

Impetus and Obstacles for Interdisciplinarity in Higher Education

Stocktaking at a German University

ABSTRACT

Across disciplines, there is generally consensus within the academic community on the importance of interdisciplinarity. Yet, reviews of its actual application in higher education are scant. In this article, I probe the adequacy of higher education in offering courses that foster interdisciplinary literacy, equipping students for an intricate and evolving working environment. To align methodology and content, I highlight three interdisciplinary opportunities for students at Heidelberg University, Germany, using various methods from different disciplines. 1) A descriptive content analysis of publicly-available information reveals that 51% of the offered degree programs include a core interdisciplinary element. Interdisciplinary degree programs are especially prevalent in certain fields, such as regional studies. 2) Leveraging descriptive statistics, I find that parallel-degree students tend to study several similar subjects, while female and international students are less likely to pursue parallel degree programs than male and German students. 3) An interview with a recent certificate holder indicates that the Marsilius Study Program fosters interdisciplinary approaches and critical thinking but reaches few students. While Heidelberg University provides a breadth of interdisciplinary opportunities, it would be desirable for students to be provided with more information about available interdisciplinary formats and to receive support for incorporating interdisciplinarity into their studies.

Keywords: Interdisciplinarity – Mixed methods – Elective coursework – Advanced studies – Parallel degree program

ZUSAMMENFASSUNG

Obwohl in der Forschungsgemeinschaft über Fächer hinweg weitgehend Konsens über die Bedeutung von Interdisziplinarität vorliegt, ist dessen tatsächliche Implementierung in der Hochschulbildung wenig erforscht. In diesem Artikel untersuche ich, inwiefern universitäre Angebote interdisziplinäre Kompetenzen fördern und Studierende auf eine komplexe und dynamische Arbeitswelt vorbereiten. Um Methodik und Inhalt aufeinander abzustimmen, betrachte ich drei interdisziplinäre Angebote für Studierende an der Universität Heidelberg unter Verwendung verschiedener Methoden aus unterschiedlichen Disziplinen. 1) Eine deskriptive Inhaltsanalyse von öffentlich zugänglichen Informationen ergibt, dass 51 % der angebotenen Studiengänge ein interdisziplinäres Kernelement aufwiesen. Dabei häufen sich interdisziplinäre Studiengänge in bestimmten Fächern, wie den Regionalstudien. 2) Deskriptivstatistische Analysen zeigen, dass Studierende mit Parallelstudium dazu neigen, mehrere ähnliche Fächer zu studieren. Weibliche und internationale Studierende studieren seltener mehrere Studiengänge parallel als männliche und deutsche Studierende. 3) Ein Interview mit einer Absolventin deutet darauf hin, dass die

Marsilius-Studien interdisziplinäre Ansätze und kritisches Denken fördern, aber nur wenige Studierende erreichen. Zusammenfassend bietet die Universität Heidelberg Studierenden ein breites Spektrum an interdisziplinären Möglichkeiten. Es wäre jedoch wünschenswert, wenn Studierende besser über die vorhandenen interdisziplinären Formate informiert würden und weitere Unterstützung erhielten, um Interdisziplinarität in ihr Studium zu integrieren.

Schlagnote: Interdisziplinarität – Mixed Methods – Wahlpflichtfächer – Weiterführende Studien – Parallelstudium

Introduction

In today's intricate and interconnected world, interdisciplinarity is becoming increasingly important in higher education. As collective knowledge grows exponentially, conventional disciplinary confines often fail to address (cross-) societal challenges. By incorporating interdisciplinary approaches into higher-education curricula, students gain exposure to a range of perspectives, methodologies, and knowledge from different domains. Such an approach fosters critical thinking, creativity, and adaptability, equipping students to thrive in a dynamic job market and an ever-changing globalized society.

In response to evolving trends in the economy and academia, Heidelberg University, Germany, declared the exchange between different disciplines and between academia and industry as one of its core goals in both research and teaching. The university defined the “[d]evelopment of a trans-disciplinary dialogue competence” (HEIDELBERG UNIVERSITY 2012) as one of five quality objectives in student affairs and teaching. Analogously, the “facilitation of trans-disciplinary approaches through development of suitable courses” (HEIDELBERG UNIVERSITY 2023d) was one of seven measures to be implemented in order to reach its quality objectives. Additionally, Heidelberg University is a member of the League of European Research Universities (LERU). This association of 23 European universities also aims to include interdisciplinarity as one of the key elements in their academic and educational strategies (LERU 2023). In 2016, LERU published recommendations for universities and governments on successfully incorporating interdisciplinarity in research, education, and policies (WERNLI, DARBELLAY & MAES 2016). Among other things, LERU emphasizes that “rising interdisciplinary literacy and building capacity requires teaching and training students early on in the curriculum, while making sure that they retain sufficient disciplinary depth” (WERNLI, DARBELLAY & MAES 2016: 22).

While the academic community largely agrees on the importance of interdisciplinarity, stocktaking of its implementation in higher education is scant. In this article, I probe the adequacy of higher education in offering courses that foster interdisciplinary literacy, preparing students for an intricate and evolving working environment. To this end, I will spotlight Heidelberg University, Germany, as a case study to analyze the impetus and obstacles

surrounding interdisciplinarity in academia. My discourse will initiate with a clear definition of interdisciplinarity and a delineation from related terms, laying a foundation for the subsequent analysis. I will then elucidate my method and procedure, followed by the analysis of three interdisciplinary formats: A directed content analysis will aim to discern as to whether the degree programs offered comprise a core interdisciplinary element. Leveraging descriptive statistics, I will investigate the scope of parallel-degree studies. An interview with a recent certificate holder will delve into the Marsilius Study Program, which comprises elective interdisciplinary courses that can be finished with a certificate. I will discuss the implications of these three analyzes, leading to an overall assessment of interdisciplinarity in teaching and learning at Heidelberg University. I will conclude with both research desiderata and actionable recommendations for interdisciplinarity in higher education.

Clarification of Terms and Concepts

It seems prudent to start a discussion on *interdisciplinarity* with a clear definition of the term itself. This, in turn, necessitates an understanding of *disciplinarity* to begin with.

In 1970, the Organisation for Economic Cooperation and Development (OECD) hosted an international conference on interdisciplinarity at universities. The final report by Apostel et al. (1972) addresses challenges and avenues for improvement in teaching and research. Additionally, it provides definitions of concepts related to interdisciplinarity, which have been widely cited. According to Apostel et al., a *discipline* refers to “a specific body of teachable knowledge” (1972: 23). The recognition of a particular domain as a discipline hinges on various criteria, such as the delimitation of its content and methods, theories and terms, but also its institutional representation and social perception. Therefore, *disciplinarity* presents a continuous, rather than dichotomous, concept, spanning from nebulous content domains to well-defined, established disciplines (WERNLI, DARBELLAY & MAES 2016: 36). In the following, I will also use the term *monodisciplinarity* to distinguish disciplinary approaches from those that encompass multiple disciplines.

Interdisciplinarity describes “the *interaction* among two or more different disciplines” (APOSTEL ET AL. 1972: 23). Such interactions can vary in intensity, from casual idea exchanges to profound collaborations that assimilate methods, concepts, terminologies, and data across disciplines. Crucially, the outcome should be an integration of elements from the involved disciplines rather than a mere parallelization of disciplines. Similarly, an interdisciplinary team comprises individuals from diverse academic backgrounds collaborating towards a unified goal. Even though the team members might work on different subtasks and employ distinct techniques, their activity is organized into a common effort, marked by consistent interaction and communication (APOSTEL ET AL.: 23–24; WERNLI, DARBELLAY & MAES 2016: 36).

To sharpen the understanding of interdisciplinarity and to prevent common misunderstandings regarding its scope, it is worth differentiating interdisciplinarity from three closely-related terms. *Multidisciplinarity* also covers combinations of different disciplines.

In contrast to interdisciplinarity, however, multidisciplinary presents a simple coexistence of the disciplines, without any interaction or a new synergistic product (IBID.). *Pluridisciplinarity* corresponds to a “juxtaposition of disciplines assumed to be more or less related” (APOSTEL ET AL. 1972: 23), such as combinations of different natural sciences or several philologies. *Transdisciplinarity* goes beyond interdisciplinarity by either dissolving differentiable disciplines to fully focus on topics of interest (first common definition) or by opening disciplines to players from outside academia (second conventional definition; WERNLI, DARBELLAY & MAES 2016: 36).

Method

To align methodology and content, this article employs a multi- and interdisciplinary approach. Different aspects of and possibilities for interdisciplinarity during higher education are investigated using methods from a range of disciplines.

Choice of Projects and Aspects

Initially, I collected interdisciplinary opportunities for students at Heidelberg University within the following two categories: The first category encompasses interdisciplinarity within the framework of regular degree programs, which includes both mandatory and optional modules of the degree program. The second category comprises formats that go beyond the boundaries of standard degree programs and generally necessitate greater student initiative (extracurricular projects). For both categories, I searched for projects of varying scope in terms of duration and workload. The search for these projects was based on information sourced from the website of the university, conversations with university staff working in the areas of interdisciplinarity, teaching and learning, as well as insights gained from my personal experiences as a student and as a teaching and research assistant. In the subsequent sections, I will highlight a selection of three interdisciplinary opportunities. This article aims to provide an extensive overview of avenues available for interdisciplinary studies at Heidelberg University. However, it is important to note that the article by no means asserts comprehensiveness. In particular, the omission of specific initiatives does not imply any evaluation of their significance or quality.

Interdisciplinary Opportunities within the Range of Usual Degree Programs

To explore the incorporation of interdisciplinarity in higher education within the range of regular courses of studies, I investigated whether degree programs included a core interdis-

ciplinary element. The selection of degree programs for the analyses was based on the listing of all subjects offered in the Summer Term 2023, accessible on the university's website (HEIDELBERG UNIVERSITY 2023a). To evaluate the degree programs' level of interdisciplinarity, I employed a directed content analysis. Content analyses are a popular qualitative method that addresses the presence and frequency of themes and concepts in texts. The directed content analysis, in particular, serves as a research method aimed at either validating or extending a theoretical framework. This approach begins with an initial coding system consisting of codes ("labels") and superordinate categories to classify information. The researchers involved identify keywords in the texts and subsequently code the data using the initial coding system and the extracted keywords. They then define additional codes for relevant information not covered by the initial coding system (HSIEH & SHANNON 2005).

I employed a directed content analysis because my objective was to attain a comprehensive overview of all degree programs. Merely illustrating the interdisciplinarity of a few programs would not have sufficed in achieving this aim. Utilizing a (solely) quantitative method would have been inappropriate, as the degree programs lacked explicit labels regarding their interdisciplinarity. Given the nuanced definition of interdisciplinarity that was previously discussed, it became essential to adopt a qualitative approach. Directed content analyses combine prior theoretical considerations with the possibility to adjust the coding system during the analysis. These characteristics make it a valuable research method for confirming and expanding upon previous assumptions (HSIEH & SHANNON 2005). This approach ensured an informed categorization of degree programs concerning their interdisciplinarity while reducing the subjectivity inherent in the analysis.

The directed content analysis undertaken for this article was based on an initial coding system with codes and terms addressing interdisciplinarity in general, such as *multidisciplinary approach* and *interdisciplinary perspective*. The textual material analyzed covered degree program names, module manuals¹, and the description of the degree program on the faculties' and the university's websites. During the iterative process of identifying and coding keywords, the initial set of interdisciplinary codes and terms was helpful for classification, albeit with limitations. Some programs claimed an interdisciplinary approach without further elaborating on this or providing evidence. Other programs included modules from different disciplines or their names implied a multidisciplinary approach, despite lacking explicit classification as interdisciplinary. To enhance the comprehensiveness of the initial coding system with general terms addressing interdisciplinarity, I added a few further terms, such as *mixed methods*. Additionally, a second category was introduced with particular subjects and disciplines, e. g., *medicine*, *geography*, *linguistics*. In the next step, degree programs were classified as interdisciplinary or (primarily) monodisciplinary. The reference to at least two disciplines served as a strict criterion; the use of general interdisciplinary terms

¹ A module manual is a document issued by the university that includes central information about the modules and courses in a study program.

presented an additional soft criterion. The results were manually revised regarding plausibility and correctness. In the results section, I provide an overview of the proportion of degree programs classified as interdisciplinary. I will also introduce examples of degree programs, which are representative of subject fields with several interdisciplinary degree programs.

Interdisciplinary Opportunities beyond the Range of Usual Degree Programs

The first extracurricular format presented in this article are dual degree programs, i.e., studying two or more degree programs simultaneously. Stocktaking in this domain is based on descriptive statistics. All statistical data on parallel-degree studies were kindly provided by the *Department 4.2: Controlling and Reporting* (ADMINISTRATION OF HEIDELBERG UNIVERSITY). Statistics about the entire student body are based on the information available on the University's website (Heidelberg University, 2023b). I analyzed the data, grouping students by degree, subject, gender, and nationality. The categorization of study subjects into subject groups and study areas is based on the classification by the German Federal Statistical Office (STATISTISCHES BUNDESAMT (DESTATIS) 2023: 79-81). The data include preservice teachers studying a third school subject² and students simultaneously pursuing a Ph.D. and an additional degree program. I primarily focus on the winter semester of 2022/23, the most recent semester for which data was available at the time of submission of this article. In addition, I briefly discuss how the number of parallel-degree students changed over the last five years. I chose to utilize descriptive statistics, as it was the most suitable approach given the availability of reliable and (likely) exhaustive data. Not only did this method enable an assessment of the general scope of parallel-degree students, but it also facilitated a more nuanced analysis. Specifically, it allowed for the examination of typical subject combinations, as well as a detailed breakdown of the proportions of gender and nationality.

As the second interdisciplinary opportunity beyond the usual scope of a degree program, I introduce the Marsilius Study Program, which covers interdisciplinary courses accessible to all students at Heidelberg University. The Marsilius Study Program can also be completed with a certificate. Zarah Janda, a recent certificate holder, reflects on her experience during the Marsilius Study Program and how it has shaped her perspective on interdisciplinarity. The interview has been abridged and translated from German. The Marsilius Kolleg established the certificate *on the initiative of students*. The aim was to grant interested students glimpses into other scientific cultures and to connect them with the theories and methods of their own discipline. While the format has been presented to an international audience (e. g. WERNLI & OHLMEYER 2023: 18), I am not aware of any assessment of how students perceived whether the objectives of the program are met.

² In this article, preservice teachers refer to students pursuing teacher training as part of a Master of Education or the former degrees of teacher training for grammar or vocational schools.

Results

In this section, I will discuss the results of the three analyses. Following the order from the method section, I will first outline the findings of the descriptive content analysis of the publicly available material on degree programs. I will then report the results of the descriptive statistics. The interview with Zarah Janda follows a brief introduction of the Marsilius Kolleg and the Marsilius Study Program.

Interdisciplinary Degree Programs

In the summer semester of 2023, Heidelberg University offered 101 degree programs (HEIDELBERG UNIVERSITY 2023b). One degree program was excluded from the analysis because it was taught at the Heidelberg Center for Latin America (HCLA) in Santiago de Chile. As a result, 100 degree programs were analyzed, which included at least some teaching in Heidelberg. Whether these were interdisciplinary or (primarily) monodisciplinary courses of study was investigated with a directed content analysis, as described in the methods section. Based on this approximation, 51 (51 %) of the degree programs showed a strong interdisciplinary approach. The degree programs were clustered by subject based on the identified disciplines. This resulted in the following, partly overlapping, subject groups: 13 degree programs in regional studies (Cluster 1), 11 programs with a core philological focus (Cluster 2), 10 courses of study in the area of healthcare and medicine (Cluster 3), and 6 degree programs in specialized computer-science applications (Cluster 4). The remaining 17³ degree programs were in various interdisciplinary subjects, ranging from *Geoarchaeology* to *Interreligious Studies*. The size of the subject groups and the proportion of degree programs with a core interdisciplinary element are visualized in Figure 1 (next page). In the following, I briefly introduce each of the subject groups.

³ Note that the subject groups overlap, as six degree programs could be assigned to two subject groups.

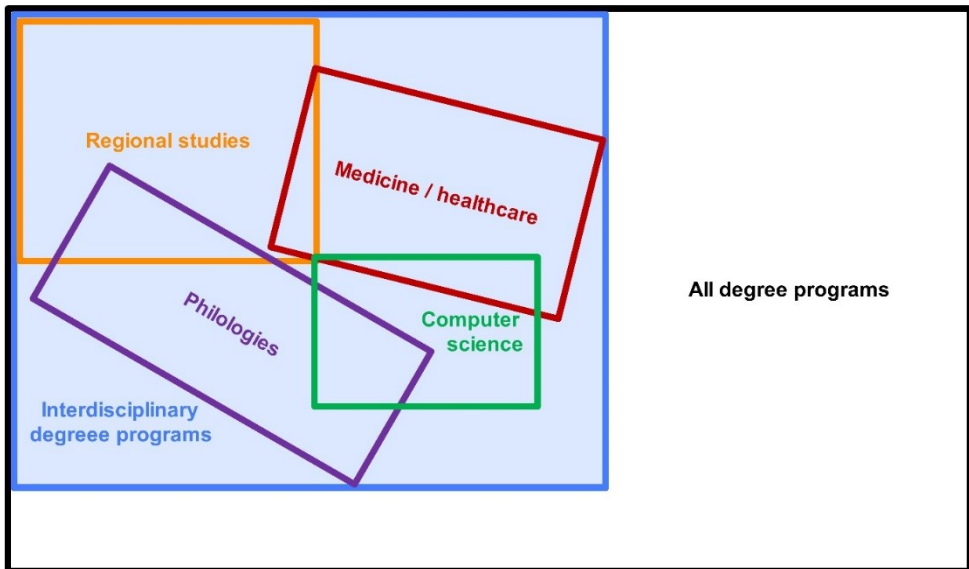


Figure 1

Visualization of the number of degree programs in the different subject groups and the proportion of interdisciplinary degree programs on all degree programs. The area of the categories represents the number of study programs. Note that the subject groups intersect, as some degree programs were assigned to two subject groups.

Regional studies (Cluster 1) investigate a specific geographical area with a variety of methods and from the perspective of different disciplines, including but not limited to philology, social sciences, religious studies, and geography. The aim of this approach is to investigate a particular area as holistically as possible through using methods and addressing topics from a wide range of disciplines. Among others, Heidelberg University offers a bachelor's program in *Eastern European and East Central European Studies* and a master's program in *Development, Environment, Societies, and History in South Asia*. The relevance of the different disciplines involved varies substantially between degree programs. *East Asian Studies* with a focus on Sinology or Japanology, for instance, places a strong focus on language acquisition, as it does not require knowledge of the respective language at the beginning of the studies. *Near Eastern Studies* investigate the Middle East with an emphasis on sociology, cultural studies, and history.

The second-largest interdisciplinary subject group covers courses of studies with a core philological element (Cluster 2). The degree programs are at the intersection of natural sciences and humanities. In *Computational Linguistics*, natural human language is processed by machines, providing the foundations for machine translation, search engines, and chatbots. *Translation Studies for Information Technologies* provides students with a background

not only in linguistics and cultural studies, but also in engineering, thus preparing them for careers as technical translators.

Interdisciplinary degree programs in the fields of health care and medicine (Cluster 3) either used natural sciences or computer science to facilitate medical research or view the healthcare system from the perspective of social sciences, aiming to improve health care governance. Courses of studies in this category include *Biomedical Engineering*, *Medical Informatics*, and *Translational Medical Research*. The latter category of degree programs covers, among others, *Health Services Research*, as well as *Implementation Science in Health Systems*.

Degree programs addressing computer science applications present the last identified group of interdisciplinary courses of study (Cluster 4). Methods from computer science become increasingly important in various research domains, as well as the economy and society more broadly. While experts in these fields do not necessarily have sufficient programming skills to use computational methods to the best of their potential, computer scientists may lack background knowledge in the particular area of application. Interdisciplinary degree programs can provide the future workforce with both sufficient programming skills and a solid background in the field of application. Among other things, this subject group includes a master's program in *Scientific Computing*, which connects computer science and mathematics with an application subject of the students' choice. I will delve into the implications of these results in the discussion.

Parallel Degree Programs

A parallel degree program allows students to concurrently pursue and complete two or more degree programs (legal norm: § 60, paragraph 1 of the Act on Higher Education of the FEDERAL STATE OF BADEN-WÜRTTEMBERG, LHG). Heidelberg University offers all students the opportunity to pursue two or more degree programs simultaneously if both or all courses have no restrictions on admission. Additionally, students have the option to select one degree course with unrestricted admission and one admission-restricted degree program to study in parallel. In both aforementioned scenarios, students can apply to undertake a parallel degree program by registering for a change of degree program, i. e., filling in a short form. Studying two admission-restricted courses concurrently is permissible solely if it is deemed necessary for specific professional, academic, or artistic reasons. Here, applicants must provide a written explanation of the particular professional or academic objectives that necessitate the choice of courses (HEIDELBERG UNIVERSITY 2023c). Unlike second degree programs, i. e., further studies after the first degree program has been completed, there are no additional tuition fees in Baden-Württemberg for parallel degree programs (Higher Education Fees Act of the Federal State of Baden-Württemberg (LANDESHOCHSCHULGEBÜHRENGESETZ), §8, LHGEBG). In the following, I present an

overview of the student population engaged in parallel degree programs at Heidelberg University.

In the winter semester of 2022/23, 582 students were enrolled in parallel degree programs at Heidelberg University. This represents approximately 2% of the total student body of nearly 30,000 students. Since the winter semester of 2018/19, which saw 706 students pursuing parallel degree programs, the number of parallel-degree students has fallen continuously and has, thus, decreased by approximately 18% within 5 years. This can be attributed to the fact that fewer preservice teachers are studying a third school subject. In Germany, prospective secondary-school teachers usually study two subjects. Training for a third school subject (or more) is classified as an extension subject within a parallel degree and must be applied to over and above the workload of the regular course of studies. The decline in parallel-degree students pursuing teacher training for elementary or vocational schools (former degree programs) cannot be compensated by the increase in Master of Education students with an extension subject. In 2018, 427 preservice elementary- and vocational-school teachers were enrolled in an extension subject. In 2022, this number has decreased to 42, while 100 Master-of-Education students pursued a parallel degree program.

In contrast, the number of bachelor's students pursuing a second degree has doubled in half a decade – with 119 students during the winter term of 2018/19 and 249 during the winter term of 2022/23. Male students tend to start a second degree when they pursue a one-subject bachelor; female students were more likely to study a parallel degree if they were already enrolled in a two-subject degree program. The number of parallel-degree students whose first degree program is a Ph.D. or master's program has remained largely stable over the last years – ranging from 22 to 26 and from 57 to 72 students, respectively. In Germany, medical school and law school are usually completed through a State Examination. The number of students studying for this degree and an additional second degree successively increased in the last half decade: In 2018, 58 parallel-degree students prepared for a State Examination in their first degree program, this number increased by 60% to 93 in the winter semester of 2022/23. The number of parallel-degree students by degree is presented in Figure 2 (next page).

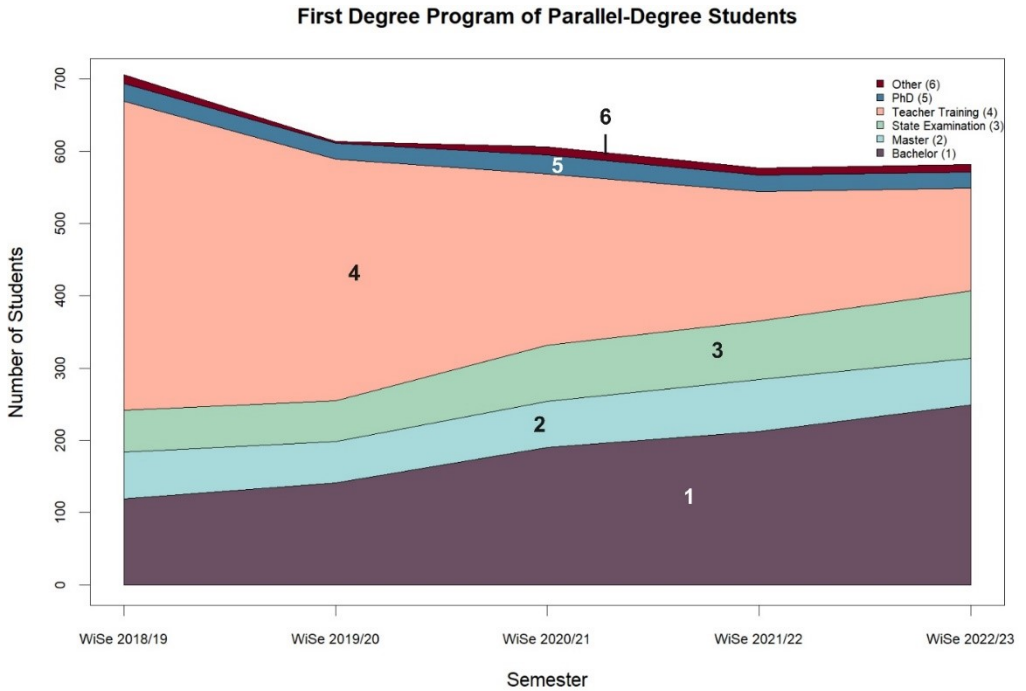


Figure 2
 Number of Parallel-Degree Students by Aimed Degree of their first degree program. WiSe = Winter Semester.

Among students who studied a single-subject bachelor’s degree as their first degree in the winter semester of 2022/23, math and natural sciences were the most common first-degree subjects, accounting for 58%. Of these, 46% studied another subject from this subject group as their second degree. Twenty-seven percent of those with a single-subject bachelor’s degree as their first subject completed it in law, economics, or social sciences. In the subject portfolio of 88% of the parallel-degree students with a two-subject bachelor’s degree as their first degree, at least one subject within the humanities was included, while 25% studied only subjects from the humanities. Law students mostly (64%) completed their parallel studies in law, economics, and social sciences. Medical students choose a wide variety of subjects as their second degree. Most master's students who pursued a parallel degree program studied either a natural science (46%) or a subject within the humanities (37%) as their first subject. In both cases, the second degree was most often within the same subject group. If parallel-degree students pursued a Master of Education (teacher training for elementary school) as their first degree, their second degree was also a Master of Education in most cases (95%). Therefore, these preservice teachers can later teach three or more school subjects. Ph.D. students who pursued a parallel degree were mostly from the humanities

(45%) and medicine (40%). The subject combinations of parallel-degree students in winter semester 2022/23 are also visualized in Figure 3.

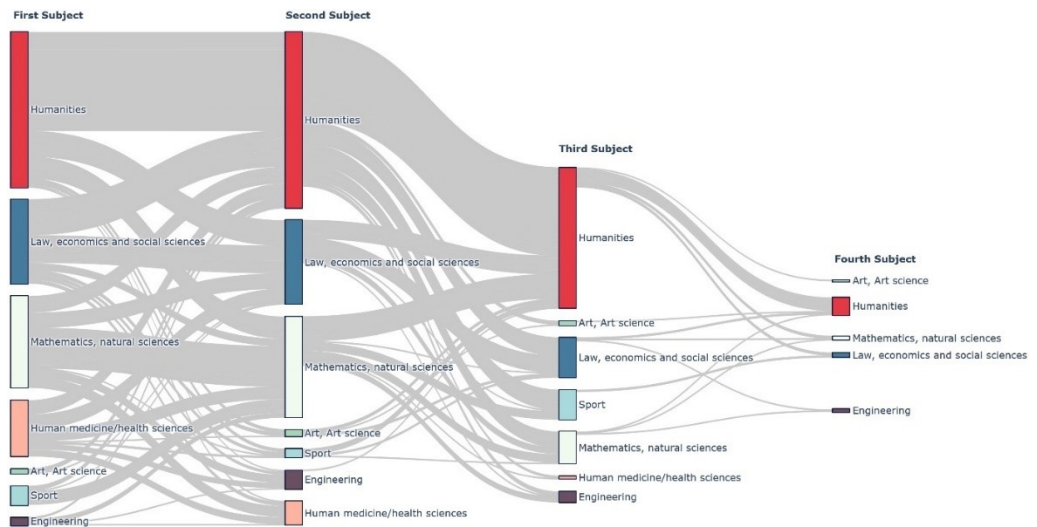


Figure 3 Sankey diagram of the subject combinations of parallel-degree students at Heidelberg University in winter semester 2022/23. Note that students might have up to four subjects; for instance, if both of their degree programs are two-subject bachelors.

In the winter semester of 2022/23, 543 of the 582 parallel-degree students indicated that they possessed German citizenship. Thus, 93% of the parallel-degree students were German, while all other nationalities accounted for the remaining 7%. As a point of comparison, it is worth noting that 19% of the entire student body consisted of international students. More than 2% of the German students, but less than 1% of the international students, were enrolled in parallel degree programs. The number of parallel-degree students with German citizenship declined over the course of the last five years – from 667 in the winter semester of 2018/19 to 543 in 2022/23. The number of international parallel-degree students increased between the winter semester of 2018/19 and 2020/21 from 39 to 54, before declining again back to 39 in the winter semester of 2022/23.

In the winter semester of 2018/19, slightly more female than male students⁴ (56% compared to 44%) were enrolled in parallel degree programs. This gender difference has de-

⁴ Information on gender and nationality is based on self-reporting during enrollment. In winter semester 2018/19, only the options *male* and *female* were available to indicate gender. From the following

creased over the years until 50% of the parallel-degree students were female and male, respectively, in the winter semester of 2022/23. In the same semester, female students accounted for 55% of the total student body. Therefore, 2% of the male students, but 1% of the female students, pursued parallel degree programs. I have already elaborated on how the overall decline in students in parallel-degree programs can be attributed to the fact that fewer preservice teachers choose a third school subject. Analogously, the gender ratio tells a different story if we exclude preservice teachers studying a third school subject from the analysis: fifty-two percent of the parallel-degree students were female in the winter semester of 2018/19. This proportion declined successively until 47% of the non-teacher parallel-degree students were female, in the winter semester of 2022/23. Considering that 55% of the total student body identified as female, this made it 38% more likely for a male student to pursue a parallel degree program than for a female student ($OR = 1.38$; $95\%-CI [1.14, 1.67]$, $p < .001$). The percentage of students studying parallel degree programs by gender and nationality is visualized in Figure 4. In the discussion, I will contextualize these results alongside the findings from other interdisciplinary formats.

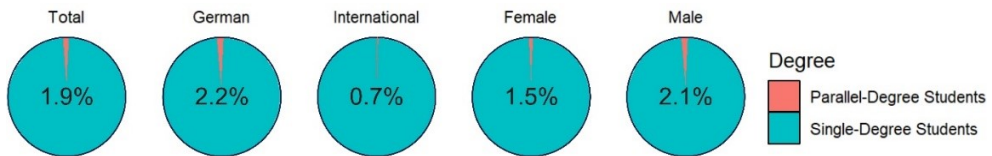


Figure 4
Percentage of Students Studying Parallel-Degree Programs by Gender and Nationality.

Marsilius Study Program

The Marsilius Kolleg is an interdisciplinary research institute at Heidelberg University that aims at bridging the gap between the natural sciences and the humanities through joint projects with researchers from different disciplines, workshops for members of the university, and public lectures. On students' initiative, the Marsilius Kolleg also established interdisciplinary courses for students since the winter semester of 2010/11 and has generally offered

semester onwards, students could also select *diverse* or *no specification*. According to the Department 4.2: Controlling and Reporting (ADMINISTRATION OF HEIDELBERG UNIVERSITY), these additional options have not yet been selected. Students usually start a parallel degree program after studying their first degree program for at least two semesters. In Germany, the third gender option has only been available since 2019, and the process of officially changing the gender information is time-consuming. Therefore, gender diversity might not be properly represented.

three to five Marsilius Seminars per semester since then. The instructors are researchers from at least two different disciplines who usually take up topics from their current or previous research at the Marsilius Kolleg. The seminars are open to all students, and many can be credited to degree programs in the disciplines covered. Including the summer semester of 2023, the Marsilius Kolleg has offered 89 seminars in total.⁵

In addition, students have the opportunity to earn a Marsilius Certificate. For this, students may either attend three Marsilius Seminars or take two Marsilius Seminars and a course from a discipline that they do not study. The Marsilius Certificate is completed with a colloquium in which the students give a presentation on an interdisciplinary topic and subsequently discuss it with the other certificate candidates, as well as members of the Marsilius Kolleg. For the preparation of the colloquium, a current or former research fellow of the Marsilius Kolleg supports the student as a mentor. In the summer semester of 2023, Zarah Janda was the 50th student who earned a Marsilius Certificate. In the following interview that was conducted on 01.06.2023, she talks about her experience at the Marsilius Kolleg and her views on interdisciplinarity.

Where are you at in your studies right now? When did you complete the Marsilius Certificate?

ZJ: I am currently finishing my master's degree in Molecular Biosciences with a Major in Molecular and Cellular Biology. Before that, I did my bachelor's degree in Applied Biosciences in Karlsruhe. I have been in Heidelberg for three years now. I visited three Marsilius Seminars throughout the whole time I have been here, and I completed my Marsilius Certificate with the colloquium in April 2023.

What were your most important experiences during the process of getting your Marsilius Certificate? What insights did you gain?

ZJ: I found the three Marsilius Seminars all very interesting, and I definitely gained new perspectives. In my opinion, it is a shame when science takes place in a bubble. Research is always done in a bubble to some extent, but it is good when that is at least the academic bubble as a whole and not just the bubble of one discipline. During the time at the Marsilius Kolleg, I perceived a higher diversity of opinions than I otherwise noticed in my biology studies. In addition, the spatial separation between the old town and the [Neuenheimer] Feld⁶ was also eliminated, and I got to know students from other disciplines. I did not experience such a

⁵ Event and participant figures are based on information provided by the Office of the Marsilius Kolleg.

⁶ In Heidelberg, the university is spread over the whole city. Most humanities are located in the Old Town, while the sciences share a campus in the Neuenheimer Feld, an area of the city on the other side of the Neckar river.

spatial separation of different disciplines, especially between humanities and natural sciences, during my bachelor's studies before.

Do the experiences from your time at the Marsilius Kolleg help you personally or professionally, and if so, how?

ZJ: I believe that the experiences from my time at the Marsilius Kolleg make me a better biologist because it is important to consider science in context. Biology is a very old science, but the development in the field within recent years is just tremendous. I strongly believe it is important and helpful for my studies to contextualize current research historically. Moreover, I think it is valuable to question scientific dogmas that one holds. Interdisciplinarity certainly helps me to explore the uncertainties within my own discipline. Furthermore, I like to entertain the possibility of not staying in academia. Interdisciplinary experiences definitely open up more options for me to work outside of research; for example, in science journalism.

Do you think interdisciplinarity is important and if so, why?

ZJ: Yes, especially now in biomedicine, my field of studies, it is particularly important because you can never look at a topic from just one discipline. That is just one of the reasons why I like biology so much; it is so complex that one perspective alone cannot answer the questions raised within the discipline, and without interdisciplinarity, undifferentiated pictures arise.

How did you hear about the Marsilius Certificate? Do you think there is enough information about the certificate and opportunities for interdisciplinary exchange?

ZJ: I discovered the Marsilius Certificate while actively searching for events of this kind. I like to have different perspectives in my life, and so I always aimed at having various side projects during my studies. By researching the additional courses available at our university, I came across the Marsilius Kolleg and decided relatively quickly that I wanted to pursue a Marsilius Certificate.

In the first two seminars, I was the only one from the natural sciences. It was really exhausting to take the additional courses on top of my regular studies. Therefore, the added workload could be a reason why few take advantage of the Marsilius Certificate. But I also wonder how many even know about the certificate. Most of my fellow students in the Marsilius Seminars were able to receive credit for the courses in their subjects. I did not meet anyone during the Marsilius Seminars who was also pursuing the certificate.

From your experience, what is the atmosphere like at the university generally? Is interdisciplinarity encouraged or ridiculed?

ZJ: In biology, attitudes towards interdisciplinarity strongly vary depending on the professors. I have teachers who say that interdisciplinarity is a core and enriching element of biology.

Others consider it entirely unnecessary. In the curriculum, interdisciplinarity is more accepted than rewarded or promoted, and you must look for the offers yourself. I did not have any interdisciplinary courses in my master's program. If interdisciplinarity was integrated at all, it was within the biological discipline. Another aspect of biology is that the humanities are sometimes perceived as a hindrance because, for instance, detailed ethical debates could slow down research. However, I think that interdisciplinarity is becoming increasingly important. One can gain an entirely different approach to a topic, even after dealing with it for 30 years. If one believes they have fully understood a topic from the perspective of one discipline, looking at it from another perspective might make them realize, "Okay, I don't understand anything yet." I really enjoy having my own ways of thinking challenged.

To sum up the key points of the interview, Zarah Janda perceived the Marsilius Study Program as a valuable experience that broadened her perspective beyond the confines of her primary discipline. Despite this, she observed a low demand for the certificate and noted that few students seem to be aware of it. In the subsequent section, I will compare the Marsilius Study Program's format with the criteria for interdisciplinarity and contextualize Zarah Janda's account of experience.

Discussion

In this section, I discuss the interdisciplinary opportunities for students at Heidelberg University, using the three examples introduced above. I point out limitations of this article, before concluding with desiderata for research and action-taking in higher education.

Stocktaking of Interdisciplinary Opportunities

Interdisciplinary Degree Programs

Interdisciplinary degree programs allow students to gain knowledge in and skills from different disciplines in order to better understand complex topics that cannot be addressed appropriately from a monodisciplinary perspective. In contrast to parallel degree programs, the students have the regular workload of one degree program, even though this can vary substantially between different subjects. The descriptive content analysis in this article indicated that 51% of the degree programs offered by Heidelberg University in the summer term 2023 presented a core interdisciplinary component. However, it must be noted that these courses of studies, on average, have substantially lower numbers of students than the conventional disciplines. The interdisciplinary degree programs were clustered in a few areas. The main subject groups included regional studies, combinations of philologies with other disciplines, healthcare and medicine, and applications of computer science. These topics of interest are of great importance in an increasingly globalized and digitalized world, as well as in a continuously aging society. Desiderata remain for other

interdisciplinary degrees, e.g., addressing climate change and sustainability. In Heidelberg, topics such as the latter are addressed by additional courses and certificates rather than full degree programs.⁷ LERU proposes two central course formats for interdisciplinary degree programs (WERNLI, DARBELLAY & MAES 2016: 22) that have been successfully implemented at Heidelberg University in most interdisciplinary and many disciplinary degree programs. First, the philosophy and history of the discipline is addressed in the compulsory curriculum of many degree programs. Second, seminars in elective modules foster critical thinking and the application of acquired knowledge. LERU suggests that interdisciplinary degree programs may also include seminars that address interdisciplinarity and systems thinking explicitly (WERNLI, DARBELLAY & MAES 2016: 22–23). In my opinion, this would be a valuable addition to the interdisciplinary (as well as monodisciplinary) degree programs at Heidelberg University.

As noted in the introduction, Heidelberg University declared transdisciplinarity as one of its five quality objectives (HEIDELBERG UNIVERSITY 2023d). The broad range of degree programs in regional studies, for instance, seems to contribute towards this objective. For each of these courses of studies, a particular region presents the area of interest, which is investigated as holistically and flexibly as possible, independent of disciplinary boundaries. In practice, however, the degree programs still must be structured in terms of courses and modules. Therefore, in most degree programs, the courses still reflect differentiable disciplines, such as courses in history, language, or methodologies. In general, most interdisciplinary degree programs show a similar pattern: in the first semesters, students acquire foundations of the different disciplines involved. Courses further into the program deepen and interconnect the knowledge from the different disciplines. Therefore, I would argue that most of the degree programs are interdisciplinary rather than transdisciplinary; however, this by no means makes them less valuable. In an interdisciplinary setting, methods from different disciplines are used, but can still be clearly identified and distinguished. This allows us to be better aware of the benefits and pitfalls of the different methods and, thus, of the limitations of the research.

Parallel Degree Programs

Parallel degree programs allow students to flexibly combine subjects based on interests and career objectives. Upon graduation, they receive a separate degree in both (or all) degree programs. This provides parallel-degree students with more flexibility in their subsequent choice of degree programs or career paths, as in some cases a certain degree presents a prerequisite. Admittedly, this comes with the costs of a high course load and a need for good time management and, most importantly, sufficient stress resilience. The total number of

⁷ Examples for additional qualifications addressing these topical issues are the transdisciplinary project TdLab for geography students (<https://www.geog.uni-heidelberg.de/institut/tdlab.html>) and the certificate for sustainability, which is issued by the Heidelberg School of Education (<https://www.hse-heidelberg.de/studium/zusatzqualifikationen/nachhaltigkeit>).

parallel-degree students indicates a substantial decline within the last five years. Fortunately, however, the numbers have remained largely constant for most expected degree types, or have even increased for bachelor and State-Examination degree programs. This indicates that students orient themselves broadly in terms of subject matter, especially at the beginning of their studies, and value different perspectives on a topic.

The overall decline of parallel-degree students can be attributed to the drop of pre-service teachers pursuing training in at least one extension subject. Preservice teachers account for a substantial proportion of the students enrolled in parallel degree programs. When teachers receive training in three subjects, this offers schools more flexibility in which subjects the teacher may be assigned to. An interdisciplinary background also presents a valuable competence that can further improve teaching quality, as “[s]uccessful graduates of the extension subject in the Master of Education [...] can productively interconnect and apply the knowledge they have acquired in an interdisciplinary and transdisciplinary way” (HEIDELBERG SCHOOL OF EDUCATION 2023; my translation). It is often criticized that schools should be less focused on the delimitable school subjects. Instead, topics of societal interest should be addressed from the perspective of different school subjects, allowing a holistic view of a subject or topic. Teachers with interdisciplinary perspectives could aid in interconnecting different school subjects in order to foster this more holistic view. It is worth considering how incentives for preservice teachers to study an extension subject could be increased.

Discussing the scope of parallel degree programs, it is also important to differentiate for gender and nationality. At first glance, gender differences have dissolved over the last years. However, consideration of the gender proportions in the total student body reveals a worrying relative decline in female parallel-degree students, especially if preservice teachers are not considered, where there is a high proportion of women overall. The difference between German and international students is even greater, with international students being substantially less likely to pursue parallel degree programs. These differences between student groups give rise to several questions, such as:

What are the reasons for the gender difference? Are male students simply more confident when it comes to estimating whether they can handle the workload of two degree programs? Why is there a high number of both male parallel-degree students and parallel-degree students studying a combination of natural sciences? Are male students more likely to pursue a parallel degree and at the same time often study natural sciences? Or do students of the natural sciences tend to study parallel degree programs and generally have a high proportion of male students? Is it simply more challenging to study in a foreign language, or are there other reasons for the lower proportion of parallel-degree attendees among international students? These questions are beyond the scope of this study; however, they deserve future investigation.

Although parallel studies certainly provide insights into different disciplines, it should be critically questioned as to whether or not this represents interdisciplinarity. First, parallel-degree students are most likely to study several similar subjects. The most often-observed

subject combinations are two or more natural sciences and two or more humanities. According to the strict definition outlined by Apostel et al. (1972: 23), this presents pluridisciplinarity rather than interdisciplinarity. However, it should be noted that more gentle shifts of perspectives can also add valuable insights. Furthermore, in some cases, different disciplines from the same subject group (or even different subdisciplines of one subject) use entirely different methods, resulting in a fundamentally different approach to the topic of interest. Second, one could argue that the fact that parallel-degree students study two degrees in *parallel* indicates multidisciplinary rather than interdisciplinarity. Term papers and dissertation projects, though, offer ample opportunities to interconnect different disciplines. Students can often choose the topic of term papers themselves after consulting with the instructor. This enables them to apply their background from one discipline in a term paper for a seminar from another discipline. Parallel-degree students must also write a dissertation thesis for both (or all) degree programs they are studying⁸, allowing them to carry out several interdisciplinary projects. As a result, parallel degree programs offer great potential for interdisciplinarity while leaving the responsibility to make use of it to the students.

Marsilius Study Program

LERU presents the Marsilius Study Program and the Marsilius Certificate as one of its example initiatives for fostering interdisciplinarity in higher education (WERNLI & OHLMEYER 2023: 18). This coincides with the experiences Zarah Janda reported in the interview. Following the objectives of the Marsilius Kolleg, each seminar addresses a particular scientific or societal challenge by combining at least two disciplines. The certificate has no compulsory courses. In each category, students can choose between different elective courses. In the colloquium, students most often present a dissertation project and embed it in an interdisciplinary context. During their time at the Marsilius Kolleg, students are thus encouraged to follow their own interests. As a result, they can simultaneously participate in interdisciplinary exchange and deepen their disciplinary knowledge. Additionally, many students attend an individual Marsilius Seminar as part of elective modules within their degree program without earning the certificate, adding valuable interdisciplinary approaches to (monodisciplinary) courses of studies.

The (theoretical) accessibility to the Marsilius Study Program is very high. The certificate has no selection process or requirements apart from being enrolled as a student at Heidelberg University. Students are only recommended to start the Marsilius Study Program in their third semester at the earliest to already have some previous training in higher education. The certificate focuses on interdisciplinary exchange and not on the assessment of performance. Many seminars are ungraded, and the colloquium is based on a pass-or-fail system. This can be a pleasant contrast to a competitive degree program. Additionally, courses for the certificate can be split flexibly over as many semesters as needed. Students

⁸ Students do not have to write a dissertation thesis for minors or second majors.

can attend individual seminars without pursuing the certificate. The Marsilius Study Program is characterized by high-quality, individual support. The seminars are usually held by two or more full professors who are current or former fellows at the Marsilius Kolleg. Mentors assist the students in their preparation for the interdisciplinary colloquium, while the office of the Marsilius Kolleg supports students in finding a mentor and navigating the program. Regarding the practical accessibility, however, it must be noted that that few students earn the certificate each semester and most students seem to not even know about the Marsilius Study Program. Since the start of the Marsilius Study Program in the winter semester of 2010/11, a total of 50 students have earned the certificate. This corresponds to two new certificate holders each semester, on average. It would be valuable to inform more students about the program and to think critically about how it could be better integrated in students' studies, in order to reach more students. Referring to LERU's recommendation above, it also seems beneficial for students to receive some general input on interdisciplinarity and systems thinking (WERNLI, DARBELLAY & MAES 2016: 22–23).

Limitations

This article is intended to foster the discussion on interdisciplinarity in higher education and to motivate multi-method approaches for the research thereupon. It neither presents a systematic review nor addresses the effectivity of the initiatives and claims by no means comprehensiveness. In the following, I briefly discuss some limitations of this article.

First, the categorical differentiation between inter-, multi-, and monodisciplinary studies is an oversimplification. Almost all degree programs have some multi- or interdisciplinary aspects. Courses of studies in languages (or linguistic families), for instance, often include courses in cultural studies, history, or politics of the respective regions. The categorization of knowledge into the classical disciplines has strong historical and societal influences. It is likely that many fields of study that combine knowledge and methodologies from multiple disciplines will eventually evolve into standalone disciplines; in the words of Apostel et al. (1972: 9): “The ‘inter-discipline’ of today is the ‘discipline’ of tomorrow.”

Second, the methodology faces some limitations. The directed content analysis based on publicly-available material presents only a rough proxy for the interdisciplinarity of degree programs. The descriptive statistics regarding parallel degree programs only quantify the number of students enrolled, but do not consider the perspectives and experiences of the students. The interview only represents one personal perspective from a Marsilius Certificate holder. It would also be valuable to view each project from the perspective of several disciplines, instead of using a one-method-per-project approach. Just as Zarah Janda said in the interview, you can never look at a topic from just one discipline. Without interdisciplinarity, undifferentiated pictures arise.

Third, this article only discusses a selection of the interdisciplinary initiatives at Heidelberg University. Several projects have not been discussed. On an extracurricular level, the

university offers an increasing number of other interdisciplinary certificates and lecture series. In the winter semester of 2023/24, for instance, the university is introducing a new *Certificate of Advanced Studies in Cognitive Science* (PSYCHOLOGICAL INSTITUTE 2023). Within many regular degree programs, students must earn a certain number of credits point in overarching competences (ÜKs; abbreviation for *übergreifende Kompetenzen*). The definition of ÜKs and the number of credits students must take in ÜK courses varies greatly between different degree programs. While some courses of study require no ÜKs or ÜK courses equivalent to 60 working hours (two credit points), other degree programs include an ÜK module of up to 20 credit points (approximately 600 working hours). For some degree programs, students can have all courses from other disciplines credited as ÜKs, while the regulations are more restrictive in other courses of studies.

Desiderata

In this section, I address desiderata for future research and action-taking in higher education. First, there is a high demand for more outcome-orientated, multimethodological research on interdisciplinarity in higher education. Most research on interdisciplinarity in higher education consists of narrative overviews of projects and programs offered. It would be valuable to establish systematic stocktaking of the scope of students reached with these initiatives. The effectivity of interdisciplinary projects should be evaluated by measuring the interdisciplinary literacy of students. To my knowledge, there are almost no experimental studies that systematically test the effects of interdisciplinary initiatives in higher education.

Second, universities should implement strategies for interdisciplinarity in their teaching, which may provide answers to the following questions, among others:

- *How do we encourage interdisciplinary exchange and disciplinary depth at the same time?*
- *How can all students be informed about interdisciplinary opportunities and initiatives?*
- *Should all students be required to take some interdisciplinary courses?*

Third, the initiatives and programs should reach more students. Incentives for students to take part in interdisciplinary exchanges should be increased, and students should be informed about the benefits of interdisciplinarity. At the same time, the pitfalls of interdisciplinary courses and lectures should be reduced by supporting students in better incorporating interdisciplinary activities into their courses of study.

Conclusion

This article aimed to take stock of the interdisciplinary opportunities for students at Heidelberg University. To this end, I analyzed three different interdisciplinary formats using a mixed-methods approach. In alignment with Heidelberg University's own quality objectives and those stated by the League of European Research Universities, the university provides a breadth of initiatives that foster interdisciplinarity and vary in scope and required workload. While interdisciplinary degree programs guide students on their paths towards acquiring competencies from different disciplines, parallel degree programs and the Marsilius Study Program provide the students with more flexibility, but also more personal responsibility. Only a small proportion of students benefit from these interdisciplinary initiatives. In particular, projects that go above and beyond a regular degree program, e.g., the Marsilius Study Program, reach few students. This is most likely because these initiatives require a high workload; however, a complicating factor is that students may simply not know about such interdisciplinary opportunities. In addition, the low representation of international and non-male students is symptomatic of remaining societal challenges. For the future, it is essential to better communicate existing and emerging interdisciplinary formats. The university should also support students in incorporating interdisciplinarity in their studies alongside often already-demanding regular curricula. By enhancing students' interdisciplinary literacy and thus supporting well-rounded perspectives, we can fortify the broader society against current and future challenges.

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