

A Qualitative Exploration Into the Impact of Interdisciplinary Education on Graduate Students in Japan

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Abstract

Interdisciplinary educational programs in graduate studies often serve as a crucible for innovation and comprehensive knowledge. In Japan, such programs have garnered attention and have progressively been integrated into the academic landscape, aiming to foster collaborative knowledge creation and address complex global issues. This study delves into the nuanced experiences of graduate students engaged in such programs at a Japanese national university, examining their motivations, learning experiences, outcomes, and the challenges they encounter. Employing a phenomenological approach, this study aims to elucidate the multifaceted experiences and perceptions of students, offering a lens through which to comprehend their academic journeys amidst the confluence of diverse disciplines. Through semi-structured interviews, we carefully collected data from 24 participants, thereby allowing for an in-depth exploration and subsequent analysis of their narratives and reflections. Our primary findings indicate that students have clear motivations and learning objectives, and their expectations align closely with the course design. Furthermore, they assign a high rating to the course's utility. However, they also face challenges related to time constraints and the difficulty level of the course. The insights garnered provide a foundation for emphasizing potential improvements and proactive measures in interdisciplinary educational strategies and policies. By charting the terrains traversed by these graduate students, this study not only illuminates their pathways but also engenders considerations for evolving pedagogical practices, thereby seeking to enrich and bolster the learning experiences of future academic cohorts within interdisciplinary contexts.

Keywords: Graduate Program, Interdisciplinary Education, Japan

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Introduction

Contemporary societies face complex and multifarious challenges, as underscored by the Sustainable Development Goals (SDGs). Addressing these challenges transcends the scope of unidimensional approaches; rather, it necessitates the cultivation of advanced capabilities that enable a comprehensive perspective (Wilson, 2010).

Universities and other higher education institutions bear a significant responsibility: they are the epicenters of pioneering research and the crucibles for educating the forthcoming generation of scholars and professionals. A retrospective analysis from educational offerings to course structures indicates an escalating demand and interest in interdisciplinary and transdisciplinary approaches to education, as identified by Boor et al. (2021).

The contemporary global education paradigm is experiencing a discernible shift, with a reduced emphasis on the mere acquisition of knowledge and an increased focus on the development of skills and competencies. This transition is reflected in initiatives such as the Organization for Economic Co-operation and Development (OECD)'s Definition and Selection of Competencies (DeSeCo) project. The project redefines "competency" as more than a mere collection of knowledge and skills; it represents an individual's ability to effectively deploy a range of resources, including attitudes and values, to achieve specific objectives (Rychen & Salganik, 2003). The DeSeCo project asserts that the essence of competency lies in the adept application of these resources in various contexts and scenarios. In parallel, the OECD Education 2030 project echoes this sentiment, envisioning an education system that aligns with the demands of a rapidly evolving society (Shirai, 2020).

This conceptual shift is also evident in Japan's recent educational reforms, particularly the 2017-2018 revision of the national Course of Study, which underscores the importance of competencies. The updated framework structures the desired qualities and abilities around three foundational pillars: "Knowledge and Skills," "Thinking, Judgement, and Expressive Skills," and "The Power to Learn and Humanity." These pillars serve as guideposts for fostering a capable and holistic individual, poised to navigate and contribute to a complex world.

In 2006, Japan's Ministry of Education, Culture, Sports, Science and Technology introduced the "Promotion of Graduate School Education Policy Guidelines." Recognizing the critical need for enhancing graduate schools' role in talent development and establishing graduate programs of international repute, these guidelines were set against the backdrop of an emergent "knowledge-based society" (MEXT, 2006). The policy articulated a roadmap for future graduate education reform, emphasizing the alignment of industry and societal needs with the offerings of graduate education and committing targeted support to graduate schools charged with cultivating highly innovative and adaptable researchers.

Building on these foundations, the "Doctoral Program Leading Initiatives" were launched in 2011, reinforcing the commitment to develop global leaders capable of operating seamlessly across industry, academia, and government sectors. By 2013, this initiative had successfully implemented 62 such programs (MEXT, 2019a). Moreover, the "Excellence Graduate School Program," introduced in the 2018 academic year, aims to foster doctoral candidates who are poised to become global leaders. This program is dedicated to advancing the creation and application of new knowledge, addressing and resolving societal challenges, and driving innovation (MEXT, 2019b).

The objective of this study is to qualitatively investigate the impact of interdisciplinary education on graduate students at a leading national university in Japan. The research will address the following questions:

1. What motivates graduate students to participate in interdisciplinary education programs?
2. What primary learning experiences do graduate students report in these programs?
3. What outcomes are associated with interdisciplinary education for graduate students?
4. What challenges do graduate students encounter in interdisciplinary education?

Interdisciplinary Graduate Education Programs at a Leading Japanese University

At the forefront of interdisciplinary education, a distinguished Japanese university offers two innovative programs: the Graduate Minor Program and the Graduate Program for Advanced Interdisciplinary Studies. Designed to cater to a variety of academic interests, these programs present students with a comprehensive learning experience, centered around well-defined academic themes. The key distinction between these programs lies in their credit requirements — the Graduate Minor Program requires students to earn more than 14 credits, in contrast to the Advanced Interdisciplinary Studies Program, which requires over 5 credits.

Central to these programs is a student-focused philosophy, which grants individuals the autonomy to tailor their academic journey according to their interests. This personalized approach not only fosters engagement with current interdisciplinary issues but also encourages the integration of knowledge across different fields, bridging the gap between academia and real-world challenges. A fundamental feature of these programs is the collaborative learning environment they promote. By bringing together students, faculty, and peers from various disciplines, these programs create dynamic educational spaces that are rich with diverse perspectives and opportunities for meaningful exchange.

As of the 2023 academic year, the breadth of offerings is impressive. The university has introduced 24 Graduate Minor Programs and 44 Graduate Programs for Advanced Interdisciplinary Studies, showcasing its dedication to encompassing a wide range of scholarly pursuits. The data presented in Figure 1 illustrates the evolution of the educational programs since their inception in 2008, starting from a modest 14 to a substantial 68 programs over time. Correspondingly, there has been an upward trend in the number of applicants, with the count nearing 900 at its zenith. Yet, the recent three-year trend shows a notable decline in applicant numbers, a downturn attributable to the effects of the global pandemic.

Upon completion, students receive a certificate that not only represents their academic journey but also stands as a testament to their commitment and scholarly endeavors. This formal recognition highlights the value of their interdisciplinary education and the breadth of knowledge they have gained.

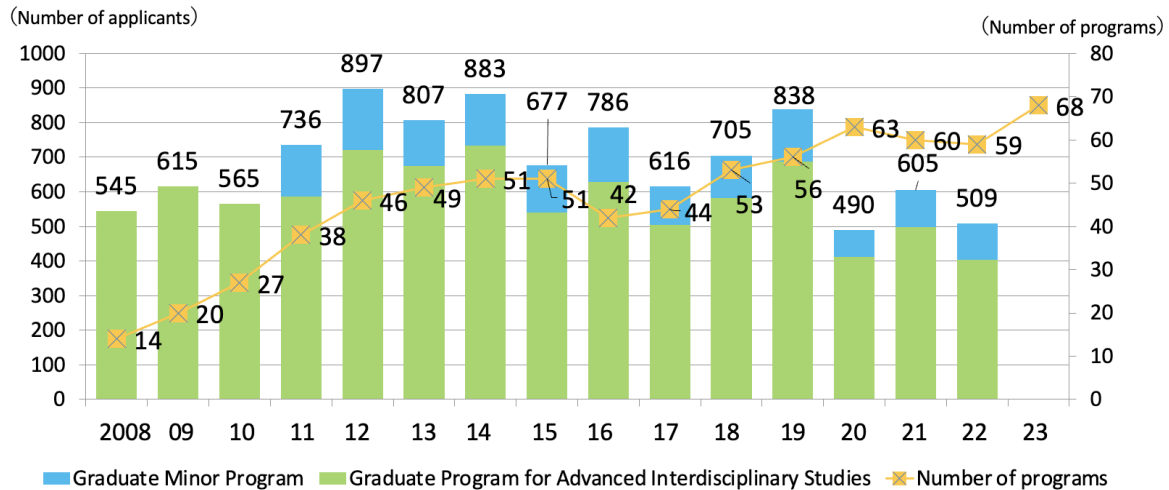


Figure 1: Number of programs and applicants

Methodology

Qualitative research methods, such as semi-structured interviews, enable researchers to engage in open-ended, conversational exchanges with participants. This facilitates the emergence of rich, detailed narratives that quantitative methods might overlook. By employing a qualitative approach, we were able to capture the diverse, multifaceted realities of graduate students, offering insights into their motivations, challenges, and aspirations in a way that standardized measures could not. Moreover, the choice of qualitative research underscores our commitment to valuing the voices and perspectives of our participants. It aligns with the phenomenological framework's emphasis on the lived experiences of individuals, seeking to understand the essence of these experiences from the participants' viewpoints. This methodological stance not only enriches the depth of our findings but also contributes to the broader academic discourse on graduate education by highlighting individual experiences within their socio-cultural contexts.

This study was underpinned by a qualitative research approach, characterized by the use of semi-structured interviews carried out from 2020 to 2023. Throughout this period, our research team engaged with a diverse group of 29 graduate students, including 24 pursuing master's degrees and 5 doctoral candidates. This cohort was carefully selected to maintain a gender balance, with 16 males and 13 females, providing a wide range of perspectives. The interviews were conducted with meticulous attention to detail. Sessions were held in Japanese, facilitated by a pair of researchers, and consisted of small group discussions to encourage in-depth dialogue. Each interview spanned approximately 90 minutes, resulting in a total of 12 hours of comprehensive qualitative data.

For the data analysis, we employed a phenomenological framework to capture the essence of the participants' experiences (Creswell & Poth, 2016). This intricate process entailed intensive reflection by the interviewers, extensive notetaking, and the thorough transcription of the audio recordings. The analysis culminated with the systematic coding of data and the formation of clearly defined thematic categories.

The Motivations for Interdisciplinary Graduate Education

Students embark on interdisciplinary studies for a variety of reasons. A key motivation is the acquisition of diverse perspectives and methodologies distinct from their primary field of study. For instance, a doctoral candidate shared how exploring sports within the context of education led to a profound reevaluation of standard teaching and coaching methods, resulting in significant insights.

"It was significant to be able to view my research field from different standpoints. My specialty is education, so I had been looking at sports from the perspective of education and my personal interests. However, the content of the lectures mainly involved the long-term maintenance of physical functions and research and insights from the clinical side. Looking at sports and education from the opposite perspective, I discovered that what I had always considered 'common sense' in terms of classroom content and coaching in junior and senior high school activities actually had room for reevaluation. This revelation was truly an eye-opener." (Doctoral candidate, Graduate School of Human Science, Sports Medical Science Research Program)

Another driving factor is the desire to deepen specialization. A master's student recounted their journey in graduate research on nanodevices, leading them to further their expertise in nanotechnology through a minor program. This reflects a commitment to enhancing their knowledge and skill set in a specialized area.

"When I entered graduate school, I was conducting structural analysis of nanodevices in my research, so I took the first minor program to deepen my knowledge and technology related to nanotechnology. Among those courses, there were lectures on machine learning, and from autumn, I enrolled in a data science program that included those lectures in its curriculum requirements." (Master's student, Graduate School of Engineering Science, Advanced Inter-/Multi-Disciplinary Programs in Nanoscience and Nanotechnology)

Two other prominent motivations for pursuing interdisciplinary studies are broadening career competencies and fostering multigenerational and multidisciplinary interactions. A master's student in Engineering, despite a primary focus outside finance, chose to study finance as part of their interdisciplinary education. This strategic decision was aimed at enhancing their job prospects, demonstrating a proactive approach to career development.

"I was interested in economics and finance and was considering a career in the financial sector. My expertise was not directly related to finance, but I systematically studied it to enhance my appeal during job hunting, hoping it would be effective." (Master's student, Graduate School of Engineering, Finance and Insurance)

Simultaneously, a student sought to enrich her educational journey by engaging with people from different fields and generations. This student, interested in medical ethics, selected a program that included medical ethics lectures, illustrating the desire for a diverse and enriching learning environment.

"I sought opportunities for interaction with individuals from various disciplines and age groups. My interest in medical ethics, closely related to my major, guided me to a program that offered relevant lectures." (Master's student, Graduate School of Human Science, UNESCO Chair in Global Health and Education: Social Design for Health)

These motivations reflect a deep understanding of the importance of broadening career skills and the value of diverse perspectives and interactions in the educational process.

Learning Experiences in Interdisciplinary Graduate Education

In the interdisciplinary graduate programs, students have had transformative learning experiences, each unique to their field of study. A master's student highlighted the importance of applying systematic knowledge to their research. The student appreciated the interactions with instructors and peers from various fields, which significantly enriched their learning. A notable achievement was the application of Digital Humanities (DH) methods in their research, leading to recognition at a young researchers' forum. This instance underscores the real-world impact of interdisciplinary education.

"The course content was beyond my expectations. Learning systematically and performing actual analyses using sample data was invaluable. Connecting with DH instructors and peers from different fields allowed for a richer educational experience. My research, influenced by courses like 'Linguistic Statistics' and 'Basics of DH,' received an encouragement award at a research forum." (Master's student, Graduate School of Humanities, Digital Humanities)

Similarly, a master's student in the School of Engineering, whose primary focus was not finance, pursued a finance minor to enhance their job prospects. This strategic move led to a successful transition into the financial industry, exemplifying the practical benefits of interdisciplinary learning.

"Coming from a non-finance background, I systematically studied finance to stand out in the job market. This approach paid off, as I secured a job offer as a specialist (Quant) in the financial industry and succeeded in the university-level mathematics exams specific to finance roles." (Master's student, Graduate School of Engineering, Finance and Insurance)

In the School of Law and Politics, a master's student in Global Japanese Studies immersed themselves in Japanese culture, arts, and philosophy. This experience not only met but exceeded their expectations, significantly enriching their knowledge and enhancing their research capabilities.

"Studying in Japan, I sought to gain in-depth knowledge about Japanese culture, arts, and philosophy. The program provided excellent classes and content, including unique experiences like museum visits with professors. This broadened my understanding of how different fields of knowledge interconnect, which I believe will be beneficial in my future research." (Master's student, Graduate School of Law and Politics, Global Japanese Studies)

Each of these experiences reflects the foresight of students in choosing interdisciplinary paths, adapting to the dynamic demands of their fields, and the transformative impact of such education on their professional and academic journeys.

Learning Outcomes in Interdisciplinary Graduate Education

The study of learning outcomes, as informed by De Greef et al. (2017), highlights that interdisciplinary understanding is anchored in critical thinking, collaboration, and reflection (Figure 2). These skills and subskills are indispensable in formulating common objectives, evaluating decisions, and addressing cognitive biases, crucial for excelling in a diverse academic and professional milieu.

Our review of learning outcomes unveils key areas of development. In the realm of critical thinking, a project-based activity in data science required students to analyze data sets and adapt when results deviated from initial expectations, sharpening their analytical skills. A master's student in data science described this process: "We had considerable freedom in our analysis, which made choosing the theme challenging. The frequent need for trial and error when hypotheses did not hold was a significant part of the learning experience."- Master's student, Graduate School of Engineer Science, Data Science.

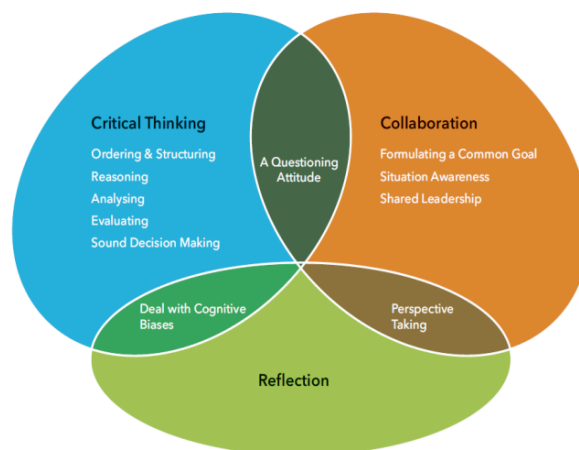


Figure 2: Skills and subskills that foster interdisciplinary understanding

In terms of collaboration, working in teams taught students to appreciate diverse opinions and address complex issues beyond their immediate fields. This fostered interdisciplinary communication and problem-solving. A student shared their experience: "In the team, learning to value different ideas and think flexibly about solving problems was transformative. It opened me up to areas outside my expertise and improved my ability to communicate complex ideas simply."- Master's student, Graduate School of Law and Politics, Cross-Boundary Innovation.

Reflective practices enabled students to deepen their knowledge and reevaluate the positioning of their research, enriching their overall understanding and application of interdisciplinary concepts. A student reflected: "The program helped me deepen my engagement with diverse knowledge areas. Reconsidering the disciplinary context of my research and exploring different regional studies was invaluable in understanding the broader significance of my work." -Master's student, Graduate School of Language and Culture Studies in Language and Culture, Global History.

These learning outcomes showcase the profound impact of interdisciplinary education in fostering critical thinking, enhancing collaborative skills, and encouraging reflective learning, all vital for thriving in today's complex academic and professional environments.

Navigating Challenges in Interdisciplinary Graduate Education

Interdisciplinary graduate programs, while offering a breadth of knowledge and fostering innovation, present unique challenges for students. These issues range from logistical to academic, impacting the overall educational journey.

Course scheduling conflicts have emerged as a notable obstacle. Students frequently encounter difficulties aligning their schedules to accommodate all required courses. For instance, a student from the School of Language and Culture Studies highlighted the struggle of balancing their schedule, stating, "The biggest challenge was aligning my timetable. I had to drop a desired program because it conflicted with my core courses." -Master's student, Graduate School of Language and Culture Studies in Language and Culture, Global History.

Time Management is another critical issue, particularly for students who are trying to balance their academic research with personal and professional commitments. A medical student shared their struggle, noting, "Balancing my research with part-time work and other personal responsibilities required a significant investment of time, making it a tightrope walk between various commitments." -Master's student, Graduate School of Medicine, "Medical Device Design" and "Cross-Boundary Innovation".

Course Accessibility also poses a significant challenge, with the absence of online learning options exacerbating the difficulty of attending classes, especially for those who need to travel between campuses. A student remarked on the logistical hurdles, "The lack of remote learning options added another layer of complexity to attending classes, especially when needing to navigate between different campuses for various courses." -Master's student, Graduate School of Language and Culture Studies in Language and Culture, Linguistics.

Complexity of Course Content presents an academic challenge, with students outside their primary field of study finding it difficult to grasp the material. An engineering science student explained, "The diversity of available courses is great, but the assumption of pre-existing knowledge makes it challenging to branch out into new areas of study." -Master's student, Graduate School of Engineer Science, Advanced Inter-/ Multi-Disciplinary Graduate-level Programs for Education, Research and Training in Nanoscience and Nanotechnology.

These highlighted challenges point to the necessity for interdisciplinary programs to evolve continually and adapt, ensuring they meet the varied needs and constraints of their student body more effectively.

Discussion and Conclusion

Interdisciplinary studies are at the forefront of educational innovation, challenging students to rethink traditional paradigms and encouraging the fusion of diverse perspectives. Our research into student motivations and outcomes reveals a compelling draw toward these programs, fueled by the desire to expand research abilities, deepen subject-matter expertise, and cultivate versatile career skills. The tangible benefits of this educational approach are

evident in the enhanced critical thinking, teamwork, and introspective skills that students develop. At the core of this transformative educational experience is experiential learning. Through hands-on project work and real-world problem-solving, students are able to translate theoretical knowledge into practice—a process that is crucial for their personal and academic growth.

Despite these advantages, it is important to acknowledge the challenges that students face, including managing time effectively, navigating course availability, understanding complex material, and maintaining a balanced academic workload. These challenges call for continuous improvement and the establishment of robust support structures within interdisciplinary education to maximize its effectiveness.

In conclusion, the goal of interdisciplinary programs is clear: to integrate diverse academic fields into a cohesive framework that produces adaptable, innovative thinkers ready to tackle the multifaceted problems of today. To fully realize the potential of these programs, we must implement strategic support systems that promote flexible course scheduling, improve time management, and provide expansive access to a variety of courses. Looking ahead, the ongoing refinement of these programs is critical. We must actively respond to the challenges faced by students, evolving our teaching strategies to better equip them for the intrinsically interdisciplinary demands of the global arena.

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