as 64.6%, whilst "yes" falls to 20.8% and 12.1%, respectively. A constant component of uncertainty (approx. 20% overall) also stands out as a diagnostic factor, suggesting that part of the provision – even if it is available – lacks consistent visibility and is not uniformly 'assigned' to doctoral students as an available instrument (Table 13; Fig. 39 – heatmap).

The mechanism behind this pattern is clarified by the focus group comments. As respondent X6 pointed out, some doctoral schools do not offer courses *strictly* on science communication: "No science communication courses at the Medical University of Silesia." Similarly, respondent X7 highlighted the lack of such provision, while mentioning alternative forms such as self-presentation: "As for science communication – no, we don't have such courses." However, where communication channels do exist, their effectiveness often depends on organisational resources and the flow of information: respondent X2 points out that "there aren't enough people to do the work" and that "it's hard to encourage doctoral students to send us their achievements". In the same context, respondent X7 described the potential of institutional channels, but at the same time highlighted the conditional nature of this: "it depends on whether […] those interested prepare such material".

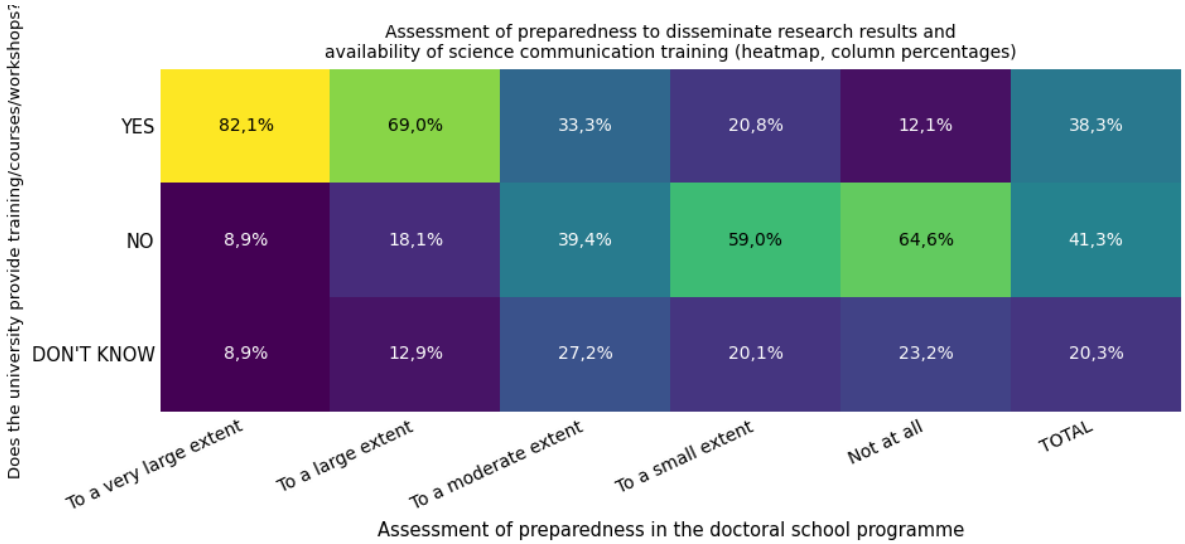
Table 13. Assessment of the doctoral school educational provision regarding the dissemination of one's own research findings and the availability of additional activities (courses, training sessions, workshops) in science communication

Does your university/institute offer training/courses/workshops for doctoral students on the dissemination of research results?	To what extent does the doctoral school curriculum prepare students to disseminate their own research findings?					Overall
	very much	to a large extent	to a moderate extent	to a small extent	at all	

YES	82.1%	69.0%	33.3%	20.8%	12.1%	38.3%
NO	8.9%	18.1%	39.4%	59.0%	64.6%	41.3%
DON'T KNOW	8.9%	12.9%	27.2%	20.1%	23.2%	20.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 39. Assessment of preparedness to disseminate results and availability of training in science communication (heatmap)



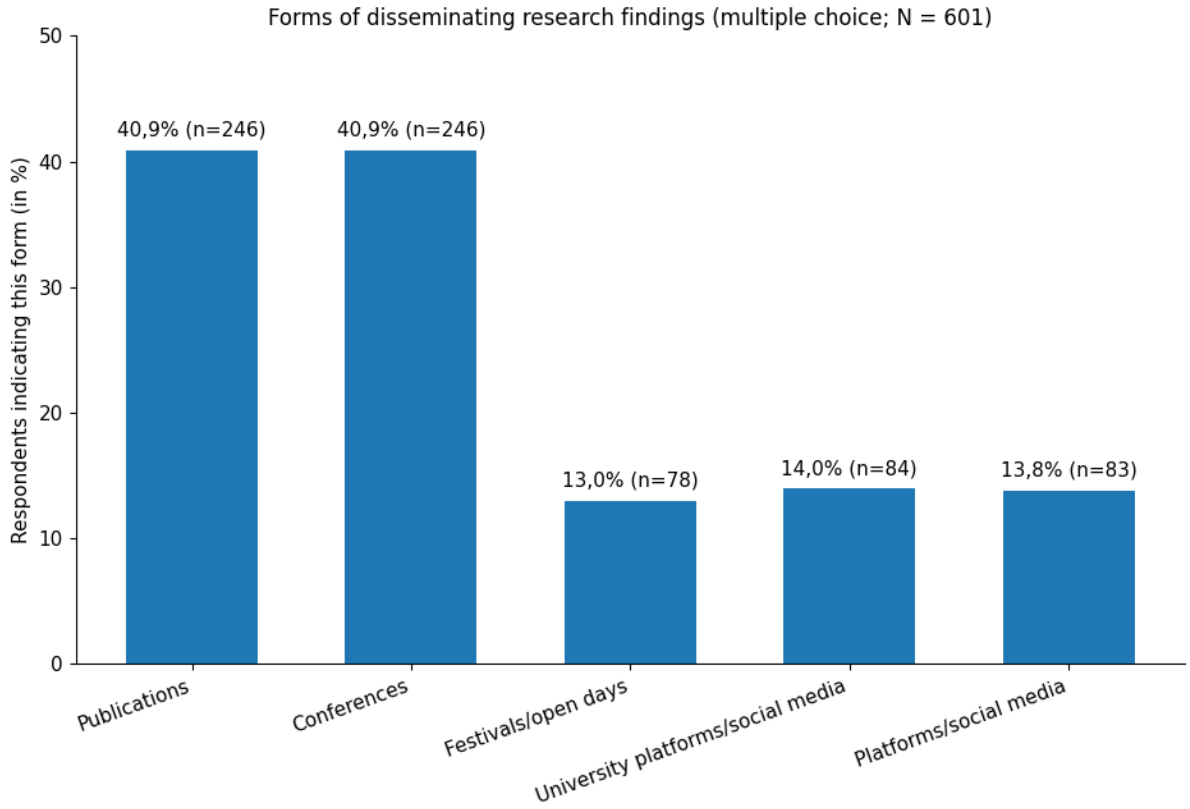
Source: the "Research Activity of Doctoral Students" study.

Responses concerning the methods used to disseminate research findings reveal a clear predominance of traditional academic channels. Both scientific publications and participation in conferences were mentioned by 40.9% of respondents (246 responses in each case). Doctoral students, however, are much less likely to mention *outreach-oriented* forms of dissemination aimed at wider audiences. Participation in science festivals or university open days was highlighted by 13.0% of respondents (78 individuals), the use of university platforms or social media – 14.0% (84), while the use of publicly available platforms and social media – 13.8% (83) (Fig. 40). **This asymmetry reflects the dominant logic of doctoral research, in which dissemination is**

primarily understood as communication within the academic community rather than with systematic engagement with audiences outside that community.

The mechanism behind this pattern is evident in the qualitative data. The statements explicitly reveal a certain standard that prioritises academic outputs (respondent X2: "publications are a must"), while examples of outreach activities (YouTube, social media, festivals) tend to appear as isolated initiatives rather than as a regular recurring element of research practice. This suggests that even if doctoral students are familiar with communication tools, in the practical balance of time and benefits (publications, conferences, supervisor requirements, deadline pressures), outreach activities aimed at a wider audience are treated as secondary, as they are not as firmly embedded in the everyday routine of the doctoral programme. Consequently, digital communication does not become a routine element, but rather an ad hoc addition, as confirmed by statements indicating that outreach activities mainly occur when there is an issue worth addressing and someone has sufficient time resources to prepare the relevant material. This explains why the reported use of digital communication channels are low and similar to one another (approx. 13–14%): there is no mechanism that would systematically transform daily research activity into communication content.

Fig. 40. Forms of disseminating findings



Source: the "Research Activity of Doctoral Students" study.

These findings indicate that science communication in doctoral students' activities remains a complementary rather than a central component of research activity. Consequently, it is important not only to analyse the forms of disseminating research results themselves, but also to assess doctoral students' competence in presenting them, as well as the existing mechanisms for recognising and rewarding dissemination activities.

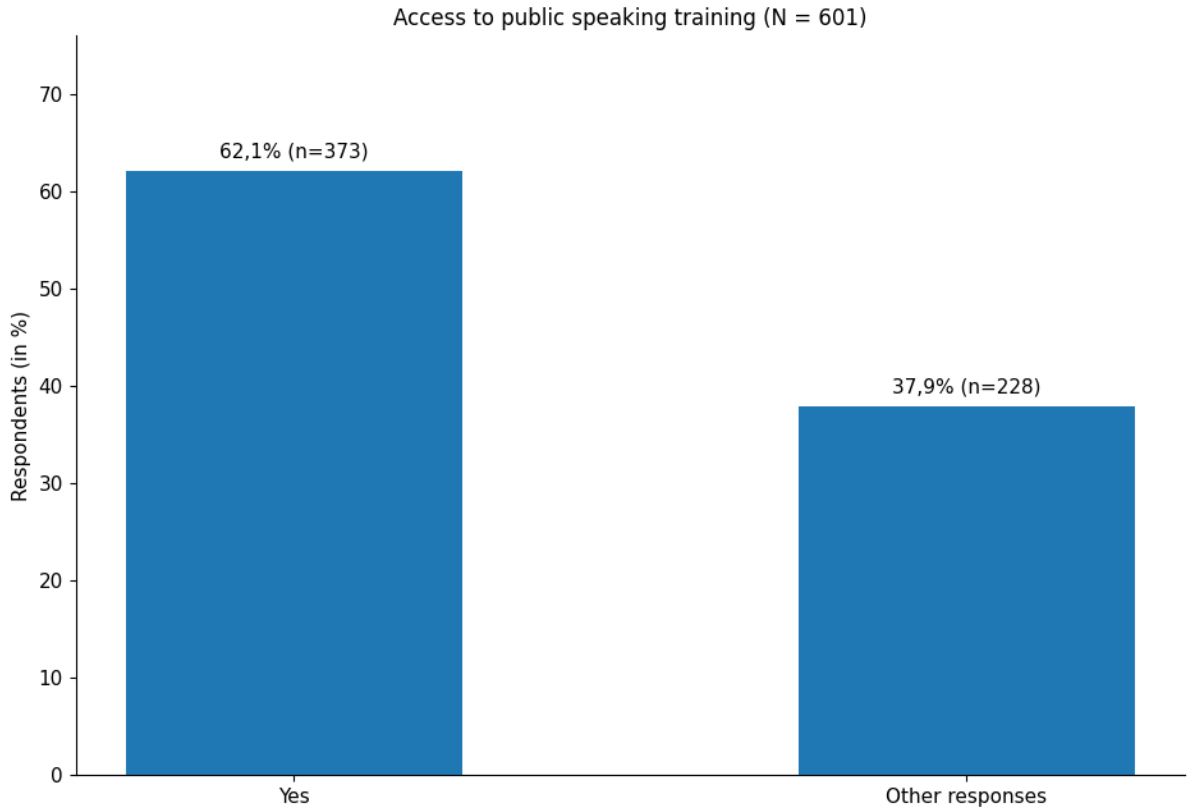
62.1% of respondents (373 individuals) report having received training in public speaking (Fig. 41). At the same time, 42.3% of respondents indicate that the doctoral programme prepares them for participation in academic debates and public speaking to a large or very large extent (171 and 83 responses, respectively). This relatively high

availability of training in public speaking and relatively good assessments of the curriculum preparation for participation in debates and the presentation of research findings indicate that this category of competence is among the strongest and most visible elements of education in doctoral schools.

This is consistent with the dominant model of doctoral education , in which the core academic activities are papers, seminars, the defence of research proposals and results, and participation in conferences, hence investment in presentation skills yields rapid and easily observable results in everyday academic practice. However, a consequence of this emphasis is an imbalance in the competence profile: areas of high value for the university's 'third mission' (commercialisation, collaboration with the socio-economic environment wider community, entrepreneurship) receive substantially lower evaluations in the study, suggesting that institutions primarily develop competences that directly support traditional academic career trajectories.

It is also worth noting that public speaking may function as a 'bridge competence'. These skills also provide an important foundation for communicating science to audiences outside academia, but only when supplemented by elements of tailoring the message to different audiences, media communication, and dissemination planning. Without these additional components, they remain primarily a tool for effective participation in academic discourse, and a high level of these skills does not automatically translate into increased activity in implementation and collaboration with the wider community.

Fig. 41. Access to public speaking training



Source: the "Research Activity of Doctoral Students" study.

The results of the analysis indicate a very strong correlation between the assessment of the extent to which a doctoral programme prepares students for public speaking/academic debates, and their reported access to additional activities (courses, training sessions, workshops) that develop these skills. Among the group of respondents who rate the study programme's preparation as "to a very large extent", the availability of additional courses is almost universally confirmed (95.2%), with a marginal percentage of "no" responses (1.2%) and a low "don't know" (3.6%). As the assessment of the curriculum adequacy decreases, the proportion of "yes" responses regarding additional activities also decreased: for "to a large extent" it stands at 81.3%, for "to a moderate extent" at 60.7%, for "to a small extent" at 31.2%, and for the rating " " it fell to ops to 25.8%. At the same time, the proportion of "no"

responses increased – from 12.3% for the "to a large extent" rating, through 22.5% for "to a moderate extent", up to 49.5% for "to a small extent" and 62.9% for "not at all" (Table 14; Fig. 42 – heatmap). This pattern is almost monotonic and suggests that positive assessment of preparation for public speaking is, in practice, correlated with the availability of a real, additional practical component, rather than merely the formal inclusion of this component in the curriculum.

Focus group comments elaborate on which educational formats are perceived as actually developing public speaking skills and why. As interviewee X2 pointed out, one specific shortcoming is the lack of *strictly* practical workshops, e.g. "voice training classes", which – in his view – are directly relevant to preparing doctoral students for public speaking and teaching. At the same time, the focus groups show that some doctoral schools develop these skills through practical "presentation" formats embedded within the educational process. Interviewee X10 describes a seminar in which doctoral students "present their research findings to date […] in such a way that everyone can understand us", including audiences from other fields or disciplines, which forces them to work on the clarity of expression and communication in their presentations. Similarly, interviewee X9 described the involvement of doctoral students in outreach activities ("Biologists' Night"), which include sessions for audiences beyond their own field of expertise, providing practical training in public presentation and communication.

In summary, the findings indicate that public speaking skills are relatively best 'embedded' within existing institutional arrangements, as they often take the form of practical, repeatable and easily operationalised activities (workshops, presentations, feedback), which translates into highly positive ratings for preparation. At the same time, in segments with low ratings of preparedness, the

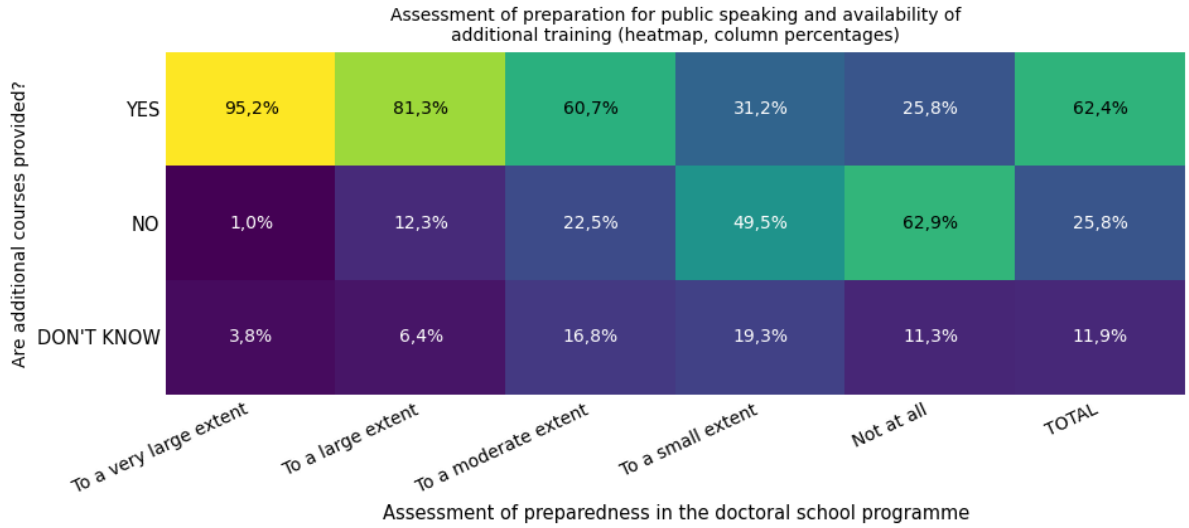
absence of additional courses predominates (49.5–62.9%), suggesting that without a practical training component and regular exposure (rather than just isolated lectures), the sense of agency rapidly declines. This is a statistical correlation rather than evidence of a causal relationship. However, the consistency of the pattern across all response categories supports the conclusion that 'additional courses' serve as an important infrastructural factor for the quality of preparation for public speaking.

Table 14. Assessment of the educational provision in the doctoral curriculum regarding the development of public speaking skills and the availability of additional activities (courses, training sessions, workshops) in public speaking skills development

Does your university/institute offer training/courses/workshops for doctoral students in the development of public speaking skills?	To what extent does the doctoral school curriculum prepare students for public speaking and conducting academic debates?					Overall
	very much	to a large extent	to a moderate extent	to a small extent	at all	
YES	95.2%	81.3%	60.7%	31.2%	25.8%	62.4%
NO	1.2%	12.3%	22.5%	49.5%	62.9%	25.8%
I DON'T KNOW	3.6%	6.4%	16.8%	19.3%	11.3%	11.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 42. Assessment of preparation for public speaking and availability of additional training (heatmap)



Source: the "Research Activity of Doctoral Students" study.

III.7.2. Recommendations

Based on the study findings presented, the following recommendations regarding the popularisation and communication of science can be formulated.

Introducing a minimum standard of science communication training

It is recommended that doctoral schools introduce a compulsory science communication component within doctoral education. These courses should primarily be delivered in a workshop format and include the preparation of materials communicating research results, such as popular science summaries, information materials or short presentations aimed at audiences outside academia. This solution would help to reduce the current fragmentation of provision and strengthen doctoral students' science communication competences.

Strengthening institutional science communication channels

It is recommended that institutional communication channels (e.g. university websites, social media, platforms and research dissemination portals) be developed and

systematically utilised, enabling doctoral students to present the results of their research. Access to these channels should be supported by simple procedures for reporting achievements, and by editorial and organisational assistance.

Developing practical science communication formats

It is recommended to support doctoral students' participation in events promoting science, such as science festivals, university open days or educational activities aimed at diverse audiences. Participation in such initiatives helps to develop the ability to communicate research findings outside the academic community and to build the societal impact of the doctoral research.

Strengthening editorial and media support for doctoral students

It is recommended that institutional services supporting science communication be developed, including editorial assistance in preparing materials to popularise research, media relations support and access to digital communication tools. These measures would help transform outreach activities from occasional initiatives into a more systematic part of the academic community's operations.

Using public speaking skills as a foundation for science communication

It is recommended that existing public speaking training courses be developed to include science communication aimed at audiences outside the academic community. These should include adapting the language of communication to different audience groups, working with the media, and preparing public engagement.

Introducing mechanisms to recognise outreach activities

It is recommended that mechanisms be introduced to recognise doctoral students' outreach activities, e.g. by incorporating them into reward systems, awards or the assessment of research activity. Such recognition could increase motivation to

undertake activities that popularise research findings and reinforce the importance of science communication in research activities.

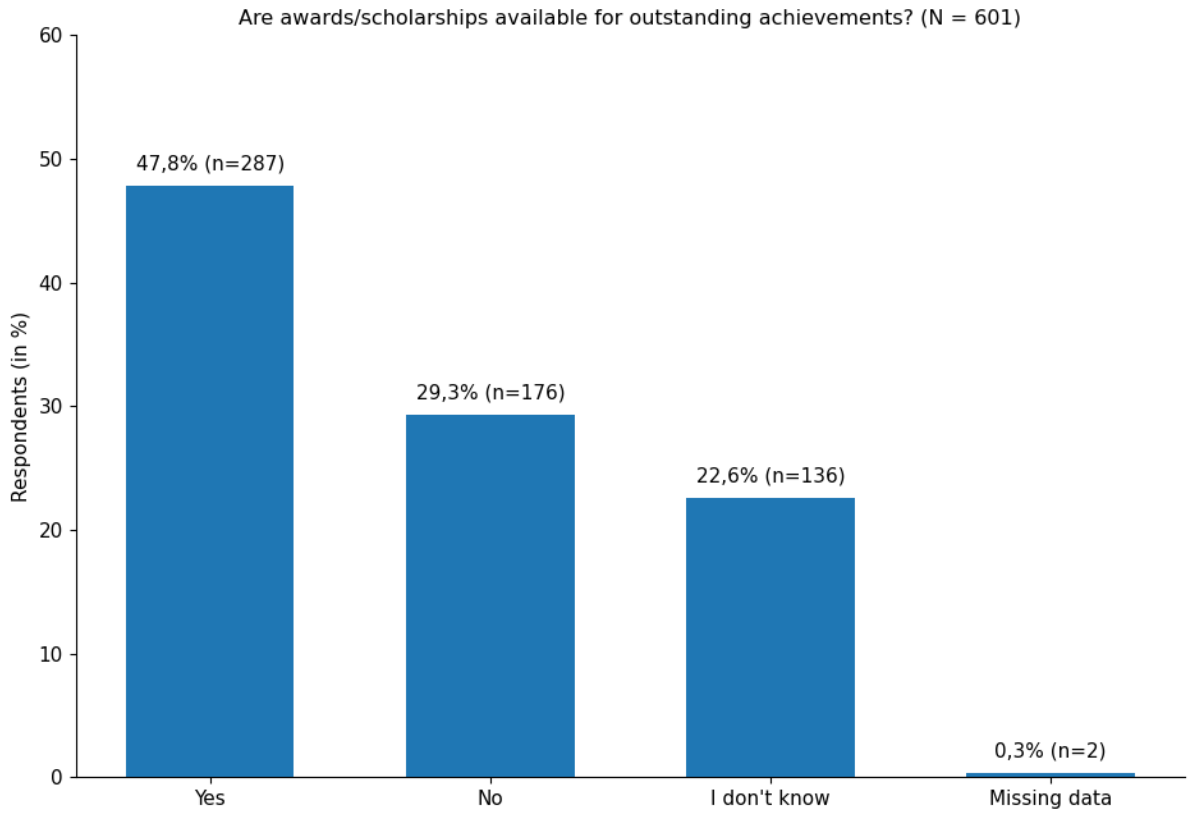
III.8. Incentive systems for doctoral students and institutional communication

III.8.1. Analysis of study findings

In the context of developing a support system for doctoral students' research activities, it is also important to consider the functioning of incentive mechanisms. A well-designed incentive system, encompassing both financial instruments and non-financial forms of recognising achievements, can significantly influence the level of doctoral students' engagement in research activities and their involvement in the academic community.

Nearly half of the doctoral students surveyed (48%) report that the university or institute where they are preparing their doctoral dissertation offers financial awards or scholarships for outstanding academic and research achievements, commercialisation of research results, or the dissemination of research findings (Fig. 43). **The distribution of responses indicates that awards and scholarships mechanisms operate inconsistently within the system, as they are available in some institutions or units but do not constitute a widely recognised and predictable standard for doctoral students.** The high proportion of "don't know" responses suggests that even where incentives formally exist, their eligibility criteria, award procedures and communication visibility are limited, which reduces their actual motivational potential. From a systemic perspective, awards serve a motivational function only when they are predictable, transparent and linked to clearly defined outcomes (e.g. publications, outreach, and collaboration with the socio-economic environment or implementation).

Fig. 43. Availability of awards/scholarships for research achievements



Source: the "Research Activity of Doctoral Students" study.

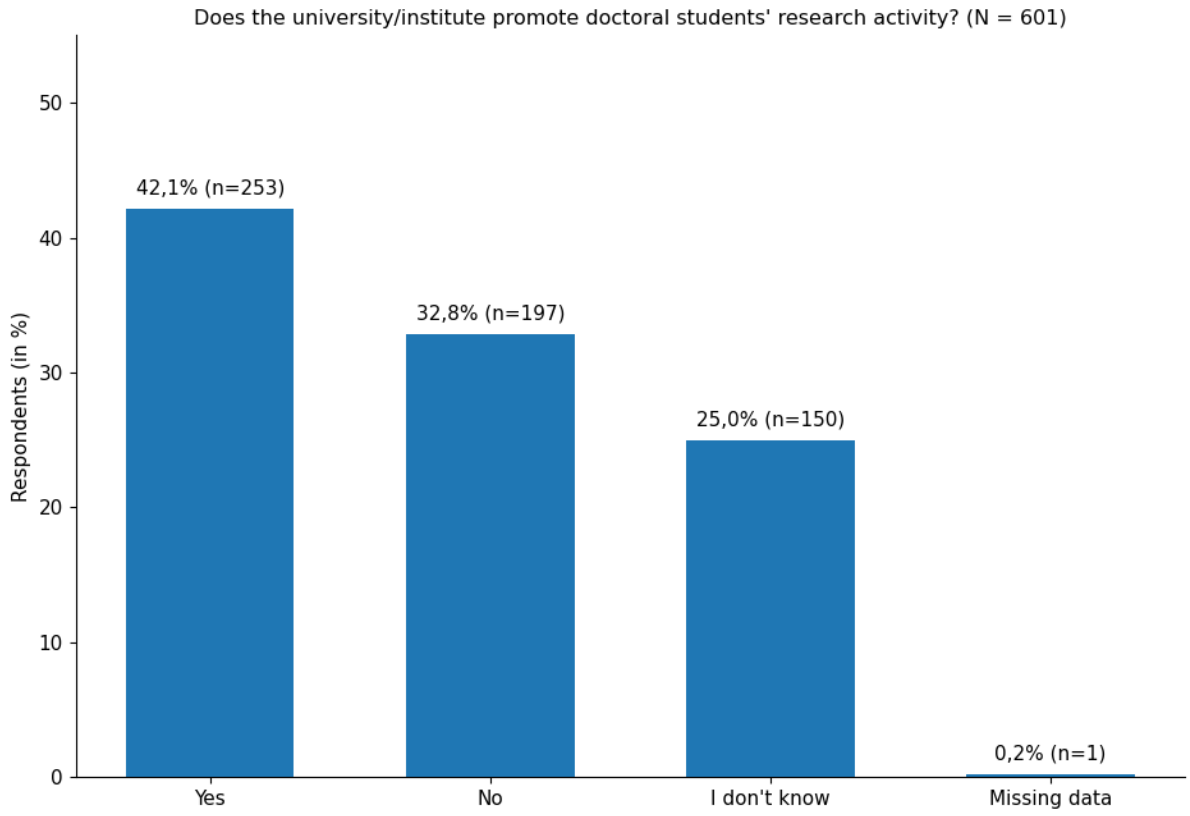
Doctoral students studying at universities of technology and natural science are most likely to receive such awards (67%). This is followed by universities (47%) and institutions classified in the survey as "other" (46%), while doctoral students at institutes of the Polish Academy of Sciences were least likely to report the availability of such support (31%). Across fields of study, it should be noted that doctoral students preparing their dissertations in engineering and technology (65%), exact and natural sciences (51%) and social sciences (48%) reported the availability of awards and scholarships most frequently. Doctoral students in medical sciences and health sciences (27%) were the least likely to mention such an opportunity. However, these differences should be interpreted primarily as a result of organisational arrangements

adopted by individual universities and institutes, rather than as a consequence of the characteristics inherent to particular scientific disciplines.

When asked whether their university promotes doctoral students' research activity, 42.1% of respondents (253) answered in the affirmative. At the same time, 32.8% of respondents (197) indicated that no such measures were taken, while 25.0% of respondents (150) stated that they had no knowledge in this regard (Fig. 44). The distribution of responses suggests that the promotion of doctoral students' research activity is not a consistent institutional standard, but is experienced selectively as some doctoral students perceive it, some do not identify it, and a significant group is unable to assess whether it exists at all. In practice, such a disparity usually reflects the fact that the communication of achievements is carried out on an ad hoc basis (e.g. for selected successes), dispersed across various channels (doctoral school, faculties, units, social media) or is not based on a consistent process of reporting and publishing information. The consequence is limited predictability: doctoral students do not know which achievements are easy to promote and suitable for promotion, where to report them, and within what timeframe they can expect publication. This absence of a clear mechanism results in inequalities in the visibility of achievements, which depend more on one's orientation within the institution and personal initiative than on a systemic communication policy. The qualitative findings clarify that the academic community's expectations do not concern merely 'publishing information about successes', but institutional mediation in external communication. Doctoral students request practical support in reaching the media and tools to facilitate the translation of academic content into a format understandable to diverse audiences beyond academia (e.g. how to prepare material for editors). This aligns with the quantitative findings regarding the perceived effectiveness of promotional activities. Project promotion and dissemination workshops are identified as significant factors in increasing

research activity, suggesting that doctoral students view communication as a practical tool for development, but expect support in the form of services (editing, distribution, media relations), rather than merely declarative promotional efforts .

Fig. 44. Promotion of doctoral students' research activity



Source: the "Research Activity of Doctoral Students" study.

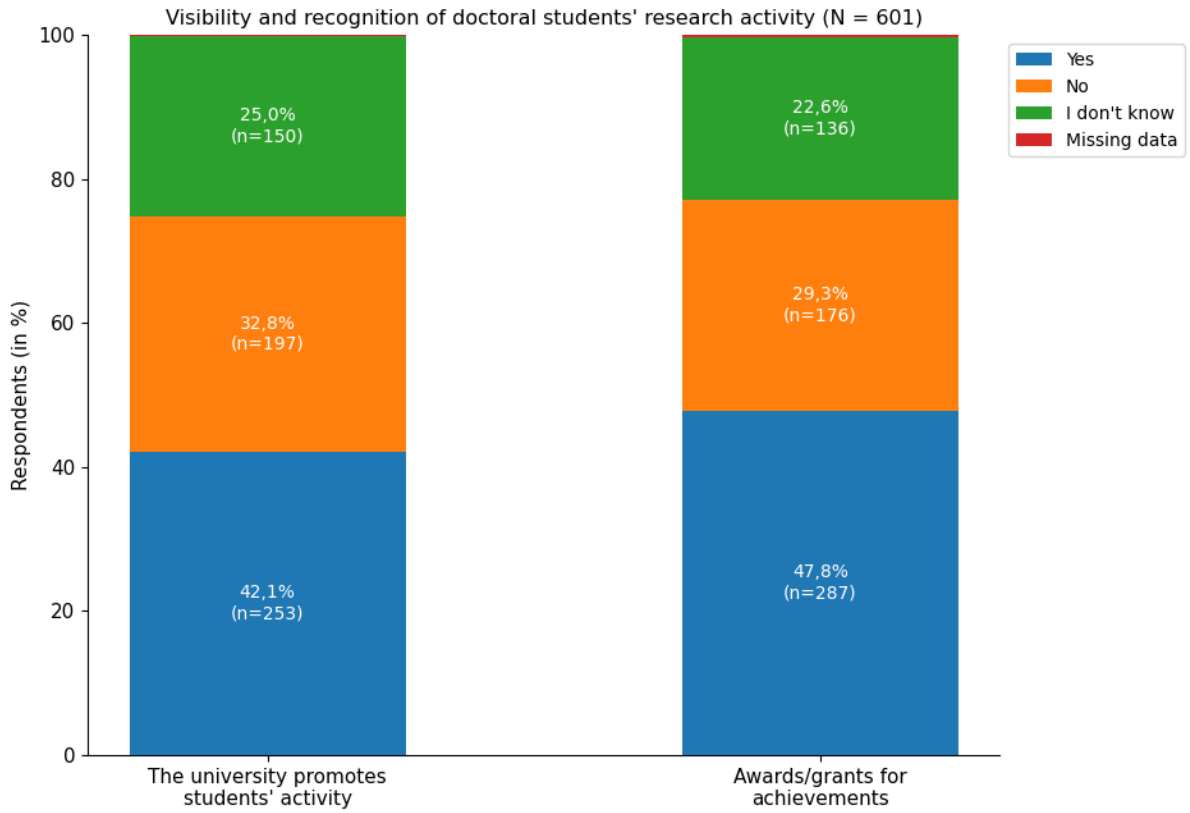
An analysis of the survey results reveals two key points. First, 'visibility' and 'recognition' are genuinely present in some institutions (42.1% of respondents confirm the existence of promotions, and 47.8% confirm the existence of awards/scholarships); and secondly, they do not functions as a predictable mechanism, as the proportion of 'don't know' responses is very high (25.0% for promotion and 22.6% for awards) (Fig. 45). This component of uncertainty constitutes a behavioural barrier, as doctoral students do not seek support whose existence and

rules they are unsure of, even if it is formally available. Focus group interviews clarify that the problem primarily concerns the selectivity and fragmentation of communication. Firstly, visibility depends on the perceived significance of the achievement. Highly prestigious accomplishments are more likely to be featured in university-wide communications, whereas routine research activities remain at the doctoral school level. This is captured in the statement by interviewee X11 who explained that "very big things" make it into the main communications, whilst other activities are "rather… at the doctoral school level" and "not… heavily promoted". This mechanism explains the coexistence of "yes" and "no" responses, i.e. that promotion "does exist", but on an event-based and selective basis, meaning that some doctoral students do not experience it directly. Secondly, the focus groups show that communication information channels are often based on grassroots and informal initiatives, which contributes directly to the large proportion of "don't know" responses. Interviewee X7 described the activity of the school's channels and the role of the student council (e.g. the selection and promotion of content), which means that the flow of information about achievements may depend on local practices and the individuals currently responsible for communication rather than on a stable institutional procedure. At the same time, there are potential professional structures (communications departments) that "might" help, but are not seen as a standard service activated automatically – interviewee X9 indicates that in the event of problems "with media coverage", the communications department is able to "promote something". This corresponds exactly to the distribution shown in the graph: instruments are sometimes available, but do not function as part of routine consistent support.

The overall conclusion is that promotion and recognition function more as "selective events" than as a predictable process encompassing the entire

population of doctoral students. In the absence of clear procedures, the visibility of achievements depends largely on one's familiarity with the institutional structure and access to local support networks.

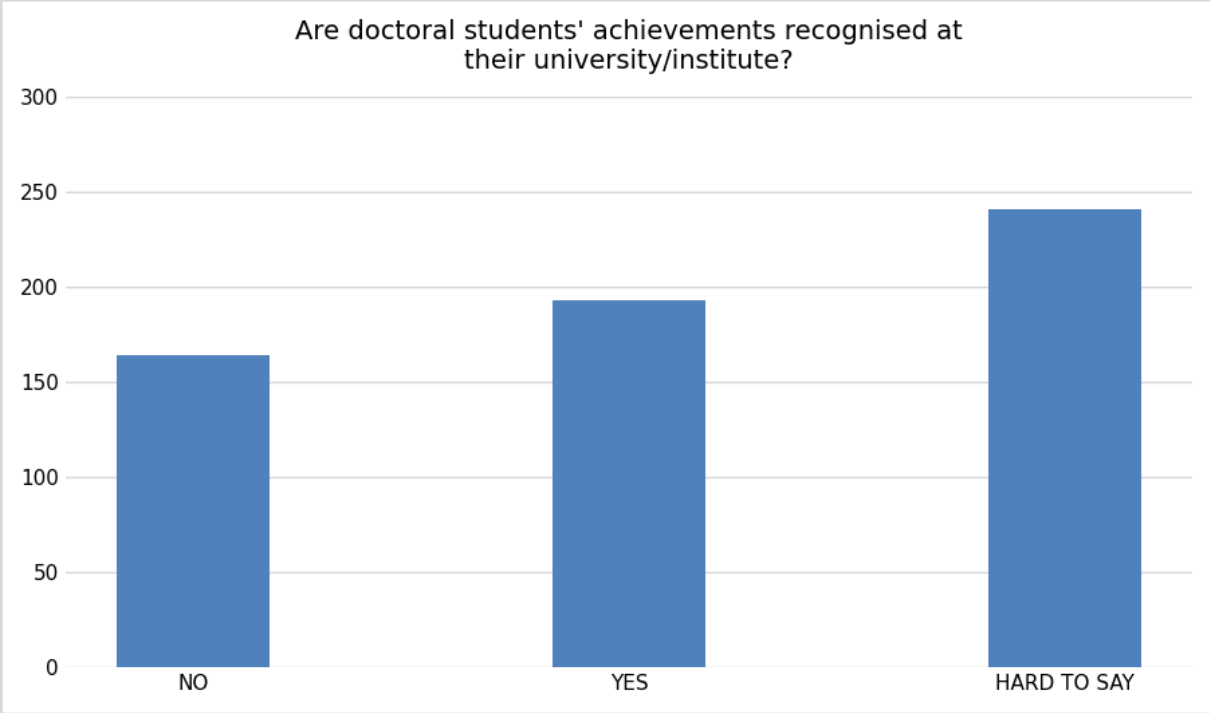
Fig. 45. Visibility and recognition of doctoral students' activities



Source: the "Research Activity of Doctoral Students" study.

The level of perceived appreciation for doctoral students' research activity at their university or institute is relatively low. Only around one-third of survey participants reported feeling that their achievements were appreciated. At the same time, as many as 40% of respondents are unable to clearly state whether their achievements are appreciated within their immediate academic community, while 28% of respondents indicated that they did not receive recognition (Fig. 46).

Fig. 46. Respondents' views on the recognition of doctoral students' achievements at universities/institutes.



Source: the "Research Activity of Doctoral Students" study.

Cross-tabulation reveals clear differences between types of institutions. The highest level of positive ratings is found in universities classified under the "other" category (48.9%) and in universities of technology and natural sciences (45.6%). In these institutions, the proportion of "hard to say" responses is also relatively lower, which may indicate greater visibility and transparency in the mechanisms for recognising achievements.

At universities, the situation is more ambiguous: only 27.3% of respondents selected 'yes', while a very high proportion selected 'hard to say' (45.7%). This may mean that even if achievements are recognised to some extent, these mechanisms are not sufficiently highlighted or communicated in a systematic manner.

At the institutes of the Polish Academy of Sciences (PAN), 32.8% of respondents stated that achievements are appreciated, yet 37.9% choose the 'hard to say' option, and 29.3% 'NO'. This again presents an ambiguous picture: a lack of clear dominance of positive assessments and a relatively high level of uncertainty. When compared with earlier analyses concerning funding and institutional support, it is evident that the institutes of the Polish Academy of Sciences do not appear to perform above the overall system average in terms of symbolic recognition of achievements.

In the opinion of doctoral students, the main factors contributing to the low level of appreciation for their achievements are the lack of financial rewards and insufficient promotion of scientific achievements through institutional websites or social media channels.

At the same time, the perception that doctoral students' achievements are undervalued may result from the relatively high assessment of the level of academic activity within this community. Nearly half of the respondents (47%) rate doctoral students' activity in this area as very high or high, while less than one in ten survey participants express critical views on this matter.

„In many institutions, there is no clearly perceptible culture of institutional recognition, which may affect doctoral students' motivation and sense of organisational belonging".

Young Science

In summary, it can be said that the mechanisms for recognising doctoral students' achievements are neither clearly established nor transparent. Many institutions lack a clearly identifiable culture of institutional recognition, which may affect young researchers' sense of motivation and organisational belonging. Differences between types of institutions suggest that the degree of visibility and formalisation of such mechanisms depends on local organisational culture, rather than on a common model of doctoral school operation.

The findings also indicate that awards and scholarships for achievements are perceived as an exceptionally strong factor in stimulating the research activity of doctoral students, regardless of the declared availability of these instruments. Overall, as many as 59.6% of respondents believed that the introduction of a system of awards/scholarships would increase activity 'to a very large extent', and a further 23.4% 'to a large extent', giving a total of 83.0% of positive responses. Significantly, a similarly high demand for such solutions was expressed among the group declaring a lack of such instruments ("no"): 67.3% of respondents here tick "to a very large extent", and 21.6% "to a large extent". This suggests that the shortage of incentives does not reduce expectations; on the contrary, it may reinforce them, as respondents view awards/scholarships as a real mechanism for increasing engagement, rather than merely a matter of prestige.

It is worth noting that even among those confirming the existence of awards/scholarships ("yes"), the distribution of responses remains concentrated in the highest categories: 60.1% of them selected "to a very large extent", and 23.8% "to a large extent". Even in the 'unsure' group ("don't know"), high ratings predominate (48.4% of responses 'to a very large extent' and 25.0% "to a large extent"), suggesting that a lack of familiarity with the system does not weaken the belief in the effectiveness of financial incentives. At the same time, the categories "to a small extent" and "not at all" remained marginal across all groups (1–4%), which indicates a broad consensus regarding the importance of financial incentives as a driver of research activity (Table 15; Fig. 47 – heatmap).

Focus group interviews help explain why financial incentives are perceived as so "effective" and what forms of recognition are regarded as real support rather than a mere symbol. As interviewee X9 described, reward schemes can have a very concrete,

"implementation-oriented" nature, including, for example, "funding for academic publications and translations", which directly reduces the financial barriers associated with the visibility of doctoral students' work. Elsewhere, respondent X11 referred to the "Per Aspera ad Astra" competition with a "financial prize of 3,000 zlotys", demonstrating that instruments rewarding achievements already exist in some institutions in a form that is understandable and communicable to doctoral students. At the same time, the focus group discussions raise an argument regarding the motivational mechanism: respondent X7 points out that "social recognition […] is very strongly correlated with remuneration", which explains why awards/scholarships are perceived as a tangible institutional recognition of doctoral students' value and contribution, rather than merely a formal distinction.

From an implementation perspective, the findings suggest that the design of a rewards/scholarship system could function as a 'lever' with a high return: there is a strong widespread demand for reward mechanisms, while at the same time the differences between the columns show that the expectation for such instruments persists even where they are currently absent. However, their effectiveness will depend on transparent procedures and communication, so that the instrument is not only available but also recognisable, predictable and applied consistently, which directly reduces the scope for 'don't know' responses and strengthens the motivational effect across the entire doctoral student population.

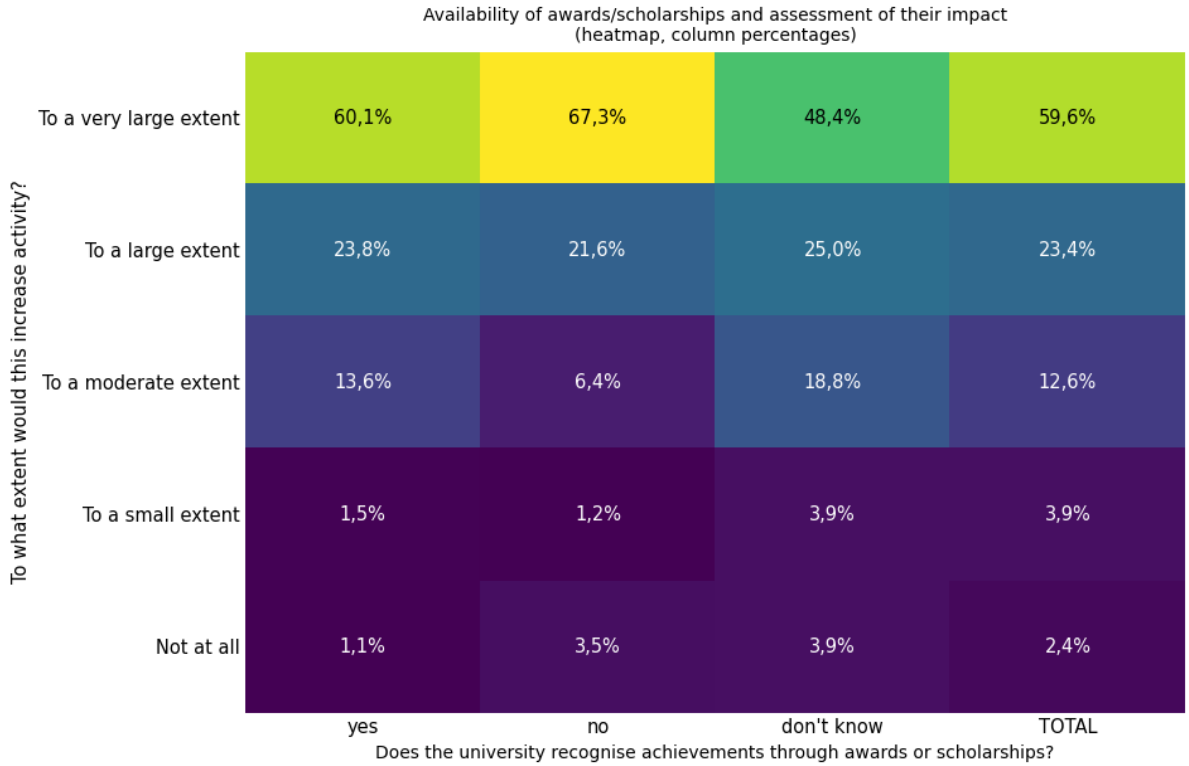
Table 15. Availability of scholarships for doctoral students' outstanding achievements and views on the role and significance of this factor in stimulating doctoral students' research activity

To what extent would the introduction of a system of awards/scholarships for doctoral students with achievements	Does your university/institute offer awards or scholarships to doctoral students for achievements in the field of research	Overall

in the field of research activity contribute to increasing their activity in this area?	activity, commercialisation or the dissemination of research results?			
	yes	no	I don't know	
To a very large extent	60.1%	67.3%	48.4%	59.6%
To a large extent	23.8%	21.6%	25.0%	23.4%
To an average extent	13.6%	6.4%	18.8%	12.6%
To a small extent	1.5%	1.2%	3.9%	1.9%
At all	1.1%	3.5%	3.9%	2.4%
Total	100.0%	100.0%	100.0%	100.0%

Source: the "Research Activity of Doctoral Students" study.

Fig. 47. Availability of awards/scholarships and assessment of their impact



Source: the "Research Activity of Doctoral Students" study.

It is also worth referring in detail to qualitative analyses of institutional communication. The respondents' statements suggest that information about doctoral students'

research is present in the university's communications, but its visibility depends on the significance of the achievement. As respondent X11 noted: "If these are really big things, like someone going somewhere, for example to the European Parliament or something like that, then it gets published on the university's main website." As it was also observed: "Activities of this sort by doctoral students are published on the website of our doctoral school […]. It's not really promoted that heavily." This means that the day-to-day research activities of doctoral students remain mainly within the scope of the doctoral school communications, and only spectacular achievements are featured in the university-wide communications.

The information channels and communication strategy of the university and institutes rely primarily on email newsletters, social media and the activities of the doctoral student council. As interviewee X7 pointed out: "My doctoral school's fan page is very active […] whatever we as the council decide should be highlighted is also sent out." At the same time, some universities have communications departments that could potentially support doctoral students in building their media presence. Interviewee X9 emphasised: "We have a communications department […], if anyone has problems with this media presence, they are able to promote something."

The communication strategy of the university and its institutes regarding the visibility of doctoral students' research focuses primarily on measurable and highly visible activities such as internships, study visits, and grants. As interviewee X11 observed: "It's more about activities such as internships […] or whether someone secures a preliminary grant or other grants." Less visible, however, are day-to-day research activities and the development of academic competences, which are not event-driven. Interviewee X4 also pointed out the inconsistency between the declared internationalisation and the university's actual internal communication practices.

The comments also suggest that doctoral students need not only the publication of information about their successes, but also support in developing an expert profile and establishing cooperation with the external stakeholders. As interviewee X7 observed: "They can come up with 100 hours of classes, but if someone doesn't reveal their secrets […]".

Taken together, these comments lead to the conclusion that doctoral students occupy an ambiguous position between the roles of student and researcher, and that in the area of communicating their achievements, no coherent institutional strategy exists for systematic communication about their research achievements. In the context of the growing importance of dissemination in academic research activity, integrating doctoral students in a systematic and consistent university communication policy is becoming a crucial component of both their professional development and the promotion of Polish science.

III.8.2. Recommendations

Incorporating doctoral students' achievements into mainstream institutional communication

It is recommended that information on doctoral students' achievements be systematically incorporated into the mainstream communication of the university or institute. Currently, the visibility of their activities is often limited to doctoral school channels, which reduces opportunities for building recognition for young researchers within the wider academic community and beyond. The regular presence of doctoral students in institutional communication can strengthen both their academic standing and the institution's public profile.

Introducing a transparent system of awards and incentives for doctoral students' achievements

It is recommended that transparent mechanisms for rewarding doctoral students' achievements be developed and systematically applied. The system of awards and scholarships should be based on clear eligibility criteria, a regular award cycle, and the public communication of results. Such solutions can play an important motivational role and strengthen doctoral students' engagement in research activity.

Strengthening institutional support for communicating research results

It is recommended that institutional services be developed to support the communication of research results produced by doctoral students, including editorial support, advice on preparing outreach materials, and assistance in selecting dissemination channels. Such measures can reduce the barriers associated with translating research findings into communication formats accessible to a wider audience.

Providing institutional mediation in doctoral students' interactions with the media

It is recommended that clear pathways be established for doctoral students to engage with the media, including support from the university's communications departments, access to editorial databases, standards for preparing media materials, and publication authorisation procedures. This will facilitate the transition from research findings to their dissemination beyond the academic community.

Integrating grassroots communication channels with the official institutional strategy

It is recommended that activities carried out by doctoral schools and doctoral student councils be integrated into the official communication strategy of the university or institute. Integrating grassroots channels with central communication (e.g. through

common publication standards or an events calendar) can increase the consistency and regularity of communication regarding the achievements of young researchers.

Developing doctoral students' competences in science communication and expert profile building

It is recommended that workshops and mentoring programmes be organised to develop doctoral students' practical skills in science communication, building an expert image, and collaborating with the social and economic environment. These programmes should be practical in nature and include, amongst other things, the preparation of media materials, the presentation of research results, and communication with various audiences.

Monitoring the impact of communication activities

It is recommended that the effects of communication activities relating to doctoral students' work be systematically monitored. Introducing a set of indicators to assess the scale and effectiveness of communication (e.g. number of publications, media materials, communication reach) would enable universities to improve their communication strategies.

III.9. Barriers to research activity

Over 40% of the doctoral students participating in the survey indicated the existence of barriers hindering their research activity. The material obtained from the open-ended question proved to be so extensive and diverse that a simple quantitative classification was deemed insufficient. Consequently, a qualitative approach was adopted, aimed at identifying a typology of the most significant constraints affecting doctoral students' research activity.

As a result of the analysis, six main categories of barriers were identified:

1. Systemic barriers – resulting primarily from the current legal regulations defining the status of doctoral students. Respondents most frequently pointed to the low level of the doctoral scholarship, which is often insufficient to ensure independent financial stability and thus forces them to take on additional paid employment. Consequently, this limits the time doctoral students can devote to conducting research and preparing their doctoral dissertation. Another significant problem is the lack of financial support following the completion of the four-year doctoral programme.

2. Financial barriers – these are among the most frequently reported constraints on doctoral students' research activities. Doctoral students highlighted the lack of, or very limited availability of, funding for their doctoral research from university or institute resources. Doctoral students studying at institutes of the Polish Academy of Sciences are in a particularly disadvantaged situation, reporting a significantly lower availability of funding for conducting research compared to doctoral students preparing their doctoral dissertations at universities.

The following opinions were expressed by respondents:

"There are clear inequalities compared to other research centres, such as the Jagiellonian University or the University of Warsaw, where doctoral students can apply for funding (I would go so far as to say that this often includes projects of lower scientific quality) from a wide range of sources, including IDUB or the doctoral student council. At the Polish Academy of Sciences (PAN) units, doctoral students do not have such privileges."

In the case of universities participating in the IDUB programme, the problem is that the amount of funding allocated to research projects is inadequate relative to the

number of doctoral students, which, according to the survey participants, creates only the illusion of its availability. The survey participants pointed out that:

"For example, research can in principle be funded from Excellence Initiative grants, but out of over 400 people in the doctoral school, only around 10 receive a grant each year, and that's in the first round of applications."

"Although the university is part of IDUB, the flow of funding for research (e.g. fieldwork) is very limited. In practice, around 5–10% of applicants receive funding for their project each year. The competition lasts for a month and closes due to the budget being exhausted."

Another problem is the low success rates in grant competitions run by the National Science Centre. Those in managerial roles also pointed out, in the qualitative study, the limited number of grant competitions specifically targeted at doctoral students. Programmes such as PRELUDIUM and '', despite their great importance for the development of young researchers, are characterised by high competitiveness and a relatively limited level of funding. Failure in a competition means having to wait several months for the next round, which delays the progress of their doctoral research. Furthermore, the study participants highlighted the lack of funds or their very limited availability for publications and participation in national and international conferences. They also pointed out that a doctoral student's situation is largely dependent on that of their supervisor: where the supervisor is carrying out a research project, the opportunities for conducting research activities are significantly more frequent. In qualitative interviews, those in managerial roles also emphasised that access to research infrastructure and opportunities to apply for grants remains, in many cases, strongly linked to the project activity of the supervisor or the research team to which the doctoral student belongs.

3. Administrative barriers – these relate both to existing bureaucratic procedures and to insufficient support from the university or institute. Doctoral students report low professional competence of some administrative staff, who are often unable to provide reliable and comprehensive information on research projects being prepared or carried out.

The following comments appeared in the respondents' opinions:

"At the aforementioned doctoral school, there is no one competent in the field of grants, public procurement, etc. There is a large 'research support' unit for the entire university, but doctoral students are neglected there. Furthermore, there is a lack of knowledge regarding how Horizon grants or other European grants operate."

"There is no department, centre or specific person with whom one could discuss a detailed action plan and technical assistance regarding commercialisation of research results. This should be someone dedicated solely to this task and with contacts across various economic sectors. Not some random lady in the department who has had further responsibilities piled onto her and has no idea what to do or how to do it."

Another problem, in the doctoral students' view, is the need to undertake administrative tasks, which they believe unnecessarily limit the time they could otherwise devote to preparing their doctoral dissertation and conducting research.

4. Barriers related to the organisation of education and teaching – these concern both the compulsory doctoral courses and teaching duties performed by doctoral students. The former are perceived by some respondents as of little use and of low academic quality. Consequently, attending them and having to prepare for assessments and exams is sometimes viewed as a waste of time.

The following opinions were expressed by respondents:

"In my research activities, what I find burdensome is the obligation to attend classes that go back to and repeat the study programme, and are conducted in a chaotic and incompetent manner; what bothers me is the obligation to prepare for and sit final exams in these subjects; I feel this is a waste of time, distracting me from my research activities and killing my motivation for academic work and further development".

Teaching duties were often perceived by doctoral students as additional duties with no direct connection to the primary aim of doctoral education, which is to conduct research and prepare a doctoral dissertation. Concerns are also raised regarding unpaid teaching as well as the institutional failure to take into account doctoral students' preferences regarding the subjects they are assigned to teach.

5. Structural barriers – these primarily concern the relationship between the doctoral student and the supervisor, and less frequently the relationship with the authorities of doctoral schools, faculties, institutes or other staff members of the units where the doctoral dissertation is being prepared. Research participants highlighted a lack of, or sporadic, contact with their supervisor. Furthermore, differences in the visions and ideas of the supervisor and the doctoral student regarding the doctoral dissertation or the research being conducted were identified as a problem, as these are perceived as limiting the doctoral student's creative initiative. At the same time, in the qualitative study with those in managerial roles, the relationship between the doctoral student and the supervisor was identified as one of the most important factors influencing the academic career development of young researchers. In many cases, it is the supervisor who acts as a mentor, introducing the doctoral student to the academic community and involving them in research and publication projects.

The following opinions appeared in the opinions of respondents in the quantitative study:

"Mainly the supervisor's attitude, and this is reflected in the subject matter: doing research 'for research's sake', without any desire to apply the subject matter to practical use. The supervisor is a specialist in one field; for commercialisation, they should either be knowledgeable in the other field themselves, or have someone in that other field whom they can rely on. Unfortunately, he is his own 'master', ignoring issues relating to that other field, and is fixated solely on his own field. This eliminates the possibility of commercialising these results."

Supervisors, as well as other members of academic staff at the university or institute, are sometimes perceived as a factor hindering the academic development of doctoral students, which – in the opinion of the study participants – is a consequence of a different approach to their own academic careers or of particular interests.

The following opinions were expressed by respondents:

"No one wants to talk to a doctoral student, and professors effectively block access to companies in a given industry so that all collaboration goes through them and the doctoral student is merely their lackey and slave. If I manage to secure a contact on my own, I won't get permission to carry out the work in the laboratory."

"Supervisors who do not participate in the international circulation of knowledge. They work locally or regionally, have a narrow network of contacts, and zero recognition. They express reluctance and are suspicious when a doctoral student, for example, wants to go on an overseas placement. This is absolutely detrimental to further attempts to secure a postdoc position and build a career."

6. Information barriers – mentioned by doctoral students just as frequently as financial constraints. These primarily concern insufficient access to information on opportunities for securing funding for research, procedures related to conducting research projects, establishing cooperation with the socio-economic environment, and the rules for research commercialisation. Respondents pointed out that the lack of transparent and easily accessible information in these areas hinders them from undertaking research initiatives and making full use of the available instruments supporting scientific activity.

The following opinions were expressed by respondents:

"I wouldn't even know who to turn to if I wanted to establish some kind of contact with the business sector or commercialise the results; there is no such advisory service."

"No one prepares us for this. If we want to find out anything on this subject, we have to look for information and announcements ourselves; these are often not available on doctoral schools' websites, so we need to know exactly where such collaborations can be established, and the only source of information is our senior colleagues, who also learnt about it from others."

Some of the barriers mentioned can be considered to significantly restrict doctoral students' research activity, yet attention should also be drawn to the rather idealistic view of education in doctoral schools present in some of the participants' opinions. This concerns, in particular, the perception of teaching and administrative duties associated with doctoral student status and the implementation of research projects.

In some of the comments, these tasks are treated as competing with scientific research, the organisational and institutional burden of which – in the opinion of some

respondents – should rest to a greater extent on the university or institute. Meanwhile, teaching, organisational and administrative duties constitute an integral part of the academic practice, and thus also a significant element in preparing doctoral students for their future academic careers.

III.10. Measures to enhance doctoral students' research activity

Identifying the barriers hindering doctoral students' research activities serves as a starting point for identifying measures that could help strengthen their activity in this area. Consequently, the study also took into account respondents' views on organisational, financial and institutional solutions which, in their opinion, could contribute to creating more favourable conditions for conducting research in doctoral schools. The following section presents the most frequently mentioned directions for such measures by doctoral students.

Analyses to date indicate that the doctoral students participating in the study take a critical view of the educational provision offered by doctoral schools in terms of its adequacy for preparing them to conduct research activity. At the same time, they point out that the content of the educational programmes largely overlaps with the topics of optional courses, training sessions and workshops offered by universities or institutes. In the respondents' opinion, however, insufficient research funding remains one of the fundamental barriers limiting the undertaking of research activity.

The results indicate that over 90% of survey participants considered the provision of funding for their own research to be a factor that could, to a very large or large extent, increase doctoral students' research activity.

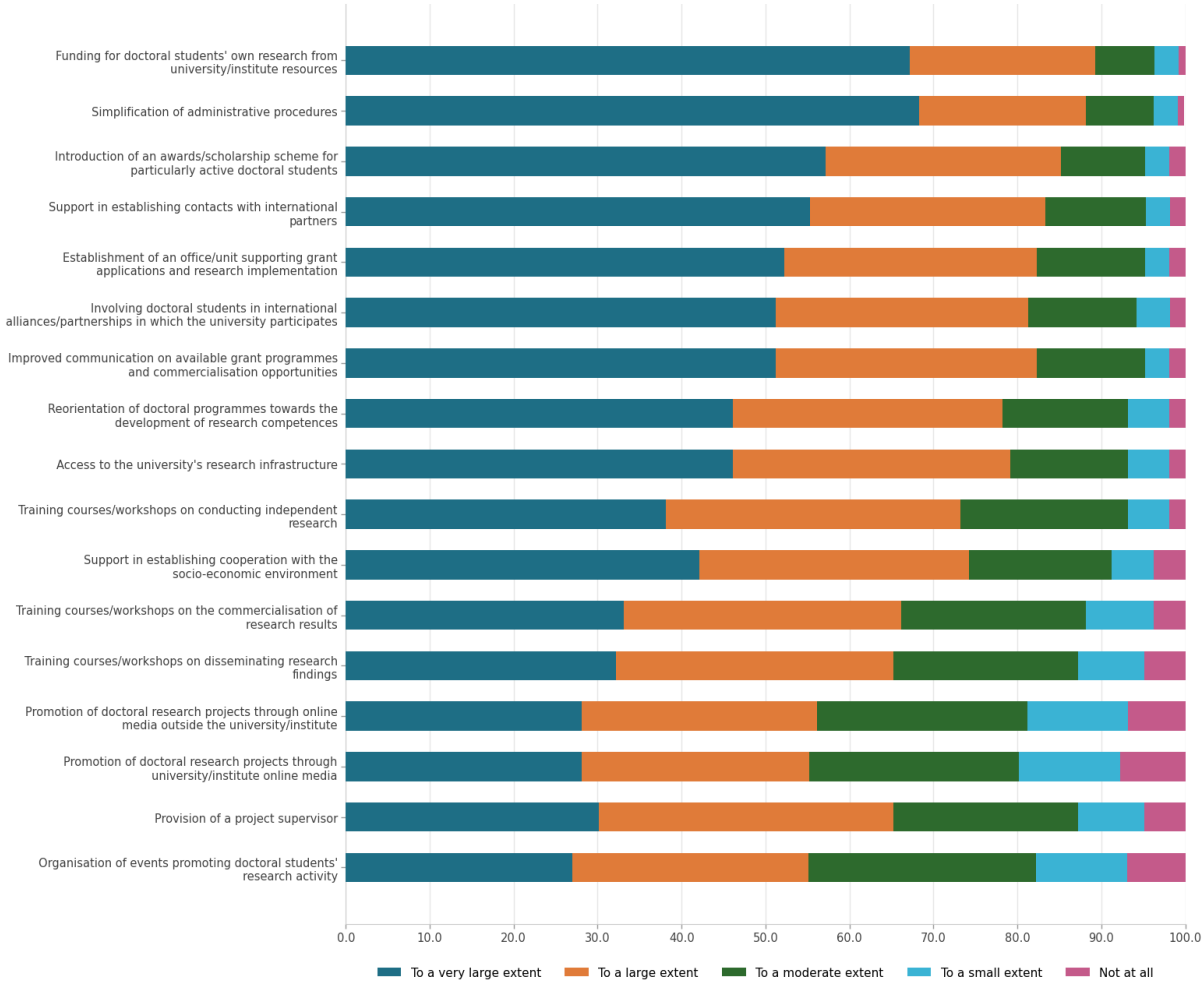
Other factors which, in the opinion of doctoral students, could significantly promote an increase in their research activity include: the simplification of administrative

procedures, the introduction of a reward system for particularly active doctoral students, and support in establishing cooperation with foreign research centres. There is a clear consistency in these proposals, as the solutions mentioned largely correspond to the barriers that doctoral students encounter in their research. The results of qualitative research (interviews with those in managerial roles) confirm the importance of international mobility as a key element in the academic development of young researchers. Respondents highlighted the role of research visits, summer schools and participation in international research projects.

Essentially, the factors that could potentially contribute most to increasing the research activity of doctoral students can be divided into three broad categories. The first comprises **financial** factors, including research funding and a system of rewards for academic achievements. The second includes administrative factors, related to the simplification of procedures and the creation of university or institute units supporting the acquisition of external research funding. The third consists of international factors, concerning the development of collaboration with foreign research centres, including support for establishing such cooperation and participation of doctoral students in existing international research teams.

Relatively less frequently – though still quite often – doctoral students point to **training** or **promotional** activities, such as organising additional training courses or publicising doctoral projects in the media and activities promoting their achievements. In interviews (a qualitative study with individuals in managerial roles), the growing importance of competences related to scientific communication emerged. Some universities have introduced courses designed to develop skills in presenting research findings, preparing publications and communicating scientific knowledge to wider audiences (Fig. 48).

Fig. 48. Measures potentially increasing doctoral students' research activity



Source: the "Research Activity of Doctoral Students" study.

When analysing the above results, it is worth noting a clear similarity between the measures reported by doctoral students as potentially conducive to increasing research activity within their academic community and the proposals put forward by undergraduates. Although the questions regarding measures that could help engage students in this area were not entirely identical to those posed to doctoral students, some of the measures identified in both surveys were very similar.

Both doctoral students and undergraduates considered the access to funding for their research, the simplification of administrative procedures, and the introduction of a

system of awards for academic achievements to be the most important measures. At the same time, doctoral students reported the organisation of events promoting their work, the provision of a project supervisor, and the promotion of their achievements in online media as the least important factors from the perspective of enhancing research activity. In the case of students, relatively little importance was attached to the organisation of training courses and workshops, the promotion of student projects in online media, and events promoting their scientific activity.

The results obtained show that, despite being at different stages of their education, the needs of undergraduates and doctoral students regarding the strengthening of their research activity are largely convergent.

III.11. Summary

The analysis conducted allows for a comprehensive assessment of the conditions under which doctoral students conduct research activities in doctoral schools and the identification of factors influencing the level of their activity in this area. The results indicate that doctoral students' research activity is shaped by a complex set of institutional, organisational and financial conditions, as well as by the quality of substantive support and the availability of resources enabling research to be carried out.

The findings show that although doctoral schools provide a formal framework for conducting research, the extent to which doctoral students are prepared to carry out research projects and develop research competences is assessed in various ways. In particular, elements related to commercialisation of research results, collaboration with the socio-economic environment, academic entrepreneurship and practical preparation for securing research funding are rated relatively poorly.

A key element of the analysis was the identification of barriers limiting doctoral students' research activity. Six main types of constraints emerge from the respondents' statements: systemic, financial, administrative, and organisational barriers related to education and teaching; structural barriers concerning relationships within the academic community; and information barriers. Among these, insufficient research funding, low doctoral scholarship levels, complex administrative procedures, and limited access to transparent information regarding research funding opportunities or collaboration with the socio-economic environment were particularly frequently reported. Some respondents also highlighted the importance of the relationship with the supervisor and the organisation of the educational process, which in some cases are perceived as factors hindering research.

At the same time, the survey results indicate a clear correlation between the identified barriers and the measures that doctoral students perceive as potentially enhancing their research activity. The most important of these is ensuring stable funding for doctoral students' own research, which over 90% of respondents considered a key factor in increasing their research activity. Great importance was also attached to the simplification of administrative procedures, the introduction of reward systems for academic achievements, and support for establishing international cooperation.

The analysis further indicates that measures to strengthen doctoral students' research activity can essentially be divided into three main areas: financial, administrative and organisational, and international. The first involves securing funding for research and mechanisms to reward scientific achievements. The second area concerns the simplification of administrative procedures and the development of institutional support for securing and implementing research projects. The third area relates to

strengthening collaboration with foreign research centres and increasing opportunities for doctoral students to participate in international research teams.

The results also show a significant convergence between the needs of doctoral students and undergraduates regarding support for research activity. In both groups, financial instruments, the simplification of administrative procedures and the systematic recognition of scientific achievements are considered essential. At the same time, promotional or training activities are viewed as relatively less important, which indicates that, for the respondents, the most important factors are measures that directly influence the ability to conduct research.

In summary, the study's findings demonstrate that the development of doctoral students' research activity requires not only the improvement of educational programmes, but above all the establishment of a coherent support system encompassing research funding, transparent organisational procedures, and institutional mechanisms supporting the academic career development of young researchers. This approach allows the doctoral school to be viewed not only as an educational structure, but also as an environment conducive to the development of independent research activity.

IV. Support for undergraduate and doctoral students in Research University (IDUB) strategies

IV.1. General remarks

A university's development strategy is a key document that specifies its long-term direction. The primary role of the strategy is to define the university's mission, vision and strategic objectives over a period of several years, as well as the means and tools necessary for their implementation. The strategy is a planning document covering the areas of teaching, research, collaboration with the socio-economic environment, internationalisation, staff development, infrastructure and the management system. It also encompasses issues related to the development of the academic community, including students and doctoral students, thus setting out the directions for supporting their education, research activities and preparation for further academic and professional careers.

The development strategy is also a key tool in the process of ensuring the quality of education and research, and serves as an important reference point in evaluation procedures (e.g. PKA assessment) and application processes (e.g. for grants or EU funding). This document also contributes to shaping the university's identity and strengthening its competitive advantage.

The Rector is responsible for drafting the strategy (Article 23(2) (3) of the PSWiN), and, following consultation with the academic community, submits the document to the university council for its opinion and to the university senate for approval. In accordance with Article 28(1) (3) of the PSWiN, the university senate adopts the development strategy and approves the report on its implementation. The university council, in accordance with Article 18(1) (1) of the PSWiN, gives its opinion on the draft

strategy. The Rector is also required to submit a report on the implementation of the strategy to the Senate covering the achievement of both the objectives and the set indicators. The development strategy typically includes an analysis of the university's current situation (including a SWOT analysis and an analysis of the external environment), a definition of the university's mission and vision, a set of strategic and operational objectives together with assigned actions, measurable performance indicators, and an implementation schedule. The document also identifies the entities responsible for carrying out specific tasks and includes a description of the mechanisms for monitoring, evaluating and updating the strategy. A properly prepared and implemented development strategy enables the university not only to respond effectively to the challenges of contemporary higher education, but also to actively shape its position and influence the local, national and international environment.

In this context, the question of to what extent and in what way the development strategies of research universities take into account support for students and doctoral students in their academic development become particularly important. An analysis of strategic documents allows not only for the identification of declared courses of action, but also for the assessment of the extent to which these objectives are operationalised through established goals, actions and indicators. The remainder of this report presents the results of a study analysing the strategies of IDUB universities in terms of measures relating to the support of young researchers.

IV.2. Analysis of the Research University (IDUB) strategy

IV.2.1. Stanisław Staszic University of Science and Technology in Kraków (AGH)

The strategy of the Stanisław Staszic University of Science and Technology in Kraków was adopted by the AGH Senate in 2022[23] . It sets out the following strategic objectives:

- modern education that is attractive to students and the wider community both at home and abroad;
- a university open to students, their professional development and the pursuit of their passions;
- a leading research university with a high standing both nationally and globally;
- a university focused on domestic and international cooperation, a leader in innovation and knowledge transfer;
- an attractive workplace for the best researchers, teachers and support staff;
- a university managed efficiently, with a modern, flexible structure.

The strategic objectives include operational objectives, which are specified by identifying planned actions and establishing indicators. Support for students and doctoral students in their academic development is mentioned in the description of two strategic objectives (Table 16).

[23] Resolution No. 93/2022 of the AGH Senate of 30 November 2022 on the adoption of the Strategy, https://bip.malopolska.pl/agh,m,401336,strategia.html.

Table 16. Support for students and doctoral students in their academic development in the AGH strategy

Strategic objective (no.)	Operational objective (no.)	Actions	Indicators
A university open to students, their professional development and the pursuit of their passions (2)	Developing an attractive range of scholarships and incentive funds for students (1)	Injecting funds from donors into the fund and engaging university graduates in the financing of the university's scholarship funds Using the scholarship fund to engage students and build a competitive advantage in the education market	Number of stakeholders, number of donors, amount of funds raised, number of scholarships awarded and paid out, number (proportion) of students benefiting from the support
A university open to students, their development professional growth and the pursuit of their passions (2)	Developing research and projects and student self-governance (3)	Creating modern spaces for student self-governance and research activities; securing additional funding for student activities	Number of projects, number of awards and distinctions, number of mentions of AGH in the media
A leading research university with a high national and global standing (3)	Recruiting and training outstanding doctoral students (3)	Emphasising a high academic standard of doctoral education Enhancing the international and national recognition of the AGH Doctoral School Improving the quality of education at the AGH Doctoral School Streamlining the organisational activities of the AGH Doctoral School	Number of Doctoral School students – overall and in the implementation-oriented doctoral programme – and the degree of internationalisation of doctoral students; ratio of the number of papers authored by doctoral students and published in journals in the top quartile in terms of citation count to the number of doctoral students

Source: the authors' analysis based on the AGH Strategy, https://bip.malopolska.pl/agh,m,401336,strategia.html.

IV.2.2. Medical University of Gdańsk (GUMed)

The strategy of the Medical University of Gdańsk was adopted by Resolution No 17/2019 of the GUMed Senate on 25 March 2019. It was amended in 2023[24] . The strategy sets out five strategic objectives:

- education – the university offers students high-quality teaching, including in soft skills, owing to modernised curricula and teaching methods;
- research – a well-established position in academia due to an increase in the number of significant grants, publications, internationalisation of cooperation and effective commercialisation of research results;
- clinical activity – a strengthened position of the university's healthcare units and intensified collaboration with them to improve the quality of teaching, research and treatment;
- organisation and people – GUMed is a well-run institution, based on a strong organisational culture and supported by modern management methods;
- organisation and people – staff achieve professional success and develop, benefiting from the university's support and its incentive and remuneration systems.

For each of the strategic objectives, metrics, operational targets and strategic initiatives – ongoing activities or projects – have been defined. These indicators relate

[24] Resolution No17/2019 of the Senate of the Medical University of Gdańsk of 25 March 2019 on the adoption of the Strategy of the Medical University of Gdańsk for 2019–2025, Resolution No 8/2023 of the Senate of the Medical University of Gdańsk of 27 February 2023 amending Resolution No 17/2019 of the Senate of the Medical University of Gdańsk of 25 March 2019 on the adoption of the Strategy of the Medical University of Gdańsk for 2019–2025; https://bip.gumed.edu.pl/attachment/attachment/90233/zal_nr_1_do_Uchwaly_Senatu_823_Strategia_GUMed_2019_2025_aktualizacja.pdf .

only to a relatively small extent directly to the support offered to students and doctoral students in their academic development (Table 17).

Table 17. Support for students and doctoral students in their academic development in the GUMed strategy

Strategic objective (no.)	Operational objective (no.)	Strategic initiatives
The university offers students high-quality teaching, including in soft skills, owing to modernised curricula and teaching methods (1)	Increasing support for students and improving study conditions (1.4)	Supporting the development of the most talented students

Source: the authors' compilation based on the Strategy of the Medical University of Gdańsk; https://bip.gumed.edu.pl/attachment/attachment/90233/zal_nr_1_do_Uchwaly_Senatu_823_Strategia_GUMed_2019_2025_aktualizacja.pdf.

IV.2.3. Gdańsk University of Technology (PG)

The Gdańsk University of Technology's strategy was adopted by Resolution No 38/2020/XXV of the Gdańsk University of Technology Senate dated 25 November 2020[25] . The strategy is of a general nature and it encompasses four strategic areas: research, education, innovation and social engagement, together with a definition of objectives. The document does not include direct references to supporting the scientific development of students and doctoral students; nevertheless, the authors of the strategy have adopted the concept that its implementation is based on operational programmes constituting a separate set of dedicated internal university documents and agreements with entities providing the university with funding to achieve the objectives set out in the strategy. Among these programmes and strategies, no references are made regarding support for the academic development of students. The 'R8 Programmes for the professional development of young

[25] Resolution of the Senate of Gdańsk University of Technology No 38/2020/XXV of 25 November 2020 on the adoption of the Gdańsk University of Technology Strategy 2020–2030; https://pg.edu.pl/files/2021-03/Strategia_PG_2020-2030.pdf.

researchers and administrative staff' programme contains only a reference to support for doctoral students.

IV.2.4. Silesian University of Technology (SUT/PŚ)

The current development strategy of the Silesian University of Technology was adopted in 2021 for the period 2021–2026[26] . It includes the following strategic objectives:

- research – conducting high-quality, world-class research and fostering innovation; achieving high scores in the evaluation of research activity;
- education – ensuring high-quality education at undergraduate and doctoral levels, based on scientific research and innovation, in cooperation with leading scientific and educational institutions and industrial partners;
- cooperation and promotion – utilising the opportunities offered by the university's location; increasing recognition, building the university's prestige and improving its position in prestigious rankings;
- human capital – supporting the individual academic and professional development of staff and doctoral students in the spirit of freedom of research and worldview, and attracting outstanding researchers;
- internationalisation – increasing the internationalisation of research and education in collaboration with leading research centres and business entities;
- university management – introducing quality-enhancing organisational changes and ensuring good internal communication and the financial capacity to achieve objectives.

26 https://www.polsl.pl/uczelnia/wp-content/uploads/sites/880/2022/02/Stategia-rozwoju-Politechnika-Slaska-2022.pdf

The strategy also sets out specific objectives and the means of achieving them. The scope of support for students and doctoral students in their academic development, as outlined in the strategy, is presented in the table below.

Table 18. Support for students and doctoral students in their academic development in the PŚ strategy

Strategic objective	Specific objective (no.)	Means of implementation
Education	Development of the student scientific movement (4)	Establishment of the Student Creativity Centre and its development as a hub for creativity and the implementation of student projects Quality-enhancing programmes, in particular those supporting and rewarding: the best students; the implementation of PBL projects; the implementation of projects within student research societies; joint publishing with students
Cooperation and promotion	Undertaking joint initiatives in research and education, including dual degree programmes, implementation doctoral programmes, PBL projects and student research societies, engineering projects and Master's theses (4)	Implementation of projects within student research societies

Source: the authors' compilation based on the Development Strategy of the Silesian University of Technology; https://www.polsl.pl/uczelnia/wp-content/uploads/sites/880/2022/02/Stategia-rozwoju-Politechnika-Slaska-2022.pdf.

IV.2.5. Warsaw University of Technology (WUT/ PW)

The development strategy of the Warsaw University of Technology was adopted in 2021[27] . It sets out strategic and operational objectives, as well as actions for the period up to 2030. It comprises the following strategic objectives:

- scientific excellence (N1);
- high visibility of research (N2);
- effective mechanisms for supporting research work (N3);
- education that takes into account the needs of the socio-economic environment and the status of a research university (K1);
- modern teaching methods (K2);
- effective quality-enhancing mechanisms in teaching (K3);
- creating a supportive ecosystem that strengthens relationships between members of the community (S1);
- promoting a culture of continuous improvement across all groups within the academic community (S2);
- introducing a programme for actively seeking out, developing and retaining talent (S3);
- building a university that values relationships and is open to new opportunities for collaboration (R1);
- increasing the effectiveness of institutional international cooperation (R2);
- building active and multidisciplinary relationships with domestic partners (R3);

[27] Resolution No 159/L/2021 of the Senate of the Warsaw University of Technology of 22 December 2021 on the adoption of the Development Strategy of the Warsaw University of Technology up to 2030; https://www.bip.pw.edu.pl/Wewnetrzne-akty-prawne/Dokumenty-Senatu-PW/Uchwaly-Senatu-PW/2021-L/Uchwala-nr-159-L-2021-z-dnia-22-12-2021.

- increasing the intensity of innovation and technology transfer activities (R4);
- developing a centre for innovative entrepreneurship for students, doctoral students and staff (R5);
- shaping modern and effective university management in a sustainable manner (Z1);
- pursuing a sound financial policy and managing the university's assets (Z2);
- organising spatial development processes (Z3).

The WUT development strategy contains several references directly or indirectly relating to supporting the academic development of students and doctoral students (Table 19).

Table 19. Support for students and doctoral students in their academic development in the WUT development strategy

Strategic objectives (no.)	Operational objectives (no.)	Actions
Scientific excellence (No. 1)	Implementing a consistent research policy (1)	Launching programmes to develop the research potential of staff and doctoral students
Research excellence (No. 1)	Ensuring comfortable and motivating conditions for research work (3)	Involving talented students with a passion for research in the work of research teams
Scientific excellence (N.1)	Introducing an attractive model for the development of young researchers (4)	Supporting and promoting the development of mentor–mentee relationships between doctoral students and their supervisors, as well as collaboration between doctoral students and research teams Introducing training courses on conscious and goal-oriented academic career development

Education that takes into account the needs of the socio-economic environment and the status of a research university (K.1)	Organising education in line with the vision of a research university (1)	Creating favourable conditions for research-oriented education (i.e. reducing class sizes, increasing access to research infrastructure) Facilitating the completion of selected parts of the study programme by students undertaking properly planned research work (in research teams and academic societies) Developing second-cycle degree programmes related to the University's Priority Research Areas Creating conditions conducive to the implementation of individual student development pathways, beginning at the start of their studies and leading towards research work Creating flexible, interdisciplinary and cross-disciplinary doctoral training pathways that facilitate the reconciliation of study with the demands of research work and mobility, in collaboration with other universities, research institutions and institutes of the Polish Academy of Sciences
Effective quality-enhancing mechanisms in teaching (K.3)	Developing financial mechanisms to increase motivation for innovative activities in teaching and to support the most talented students (3)	Expanding the scholarship system, including externally funded programmes, with a focus on particularly gifted individuals achieving measurable success (external awards, results in competitions, particularly international ones)
Creating a supportive ecosystem that strengthens relationships between members of the community (S.1)	Supporting the student research movement (4)	Constructing and developing student laboratory centres – venues for student research societies Developing solutions enabling safe and comprehensive access for students to the university's laboratory facilities

		Strengthening cooperation between research societies and the business community – establishing a sponsorship scheme Increasing the implementation potential and level of intellectual property protection for research societies Professionalising promotional and informational activities related to the student research movement Establishing an effective support system for research club supervisors Implementing a system recognising the documented achievements of research society members as learning outcomes and incorporating the supervision of research societies into staff appraisal criteria
Introduction of a programme for the active identification, development and retention of talent (S.3)	Identifying particularly gifted students and prospective students (1)	Development and implementation of programmes and effective mechanisms to support the development of particularly gifted students, such as flexible, interdisciplinary study modes within an individual tutoring system Involving the most outstanding students in ongoing research projects
Introduction of a programme for the active identification, development and retention of talent (S.3)	Attracting the most talented doctoral students, young researchers and academic staff to the university (2)	Introducing a system of housing resource management at the Warsaw University of Technology and prioritising the most talented doctoral students and undergraduates in the allocation of places in halls of residence
Development of an innovative entrepreneurship centre for students,	Disseminating knowledge and supporting activities related to innovative entrepreneurship	Professionalising support for the incubation of innovative ideas, start-ups, university technology firms (spin-offs/spin-outs), modern forms of entrepreneurship and cluster initiatives

doctoral students and staff (R.5).		Implementing the "WUT Accelerator" Programme – support for the creation and development of spin-off/spin-out companies in the field of solutions developed within the university's R&D projects

Source: the authors' compilation based on the Warsaw University of Technology Development Strategy to 2030; https://www.bip.pw.edu.pl/Wewnetrzne-akty-prawne/Dokumenty-Senatu-PW/Uchwaly-Senatu-PW/2021-L/Uchwala-nr-159-L-2021-z-dnia-22-12-2021.

IV.2.6. Adam Mickiewicz University in Poznań (UAM/ AMU)

The strategy of Adam Mickiewicz University was adopted for the years 2020–2030[28] . It contains strategic objectives, operational objectives, specific objectives and planned actions. The strategic objectives of UAM for the years 2020–2030 are as follows:

- research of the highest standard;
- the highest quality of education;
- a professionally managed university;
- a university shaping the social, cultural and economic environment.

Table 20 sets out the references to supporting the academic development of undergraduates and doctoral students contained in the AMU strategy.

Table 20. Support for students and doctoral students in their academic development in the AMU development strategy

Strategic objective	Operational objective (no.)	Specific objective	Actions
Academic excellence (1)	Ensuring that doctoral students have the conditions	Increasing the participation of doctoral	Involving doctoral students in the work of research teams (1.7.1.1)

[28] Resolution No 93/2020/2021 of the Senate of Adam Mickiewicz University in Poznań of 7 May 2021 on the adoption of the Strategy of Adam Mickiewicz University in Poznań for the years 2020–2030; https://amu.edu.pl/__data/assets/pdf_file/0025/250828/Strategia_UAM_2020-2030.pdf.

	for comprehensive academic development and the shaping of their academic careers (1.7)	students in the work of research teams (1.7.1) Developing opportunities for doctoral students' research activities (1.7.2) Developing doctoral schools that prioritise internationalisation and the quality of education (1.7.3)	Increasing external sources of funding for doctoral scholarships (1.7.2.1) Developing faculty-level support systems for doctoral students' publications (1.7.2.2) Organising seminars and summer schools (1.7.2.3) Developing mechanisms for funding research conducted by doctoral students (1.7.3.1) Securing grants and establishing research teams involving doctoral students (1.7.3.2) Developing international collaboration with other centres (1.7.3.3) Recruiting international doctoral students (1.7.3.4) Encouraging participation in exchange programmes (1.7.3.5)
Highest quality of education (2)	Education on courses run by Adam Mickiewicz University in line with the current state of knowledge, considering trends	Closer links between education and research-based learning conducted at AMU and at other research centres, including those abroad (2.1.1)	Supporting students in preparing theses and publications based on scientific research (2.1.1.2) Improving teaching methods that introduce

	in global science and the challenges of contemporary society and the economy (2.1)		students to scientific research (2.1.1.3)
The highest quality of education (2)	Providing students and doctoral students with the best possible conditions for learning and academic development (2.4)	Supporting the development of the scientific movement, student self-governance and student culture (2.4.3)	Promoting and supporting the student scientific movement (2.4.3.1)

Source: the authors' compilation based on the Strategy of Adam Mickiewicz University in Poznań for 2020–2030; https://amu.edu.pl/__data/assets/pdf_file/0025/250828/Strategia_UAM_2020-2030.pdf.

IV.2.7. Jagiellonian University (UJ)

The current development strategy of the Jagiellonian University was adopted by the UJ Senate on 26 June 2021 for the period up to 2030[29] . It sets out strategic objectives, specific objectives and planned actions. The strategy lists five strategic objectives:

- a sustainable research university, a leading scientific centre, recognised in Europe and worldwide;
- excellent education integrated with research and the wider environment;
- an open, modern university, attractive to students, doctoral students, teachers and researchers from Europe and around the world;
- a high-quality working environment and human resources management, taking into account the principles of accessibility for all;
- efficient management of organisational, financial and investment processes.

[29] Resolution No 71/VI/2021 of the Senate of the Jagiellonian University of June 2021, https://www.uj.edu.pl/documents/10172/147755975/Nowa_Strategia_UJ_wersja_polska.pdf/cabe7379-5ee6-4f70-a352-a39dce9d336e.

The table below illustrates which of these relate to supporting the academic development of students and doctoral students.

Table 21. Support for students and doctoral students in their academic development in the Jagiellonian University's development strategy

Strategic objectives	Specific objectives	Actions
A sustainable research university, a leading scientific centre, recognised in Europe and worldwide (1)	Jagiellonian University doctoral schools as an environment for the development of outstanding young academic staff — top-quality education and preparation for research and teaching activities for the most talented doctoral students from Poland and abroad (2)	Strengthening the organisational and financial infrastructure of doctoral schools and ensuring high-quality academic and organisational conditions for the scientific development of doctoral students as young researchers (1) Strengthening and diversifying the sources of funding for doctoral scholarships and support for doctoral students' research activities and international mobility (2) Strengthening teamwork and research activity based on joint research projects between doctoral students, their supervisors and members of their research teams (3) Strengthening and promoting doctoral training programmes and formats aimed at developing research and teaching competences, scientific skills, the ability to collaborate within a research team, international engagement and integration with the socio-economic environment (7)
Excellent education integrated with science and the wider environment (2)	The university as a talent incubator — attracting the most talented candidates for study and creating conditions for their optimal development, such as modern educational programmes, preparation of teaching staff, efficient administrative support and a	Developing individual learning pathways for the most gifted students (developmental university tutoring) (8) Developing student activities, cooperation with student and doctoral student councils, and improvement of the operating conditions for research societies and student organisations, in particular through the creation of spaces for independent study, the expansion of cultural and sports facilities for students and doctoral

	vibrant student environment (1)	students, and the introduction of mechanisms promoting students' social engagement (9)

Source: the authors' compilation based on the Jagiellonian University Development Strategy to 2030; https://www.uj.edu.pl/documents/10172/147755975/Nowa_Strategia_UJ_wersja_polska.pdf/cabe7379-5ee6-4f70-a352-a39dce9d336e.

IV.2.8. Nicolaus Copernicus University in Toruń (UMK/NCU)

The Strategy of the Nicolaus Copernicus University in Toruń for 2021–2026 sets out strategic objectives, operational objectives and key actions. Five strategic objectives have been adopted:

- to strengthen the university's position through significant scientific achievements addressing the challenges of the future, a talented and motivated staff, and strong partnerships within the international academic community;
- to provide education that prepares students to function and take the initiative in a rapidly changing world, through the personalisation of development pathways, the use of modern technologies and international experience, and a tailored range of supplementary educational programmes;
- to enhance the university's role and strengthen its image as an institution open to collaboration with the wider community, generating knowledge and innovative solutions, providing high-quality expert services, including medical services, as well as a socially engaged and culture-shaping institution;
- to sustainably develop an open and inclusive organisational culture in line with the university's international aspirations, in which objective assessment, trust, mutual support and the integrity of the community attract the best talent and strengthen ties with the university;

- enable the university's potential to be harnessed in a changing environment, through management that emphasises continuous improvement, the role of responsible leadership at every level, support for modern technologies, and the sustainable development of the entire community.

Table 22. Support for students and doctoral students in academic development in the NCU development strategy

Strategic objective	Operational objective	Key actions
Strengthening the university's position through significant scientific achievements addressing the challenges of the future, talented and motivated staff, and strong partnerships within the international academic community	Optimising the utilisation and development of the academic potential of the university community by fostering an open and supportive environment for academic activity (1.2)	Enhancing the competences of academic staff and doctoral students in the organisation and conduct of research and publication activities through a tailored range of training and development activities and the dissemination of good practices (1.2.1)
Providing education that prepares students to function and take initiatives in a rapidly changing world, through the personalisation of development pathways, the use of modern technologies and international experience, and a tailored range of supplementary educational programmes	Developing and promoting interdisciplinary education and link it to ongoing research activities (2.2)	Creating a development programme for particularly gifted individuals, strengthening their research skills and involving them in research activities, particularly in doctoral schools (2.2.2) Supporting the establishment of interdisciplinary research societies and closely linking their activities to research conducted at Nicolaus Copernicus University (2.2.6)

Source: the authors' compilation based on the Strategy of Nicolaus Copernicus University in Toruń 2021–2026; https://strategia.umk.pl/pliki/STRATEGIA%202021-2026.pdf.

IV.2.9. University of Warsaw (UW)

The University of Warsaw's current strategy has been adopted for the period 2023–2032[30] . It sets out priority strategic and operational objectives, which are organised around four pillars of the university's activities:

- comprehensive education;
- research excellence;
- responsible university management and infrastructure development;
- a friendly and stimulating working environment.

Despite its extensive content, the strategy does not include many references to academic support for students and doctoral students, as illustrated in the table below.

Table 23. Support for students and doctoral students in their academic development in the University of Warsaw development strategy

Pillar	Strategic objective	Operational objective
Comprehensive education	By shaping talents and attitudes, we change the world (1.1)	Enabling students to participate in ongoing research (1.1.2)
Research excellence	Streamlining processes supporting research as a path to research excellence (2.2)	An internal system of funding and development support available to all research fields and staff groups, doctoral students and undergraduates (2.2.1)

Source: the authors' compilation based on the University of Warsaw Strategy for 2023–2032; https://monitor.uw.edu.pl/Lists/Uchway/Uchwa%C5%82a.aspx?ID=6626&Source=https%3A%2F%2Fmonitor%2Euw%2Eedu%2Epl%2FLists%2FUchway%2FAllItems%2Easpx.

[30] Resolution No 299 of the Senate of the University of Warsaw of 29 June 2023 on the adoption of the University of Warsaw Strategy for 2023–2032; https://monitor.uw.edu.pl/Lists/Uchway/Uchwa%C5%82a.aspx?ID=6626&Source=https%3A%2F%2Fmonitor%2Euw%2Eedu%2Epl%2FLists%2FUchway%2FAllItems%2Easpx.

IV.2.10. University of Wrocław (UWr)

The current development strategy of the University of Wrocław was adopted on 6 May 2020[31]. It sets out the university's key development directions for the period 2021–2030. It concisely formulates strategic objectives, operational objectives and tasks. The strategic objectives are:

- the development of research activities;
- modern and effective education;
- development of collaboration with the socio-economic environment;
- development of systemic management.

The issue of supporting the academic development of students and doctoral students appears to have marginal importance in the University of Wrocław's strategy (Table 24).

Table 24. Support for students and doctoral students in their scientific development in the University of Wrocław development strategy

Strategic objective	Operational objective	Task
Modern and effective education (2)	Modern and international education and student autonomy (2.3)	Individualisation of students' educational pathways and increasing their participation in research (2.3.5)

Source: the authors' compilation based on the Development Strategy of the University of Wrocław for 2021–2030; https://uwr.edu.pl/wp-content/uploads/2021/08/resolution-no-34_2020-of-the-senate-of-the-university-of-wroclaw-dated-6-may-2020-on-the-development-strategy-of-the-university-of-wroclaw-for-2021-2030.pdf.

[31] Resolution No 34/2020 of the Senate of the University of Wrocław of 6 May 2020 on the Development Strategy of the University of Wrocław for 2021–2030; https://uwr.edu.pl/wp-content/uploads/2021/08/resolution-no-34_2020-of-the-senate-of-the-university-of-wroclaw-dated-6-may-2020-on-the-development-strategy-of-the-university-of-wroclaw-for-the-years-2021-2030.pdf.

IV.3. Conclusions and recommendations

An analysis of IDUB's development strategy reveals a clear variation in how support for students and doctoral students in their academic development is addressed. This issue is present in all documents, yet its scope, level of detail and degree of operationalisation vary.

In some parts of the strategy, support for young researchers has been clearly linked to strategic and operational objectives and categorised into specific actions. In some cases, these actions have been further supplemented with performance indicators, which enables monitoring the effects of the strategy's implementation. In the vast majority of cases, support is described in more general terms by setting out directions for action and development intentions, without assigning specific quantitative or qualitative indicators to them.

In the most comprehensive approaches, support for undergraduates and doctoral students forms part of building a research university's capacity and is directly linked to objectives relating to academic excellence and internationalisation. Key mechanisms in the strategies analysed include:

- involving students and doctoral students in the activities of research teams;
- developing doctoral schools and the strengthening of their organisational infrastructure;
- personalising the learning pathways (including tutoring);
- developing the student research movement and infrastructure for research societies;
- supporting mobility and internationalisation;
- quality-enhancing programmes and scholarship schemes.

There is a clear tendency towards a stronger and more systematic approach to supporting doctoral students than undergraduates. Support for doctoral students is more often linked to the university's research policy, the evaluation of research activity, and internationalisation. Support for undergraduates, on the other hand, more often takes the form of credit-based schemes (e.g. scholarship funds, PBL projects, development of research societies), and is less frequently presented as a comprehensive, long-term pathway for the development of research competences.

In conclusion, it should be noted that although support for students and doctoral students in their academic development is present in the strategic documents of research universities, in most cases its treatment is too superficial and insufficiently systematised. This is because general or declarative solutions predominate, whereas comprehensive and tangible support models are the exception rather than the rule. Consequently, it is worth considering a systemic change and implementing the following recommendations:

Standardising the way student and doctoral student support is addressed in university strategies

It is recommended that the way in which support for students and doctoral students is addressed in university strategic documents be standardised by clearly linking strategic objectives with operational objectives, actions and indicators of their implementation. Such a solution will increase the transparency of the strategy and facilitate the monitoring of actions taken to promote the research activity of young researchers.

Introducing a basic set of indicators to monitor the research activity of young researchers

It is recommended that a minimum set of metrics be introduced to enable the systematic monitoring of the development of research activity among undergraduates and doctoral students. These indicators may include participation in research projects, international mobility, scientific publications, participation in research teams, and the acquisition of grants and microgrants.

Clarifying institutional responsibility for the implementation of strategic measures

It is recommended that the entities responsible for implementing measures supporting the development of early-career researchers be clarified, in particular doctoral schools, teaching units, research support centres, and faculty authorities. A clear definition of institutional responsibility can enhance the effectiveness of strategy implementation and reduce the fragmentation of activities.

Strengthening systemic support for the development of students' research skills

It is recommended that a coherent, long-term pathway for the development of students' research skills be designed, covering successive stages of education, starting from the early years of study to active participation in research projects and teams. Such an approach may encourage an earlier involvement of students in research activities and help build their research potential.

Formalising mechanisms for involving students in research activities

It is recommended that mechanisms enabling the involvement of students in the university's research activities be developed and formalised, in particular through the use of methods such as *research-based learning*, academic tutoring, programmes for particularly gifted students, and systematic support for student research societies.

Developing mentoring programmes for doctoral students

It is recommended that mentoring programmes based on the mentor–mentee relationship be developed as a means of supporting the academic development of doctoral students. Such programmes can help to enhance the quality of research, build research competences and better prepare doctoral students for their future academic careers.

Increasing consistency between the university's strategy and implementing documents

It is recommended that greater consistency be ensured between the university's main strategy and its implementing documents, so that measures supporting the academic development of students and doctoral students are clearly defined at the level of operational programmes as well.

Incorporating the academic development of early-career researchers into the strategy reporting system

It is recommended that a separate category concerning the academic development of students and doctoral students be introduced in strategy implementation reporting. This will allow for the systematic monitoring of the effects of measures taken to support early-career researchers and a better assessment of the effectiveness of the implemented solutions.

V. Final conclusions and recommendations

The report presents a complex yet coherent picture of the conditions for the development of early-career researchers in Poland. The most important conclusion is that support for the research activity of students and doctoral students is, in many cases, unsystematic and depends to a large extent on local institutional practices and the quality of the immediate academic environment. **The study findings show that where a relatively comprehensive support ecosystem is in place – encompassing research funding, skills development, efficient administrative procedures and transparent information – young researchers are able to effectively develop their research activity and translate it into concrete research outcomes. In institutions where one of these elements is not functioning properly, support often becomes formal and declarative, and does not translate into real agency for young researchers.**

One of the most significant gaps identified is **the insufficient development of project management skills, understood as the ability to independently manage a research project from the planning stage to its finalisation**. The study findings indicate that many doctoral students begin their research without sufficient preparation for project management, which in practice limits their capacity to independently secure and carry out research grants. This problem is systemic in nature, as without the development of such skills, the internationalisation of research and participation in major funding programmes remain largely dependent on individual relationships with the supervisor or research team.

Another issue closely linked to this area is **preparation for teamwork and the internationalisation of research**. The findings show that international mobility,

although recognised as a key element of academic development, often remains an isolated occurrence rather than a component systematically embedded in the educational process. At the same time, the preparation of doctoral students for work in research teams, particularly in an international environment, is rated relatively low. This suggests that doctoral curricula should take greater account of the project-based character of contemporary scientific research and develop teamwork competences.

Other significant findings are also related to **commercialisation of research results and academic entrepreneurship**. The study reveals a clear deficit in the preparation of doctoral students for implementation activities and a low level of awareness of available support instruments. A high proportion of responses indicating the absence of knowledge about commercialisation opportunities or available funding suggests the existence of a substantial information barrier. In practice, this implies that even in cases where support instruments are available, they are not sufficiently identifiable or accessible from the perspective of early-career researchers.

The report's findings also clearly point to **the central role of research funding as a key driver of research activity**. Both undergraduates and doctoral students report the availability of funding for their independent research as the most important instrument supporting the development of scientific activity. At the same time, the study reveals significant differences between institutions in terms of the availability of such funding and the complexity of the procedures for obtaining and accounting for it.

The report also highlights the problem of the institutional support framework. **A significant proportion of students and doctoral students are unable to clearly identify the units responsible for supporting research activities**, suggesting that the support system is not perceived as a coherent and accessible institutional service. In

practice, this leads to the perpetuation of a model based mainly on personal relationships, in which the supervisor plays a key role, and institutional support is less visible and more variable in quality.

In the area of motivating young researchers, the study findings indicate a discrepancy between the formal existence of mechanisms for rewarding achievements and the actual sense of appreciation for scientific activity. This implies **a need to build more transparent and predictable recognition systems, based on clear and transparent criteria, and regular communication of achievements**.

Cooperation with the socio-economic environment is also of significant importance. Although young researchers recognise the potential of such relationships, **the absence of transparent procedures and instruments enabling the initiation of collaboration with external partners without an excessive administrative burden remains a barrier**.

An analysis of the strategies of universities covered by the IDUB programme indicates, however, that **support for young researchers is generally present at a declarative level, but the degree to which it is operationalised varies**. In many cases, metrics, institutional accountability, and mechanisms for monitoring the implementation of measures do not exist.

In light of the analyses carried out, a minimum set of elements can be identified that should form a coherent support system for early-career researchers. This includes, above all**, predictable funding for independent research, the development of project management skills, support for teamwork and internationalisation, a clear pathway for commercialisation of research results, an accessible institutional support system, and transparent mechanisms for recognising achievements**. Only

such a comprehensive approach can reduce inequalities between institutions and increase the real agency of young researchers within the science system.

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