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Do Flemish universities opt for interdisciplinary research? Insights from junior researchers

Authors: Katia Levecque, Justine Van de Velde, Veerle Huyghe, Eva Steenberghs, Alain De Beuckelaer

INTERDISCIPLINARY RESEARCH IN THE FLEMISH POLICY NOTES

In the 'Policy Note 2024-2029 Economy, Science, Innovation and Industry', the Flemish government again commits to a strong investment in knowledge development at universities, colleges, and strategic research centers. To facilitate a smooth flow of scientific knowledge into the societal and economic fields of work, the aim is to stimulate interdisciplinary interaction between researchers themselves, and between researchers, the business world, and societal actors, across all stages of research activities (Diependaele, 2024). The policy note of the current Flemish government seamlessly aligns with the 'Policy Note 2019-2024 Economy, Science Policy and Innovation' of the previous government (Crevits, 2019). After all, the 2019-2024 policy note explicitly stated that universities are encouraged to organize and increase the mobility of their researchers, both internationally and interdisciplinarily, and between the academic and non-academic world. PhD students must be optimally prepared for a career outside the Flemish academic world.

What exactly is meant by interdisciplinarity? Within and outside of Flanders, and in both academic and policy circles, there is no consensus on what interdisciplinary research, entrepreneurship, or innovation exactly entails (Glänzel & Debackere, 2022; Van Noorden, 2015; Zwanenburg et al., 2022). There is also no consensus on how to measure or monitor interdisciplinarity, nor on how interdisciplinarity specifically differs from transdisciplinarity and multidisciplinarity. There is more or less consensus on the general idea that, in interdisciplinarity, approaches from different disciplines are integrated into something new that transcends the separate approaches. However, when terms like 'approach', 'discipline', 'integration', or 'something new' need to be concretized in definitions, conceptualizations, or measurement tools, opinions diverge again.

INCENTIVES FOR INTERDISCIPLINARY RESEARCH

In Flanders, the lack of consensus on a precise definition and measurement/monitoring of interdisciplinarity has not incited passivity, on the contrary. In recent years, several initiatives have been taken to encourage or facilitate researchers in interdisciplinary research. This includes the establishment of an interdisciplinary panel at the Research Foundation – Flanders (FWO), various interdisciplinary research programs within Flemish universities, as well as the interuniversity initiative iBOF (ECOOM-brief 34). Furthermore, for several years now, it has been possible to earn an interdisciplinary PhD at Flemish universities: this possibility was introduced at VUB in 2011, at Ghent University in 2016, at KU Leuven and Antwerp University in 2019 (ECOOM-brief 34). In practice, this opportunity is still only used to a limited extent. Table 1 shows statistics from the Higher Education Database (DHO 2.0) of the Flemish government for the academic year 2022-2023: during this period, 30 interdisciplinary PhDs were awarded at Flemish universities out of a total of 2292 PhDs. The fact that the number of registered interdisciplinary PhDs is still very limited is not surprising, given that a doctoral track typically lasts 5 years on average (ECOOM, 2023). Moreover, we know that interdisciplinary research requires more time than monodisciplinary research before scientific output can be presented (ECOOM-brief 34). For comparison: in the academic year 2019-2020, there were 6 interdisciplinary PhDs out of a total of 1963 successfully defended PhDs (ECOOM-brief 34).

Table 1. Number of interdisciplinary PhDs and total number of PhDs defended at Flemish universities in the academic year 2022-2023

Flemish university	Number of defended interdisciplinary PhDs	Total number of defended PhDs
KU Leuven	6	926
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Antwerp University	12	277
VUB	3	245
Hasselt University + transnational University Limburg (tUL)	0	90

Total	30	2292

Source: DHO 2.0

DEFINING AND MEASURING INTERDISCIPLINARY RESEARCH

Precisely because of the lack of consensus on defining and measuring interdisciplinarity, it remains unclear how widespread interdisciplinary research actually is and what its impact is for society and the economy. Tentative attempts to measure the evolution and impact of interdisciplinary research are usually based on bibliometric analyses. Athough this approach has its merits, it cannot provide insights into the extent to which the pool of researchers, through interdisciplinary research, develops interdisciplinary knowledge, competencies, and networks. When interdisciplinary knowledge, competencies, and networks develop in researchers, this not only affects the academic environment, but also the non-academic workforce. This occurs through the communication of interdisciplinary research findings, through collaborations between universities and organizations from other sectors, and through the hiring of researchers who have left the university. Statistics show that about 9 out of 10 researchers eventually leave the university (see ECOOM-brief 39). Readers interested in whether or not interdisciplinary research has an added value for the further careers of researchers are referred to ECOOM-brief 34.

In what follows, we do not opt for a bibliometric analysis of interdisciplinarity, but instead we focus on interdisciplinary research as reported by the population of junior researchers at Flemish universities in 2023. We use data collected through the *Survey of Junior Researchers* 2023. This survey was administered by ECOOM HR in R&D and is directed at all junior researchers at the five Flemish universities. For more details on the data collection, respondents, and the topics covered, we refer to ECOOM-brief 51. In 2023, the question *'Is your research interdisciplinary?'* was included for the first time. For reasons already addressed, we did not provide respondents with an explicitly formulated definition of the concept 'interdisciplinarity'. The response options were 'yes' or 'no'.

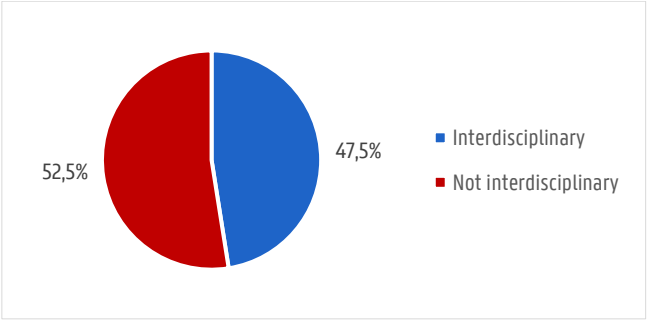
In the current ECOOM-brief, we pose the following research questions:

1. *How widespread is interdisciplinary research at the Flemish universities?*
2. *Are there differences according to gender and nationality?*
3. *Are there differences according to doctoral status, type of appointment, and working regime?*
4. *Are there differences according to scientific cluster and university?*

HOW WIDESPREAD IS INTERDISCIPLINARY RESEARCH AT THE FLEMISH UNIVERSITIES?

Figure 1 shows how many junior researchers responded affirmatively or negatively to the question *'Is your research interdisciplinary?'*: 47.5% of respondents answered 'yes'.

Figure 1. Own research perceived as interdisciplinary research by junior researchers in Flanders, 2023 (N=4550)



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In Table 2, we examine whether there are differences according to sociodemographic characteristics.

Table 2. Own research perceived as interdisciplinary research by junior researchers in Flanders, 2023: differentiation according to gender and nationality (N=4550)

	Interdisciplinary research %	Sign. $
Gender		n.s.
Male	49.1	
Female	46.2	
Nationality		***
Belgian	41.2	
EU27	51.0	
Non-EU27	60.5	

Note. ($) significance based on the Chi²-test
n.s.=not significant *** =p<0.001

Regarding gender, we do not observe a statistically significant difference in the extent to which junior researchers report their research as interdisciplinary: we note 49.1% among men and 46.2% among women.

When looking at nationality, it appears that junior researchers with a foreign nationality engage in significantly more interdisciplinary research. We note that approximately two out of five Belgian researchers, one out of two EU27 researchers, and three out of five researchers from non-EU27 countries report conducting interdisciplinary research.

ARE THERE DIFFERENCES ACCORDING TO DOCTORAL STATUS, TYPE OF APPOINTMENT, AND WORKING REGIME?

Focusing on job and employment characteristics, Table 3 highlights that interdisciplinary research is less common among junior researchers in PhD tracks (47.1%) compared to researchers who are not pursuing a PhD (57.7%).

Table 3. Own research perceived as interdisciplinary research by junior researchers in Flanders, 2023: differentiation according to doctoral status, type of appointment, and working regime (N=4550)

	Interdisciplinary research %	Sign. §
PhD track		**
Yes	47.1	
No	57.7	
Type of appointment		***
Academic assistantship	38.3	
Belgian personal scholarship	42.5	
Foreign personal scholarship	58.9	
Project funding	51.6	
No university funding	49.8	
Other	48.1	
Working regime		*
Full-time researcher	46.8	
Part-time researcher with no other job	51.9	
Part-time researcher with other job	54.3	

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* = p<0.05 ** = p<0.01 *** =p<0.001

And what about type of appointment? Again, we see significant differences. The highest percentage of interdisciplinary research is found among junior researchers with a personal scholarship from abroad: nearly three out of five answer 'yes' to the question on interdisciplinary research. Next, we observe interdisciplinary research in about one in two researchers in the categories 'project funding', 'no university funding', and 'other'. The lowest level of interdisciplinary research is found among academic assistants and junior researchers with a Belgian personal scholarship. Readers interested in more details about the origin of the personal scholarships among the respondents in the *Survey of Junior Researchers* 2023 are referred to ECOOM-brief 51.
Zooming in on working regime, we again see significant differences: junior researchers working full-time report less interdisciplinary research than part-time researchers. For full-time researchers, we note 46.8%. Those conducting part-time research at a university, whether or not combined with another part-time job, more frequently report engaging in interdisciplinary research. Among part-time researchers with no additional job, we found 51.9%. Of the part-time researchers who do have another part-time job, 54.3% indicated that their research is interdisciplinary.

ARE THERE DIFFERENCES ACCORDING TO SCIENTIFIC CLUSTER AND UNIVERSITY?

When we shift the focus from sociodemographic and job/employment characteristics to the research context, then Table 4 informs us about the extent to which interdisciplinary research occurs across different scientific clusters and universities.
Looking at scientific cluster as reported by the respondents during the survey, we observe no statistically significant difference between STEM and non-STEM. We note that 48.4% and 45.8% of respondents, respectively, indicate that their research is interdisciplinary.

Tabel 4. Own research perceived as interdisciplinary research by junior researchers in Flanders, 2023: differentiation according to scientific cluster and university (N=4550)

	Interdisciplinary research %	Sign. §
Scientific cluster (1)		n.s.
STEM	48.4	
Non-STEM	45.8	
Scientific cluster (2)		*
Natural sciences	45.7	
Engineering and technology	50.7	
Medical and health sciences	47.8	
Agricultural, veterinary and food sciences	48.3	
Social sciences	43.3	
Humanities and the arts	50.7	
Universiteit		n.s.
KU Leuven	48.6	
Ghent University	46.6	
Antwerp University	45.3	
VUB	47.1	
Hasselt University	55.7	

Note. (§) significance based on the Chi²-test
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The differences do become statistically significant when refining the categorization of scientific cluster. We see that junior researchers in the social sciences report the least amount of interdisciplinary research (43.3%), followed by the natural sciences (45.7%). Slightly higher percentages are found in the medical and health sciences (47.8%) and agricultural, veterinary, and food sciences (48.3%). Similar statistics are found for engineering and technology as for the humanities and the arts (50.7%).
Finally, we examined whether statistics differed between the universities. Table 4 clearly shows that they do not. Between universities, statistics vary from 45.3% at Antwerp University to 55.7% at Hasselt University, but the differences are not statistically significant.

DISCUSSION

To date, there is little scientific research focusing on interdisciplinary research from a human capital perspective: who chooses interdisciplinary research? How does it come about and how does it develop? How is it carried out in an interdisciplinary team? Which human and organizational factors facilitate or hinder the flow of knowledge, knowledge sharing, and knowledge integration into new insights or products? What is the impact of interdisciplinary knowledge, skills, and networks on the later careers of researchers, both within and outside the academic world?
In ECOOM-brief 34, we explored the (almost exclusively foreign) literature and investigated which researchers engage in interdisciplinary research, what personality traits, motivation, skills, and competencies facilitate successful interdisciplinary research, and what the added value of interdisciplinary research is for researchers' careers. In ECOOM-brief 47, we reported on our 2023 research in

collaboration with ECOOM-UHasselt, exploring the data of 315 postdocs and professors in Flanders. We explored which factors (de)motivate interdisciplinary research and also examined whether there are differences according to gender, scientific cluster, and position.

In the current ECOOM-brief, we focus on junior researchers at the Flemish universities. Looking at the number of official interdisciplinary PhDs awarded in 2022-2023 as a measure for interdisciplinary research, this low number suggests that junior researchers hardly conduct any interdisciplinary research. However, when we ask junior researchers themselves in the *Survey of Junior Researchers* 2023, a completely different picture emerges: almost one in two indicates that their research is interdisciplinary. We note no significant differences according to gender, but we do observe significantly more interdisciplinary research among international researchers. This latter observation repeats the findings from a study of PhD holders at U.S. universities in 2009-2010 (Kniffin & Hanks, 2017). Furthermore, based on the *Survey of Junior Researchers* 2023, we observe significantly more interdisciplinarity in research outside of PhD tracks, among researchers with personal scholarships from abroad, and among researchers conducting research on a part-time basis, usually combined with another part-time job (mainly in industry or the private sector, the hospital sector, or a Flemish university, see ECOOM-brief 51).

Successful interdisciplinary research requires researchers to develop interdisciplinary knowledge, skills, and collaborations. According to Claus and Wiese (2019), four competencies specifically promote the success of interdisciplinary research: (1) taking initiative for knowledge exchange (e.g., starting discussions and proposing solutions), (2) tailoring communication to the audience (e.g., translating jargon, explaining patiently), (3) knowledge integration, and (4) reflecting on one's own discipline and appreciating other disciplines. Research also shows that the personality trait 'openness' plays an important role in both taking on and successfully completing interdisciplinary research (Lyall et al., 2011; Lyall & Meagher, 2007). What is openness? Openness refers to how open-minded, imaginative, creative, and insightful a person is or can be. More open-minded people tend to prefer variation, seek new experiences, and are curious and attentive to their surroundings. Open-minded people can deal with ambiguity and are open to other ideas and experiences (McCrae & Costa, 1997). In line with this, the Royal Flemish Academy of Belgium for Sciences and the Arts reminds us that researchers in Flanders may be more inclined to engage in interdisciplinary research if it offers them intellectual added value (Waelkens, 2019). Based on an internal survey and a debate on interdisciplinary research with the science policy officials of all Flemish universities in 2013, the Young Academy (a part of the Royal Flemish Academy of Belgium for Sciences and the Arts) came up with a view on the challenges associated with interdisciplinary research for young researchers and how these challenges can be addressed (Geris & Op de Beeck, 2015).

With the current ECOOM-brief, we have provided an insight into interdisciplinary research from the perspective of the junior researchers at the Flemish universities. Many new questions arise: do junior researchers conducting interdisciplinary research look at the future of employment and the labor market differently? Do they perceive the (added) value of their PhD for non-academic employers in a different way? Do they assess their opportunities differently? Do they show more entrepreneurial spirit? To these types of questions, the *Survey of Junior Researchers* 2023 can provide answers. The interested reader can follow our findings on the ECOOM website (http://www.ecoom.be).

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Correction: Table 1, count of interdisciplinary doctorates for UHasselt adapted 6 to 0 and the total of defended doctorates adapted 66 to 90. The total of interdisciplinary doctorates adapted 36 to 30 and the total defended doctorates adapted 2268 to 2292. Deleted a part of a sentence ', and also Hasselt University followed' and adapted the totals in : 'Table 1 shows statistics from the Higher Education Database (DHO 2.0) of the Flemish government for the academic year 2022-2023: during this period, 30 interdisciplinary PhDs were awarded at Flemish universities out of a total of 2292 PhDs.' Context of correction in number of interdisciplinary doctorates : with regard to policy, UHasselt does not yet have interdisciplinary doctorates (no matter what research discipline).

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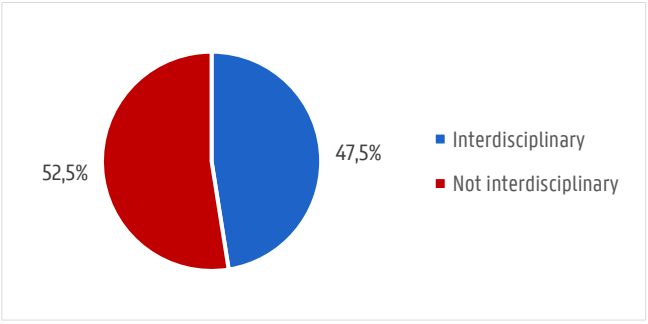

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Zooming in on working regime, we again see significant differences: junior researchers working full-time report less interdisciplinary research than part-time researchers. For full-time researchers, we note 46.8%. Those conducting part-time research at a university, whether or not combined with another part-time job, more frequently report engaging in interdisciplinary research. Among part-time researchers with no additional job, we found 51.9%. Of the part-time researchers who do have another part-time job, 54.3% indicated that their research is interdisciplinary.

ARE THERE DIFFERENCES ACCORDING TO SCIENTIFIC CLUSTER AND UNIVERSITY?

When we shift the focus from sociodemographic and job/employment characteristics to the research context, then Table 4 informs us about the extent to which interdisciplinary research occurs across different scientific clusters and universities.
Looking at scientific cluster as reported by the respondents during the survey, we observe no statistically significant difference between STEM and non-STEM. We note that 48.4% and 45.8% of respondents, respectively, indicate that their research is interdisciplinary.

Tabel 4. Own research perceived as interdisciplinary research by junior researchers in Flanders, 2023: differentiation according to scientific cluster and university (N=4550)

	Interdisciplinary research %	Sign. §
Scientific cluster (1)		n.s.
STEM	48.4	
Non-STEM	45.8	
Scientific cluster (2)		*
Natural sciences	45.7	
Engineering and technology	50.7	
Medical and health sciences	47.8	
Agricultural, veterinary and food sciences	48.3	
Social sciences	43.3	
Humanities and the arts	50.7	
Universiteit		n.s.
KU Leuven	48.6	
Ghent University	46.6	
Antwerp University	45.3	
VUB	47.1	
Hasselt University	55.7	

Note. (§) significance based on the Chi²-test
n.s.=not significant * = p<0.05

The differences do become statistically significant when refining the categorization of scientific cluster. We see that junior researchers in the social sciences report the least amount of interdisciplinary research (43.3%), followed by the natural sciences (45.7%). Slightly higher percentages are found in the medical and health sciences (47.8%) and agricultural, veterinary, and food sciences (48.3%). Similar statistics are found for engineering and technology as for the humanities and the arts (50.7%).
Finally, we examined whether statistics differed between the universities. Table 4 clearly shows that they do not. Between universities, statistics vary from 45.3% at Antwerp University to 55.7% at Hasselt University, but the differences are not statistically significant.

DISCUSSION

To date, there is little scientific research focusing on interdisciplinary research from a human capital perspective: who chooses interdisciplinary research? How does it come about and how does it develop? How is it carried out in an interdisciplinary team? Which human and organizational factors facilitate or hinder the flow of knowledge, knowledge sharing, and knowledge integration into new insights or products? What is the impact of interdisciplinary knowledge, skills, and networks on the later careers of researchers, both within and outside the academic world?
In ECOOM-brief 34, we explored the (almost exclusively foreign) literature and investigated which researchers engage in interdisciplinary research, what personality traits, motivation, skills, and competencies facilitate successful interdisciplinary research, and what the added value of interdisciplinary research is for researchers' careers. In ECOOM-brief 47, we reported on our 2023 research in

collaboration with ECOOM-UHasselt, exploring the data of 315 postdocs and professors in Flanders. We explored which factors (de)motivate interdisciplinary research and also examined whether there are differences according to gender, scientific cluster, and position.

In the current ECOOM-brief, we focus on junior researchers at the Flemish universities. Looking at the number of official interdisciplinary PhDs awarded in 2022-2023 as a measure for interdisciplinary research, this low number suggests that junior researchers hardly conduct any interdisciplinary research. However, when we ask junior researchers themselves in the *Survey of Junior Researchers* 2023, a completely different picture emerges: almost one in two indicates that their research is interdisciplinary. We note no significant differences according to gender, but we do observe significantly more interdisciplinary research among international researchers. This latter observation repeats the findings from a study of PhD holders at U.S. universities in 2009-2010 (Kniffin & Hanks, 2017). Furthermore, based on the *Survey of Junior Researchers* 2023, we observe significantly more interdisciplinarity in research outside of PhD tracks, among researchers with personal scholarships from abroad, and among researchers conducting research on a part-time basis, usually combined with another part-time job (mainly in industry or the private sector, the hospital sector, or a Flemish university, see ECOOM-brief 51).

Successful interdisciplinary research requires researchers to develop interdisciplinary knowledge, skills, and collaborations. According to Claus and Wiese (2019), four competencies specifically promote the success of interdisciplinary research: (1) taking initiative for knowledge exchange (e.g., starting discussions and proposing solutions), (2) tailoring communication to the audience (e.g., translating jargon, explaining patiently), (3) knowledge integration, and (4) reflecting on one's own discipline and appreciating other disciplines. Research also shows that the personality trait 'openness' plays an important role in both taking on and successfully completing interdisciplinary research (Lyall et al., 2011; Lyall & Meagher, 2007). What is openness? Openness refers to how open-minded, imaginative, creative, and insightful a person is or can be. More open-minded people tend to prefer variation, seek new experiences, and are curious and attentive to their surroundings. Open-minded people can deal with ambiguity and are open to other ideas and experiences (McCrae & Costa, 1997). In line with this, the Royal Flemish Academy of Belgium for Sciences and the Arts reminds us that researchers in Flanders may be more inclined to engage in interdisciplinary research if it offers them intellectual added value (Waelkens, 2019). Based on an internal survey and a debate on interdisciplinary research with the science policy officials of all Flemish universities in 2013, the Young Academy (a part of the Royal Flemish Academy of Belgium for Sciences and the Arts) came up with a view on the challenges associated with interdisciplinary research for young researchers and how these challenges can be addressed (Geris & Op de Beeck, 2015).

With the current ECOOM-brief, we have provided an insight into interdisciplinary research from the perspective of the junior researchers at the Flemish universities. Many new questions arise: do junior researchers conducting interdisciplinary research look at the future of employment and the labor market differently? Do they perceive the (added) value of their PhD for non-academic employers in a different way? Do they assess their opportunities differently? Do they show more entrepreneurial spirit? To these types of questions, the *Survey of Junior Researchers* 2023 can provide answers. The interested reader can follow our findings on the ECOOM website (http://www.ecoom.be).

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