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Profile of Doctoral Student's Motivation in Science Education Program: A Mini Research

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Abstract: The evolving landscape of higher education and its potential implications for the careers of doctoral graduates is growing. This research aims to analyze the motivation profiles of doctoral students in a Science Education program. Survey data was collected from students enrolled in the Science Education Doctoral Program at Universitas Negeri Yogyakarta in the 2024/2025 academic year. Ten question surveys with qualitative open-ended questions were developed in this research. Findings highlight intrinsic, integrated, and identified motivational factors and their potential implications for educational practices in doctoral programs in science education. The recommendations provided institutions to design more effective support strategies to ensure the academic success and contribution of doctoral students to the advancement of science education in Indonesia.

Keyword: doctoral student, motivation, science education

1. Introduction

The number of doctoral students increased significantly in developed economies. In 2024, the average share of 25-65 years old with a doctorate across the OECD was around 1% [1]. Although the number of doctoral degrees increased rapidly by 44% from 2004 to 2017, the rate is now slowing and is predicted to increase by 4% from 2017 to 2029 [2]. These shifts may indicate the evolving landscape of higher education and the workforce, as well as potential career implications for doctoral graduates.

Science education is a discipline that focuses not only on the transfer of knowledge; it also includes a broader understanding of how individuals learn and interact with scientific concepts [3]. For science education, pedagogy serves to formulate a sustainable teaching philosophy, open up space for various innovative approaches, and increase the relevance of competent and measurable educational practices in developing science competencies at formal and professional levels [4]. This complexity necessitates a thorough exploration of the motivations that fuel doctoral candidates' aspirations, as these motivations can significantly influence their academic trajectories, research outputs, and eventual contributions to the field.

Pursuing a doctoral education is a process that requires high perseverance, commitment, and dedication from students. This is because the doctoral program requires students to focus on in-depth research that can contribute to the development of science and society [5], [6]. In general, doctoral students, especially in the field of science, are faced with the demands to think critically [7], conduct research [8] , and innovate in science teaching [9]. A supportive learning environment and adequate facilities play an important role in influencing the motivation of doctoral students [10]. In addition, institutional support such as access to research facilities and extensive academic networks can increase the enthusiasm and motivation of doctoral students in undergoing the study process [11]. Thus, environmental factors and institutional support can influence doctoral students' motivation.

Understanding the profile of doctoral students in this field is essential, as it provides insights into the factors that drive individuals to engage in advanced study and research. Motivation in educational contexts is a multifaceted construct that has garnered considerable attention in educational psychology and pedagogy [12]. Various theories of motivation, including intrinsic and extrinsic motivation frameworks [13], offer valuable lenses through which to examine the aspirations of doctoral students [6]. Intrinsic motivation refers to engaging in an activity for its inherent satisfaction, while extrinsic motivation involves participation driven by external rewards or pressures [13]. For instance, a student motivated by intrinsic factors can pursue research topics that align with personal interests [14], while another motivated by extrinsic factors may focus on areas deemed more likely to yield professional advancement [15]. In the context of science education, these motivational dimensions can manifest in diverse ways, shaping the experiences and outcomes of doctoral students.

The landscape of science education has evolved significantly in recent years [16], influenced by advances in technology, shifts in pedagogical approaches, and a growing emphasis on STEM (Science, Technology, Engineering, and Mathematics) education [17]–[19]. This evolution has created new opportunities and challenges for doctoral students, who must navigate an increasingly competitive academic environment. As such, understanding the motivations that drive these students becomes critical for institutions aiming to support their development effectively [20]. Institutions of higher education play a pivotal role in shaping the experiences of doctoral candidates through mentorship, funding opportunities, and research environments [21]. Therefore, an exploration of

student motivations must also consider the institutional context and the resources available to students.

Research on doctoral student motivation is essential for informing policy and practice within higher education. By identifying the key motivational factors that influence doctoral students in science education, stakeholders can develop targeted interventions aimed at enhancing student engagement, satisfaction, and retention. Furthermore, understanding these motivations can aid in the design of curricula and support systems that align with the needs and aspirations of students, ultimately leading to more effective training of future educators and researchers in the sciences. Research question is "What is the motivational profile of students pursuing a doctoral degree program in science education?".

2. Method

This research took place during the first semester of doctoral program in Science Education Department Universitas Negeri Yogyakarta academic year 2024/2025. Ten question surveys with qualitative open-ended questions were developed in this research. The researchers is the play central role in this qualitative research [22]. The survey explored the motivation of doctoral students. It was adapted from the Survey of Initial Motivations of Doctoral Education Students by Ceglie (2019) and Litalien et al., (2015). This survey was provided online using Google Form and sent to the Whatsapp Group of eight doctoral students. The students consist of various concentrations in Science Education including two students taking the Biology Education concentration (25.00%), one student taking the Physics Education concentration (12.50%) and five students taking the Natural Science Education concentration (62.50%). The survey also asked basic information questions such as gender, age, region of origin, year of completion of master's program and activities undertaken after completing the master's program. The data were downloaded into an excel file to begin descriptive analysis.

Table 1 shows the questions from the doctoral students' motivation survey. Survey question indicators include intrinsic, integrated and identified motivation.

Table 1. Survey question of doctoral student's motivation

Indicators	Number of Item	Question
Intrinsic	Item 1	What makes you feel satisfied while studying for a doctoral program?
	Item 2	What challenges and difficulties did you face while pursuing your doctoral program?
	Item 3	What challenges and difficulties did you face while pursuing your doctoral program?
	Item 4	What makes you happy about studying for a doctoral program?
Integrated	Item 5	What are your expectations when pursuing a doctoral program?
	Item 6	What are your hopes after completing your doctoral program?
	Item 7	How can a doctoral program help you conduct research and studies?

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	Item 8	How much impact does publishing your research results have on your motivation to continue research in the future?
Identified	Item 9	What is your reason for pursuing a doctoral program?
	Item 10	How did the support of family and friends influence your decision to pursue doctoral studies?

3. Results

The results of this research include basic information and motivational profiles of Doctoral Students in Science Education in Academic Year 2024/2025 at Universitas Negeri Yogyakarta, Indonesia.

3.1. Basic Information

Table 2. Basic information of doctoral students in science education

Gender	Percentage (%)	Age (year)
Male	25	38.00
Female	75	31.50
Average	Female majority	34.75

According to the data presented in Table 2, a significant majority of doctoral students in the field of science education are female, accounting for 75% of the cohort. This trend suggests a notable gender distribution in favor of female representation within this academic level and field of study. Additionally, the average age of these doctoral candidates is between 34 and 35 years, indicating that many individuals continue their studies after gaining professional or academic experience. This age demographic may reflect patterns of late entry into doctoral programs, which may be influenced by career or family commitments prior to beginning their doctoral education. This combination of age and gender insights provides a foundational understanding of the characteristics of doctoral students in science education to design and support programs tailored to their unique needs and experiences.

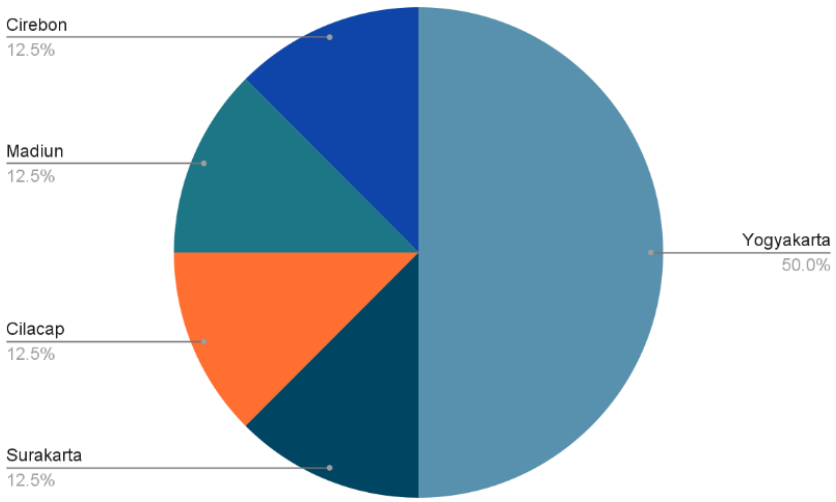

Figure 1. Region of origin of doctoral students in Science Education

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Universitas Negeri Yogyakarta (UNY), located in the Special Region of Yogyakarta, Indonesia, is a center of education for doctoral students in the Science Education program who come from various regions in Indonesia. In this first semester, students in the program come from four provinces of Indonesia, namely Central Java (from the Cilacap and Surakarta areas), West Java (Cirebon), East Java (Madiun), and the Special Region of Yogyakarta (see Figure 1). The diversity of students' geographic origins reflects the reach and appeal of the UNY's Science Education program in attracting prospective academics from all over Java.

3.2. Doctoral Student's Motivation

3.2.1. Intrinsic Motivation

In the intrinsic aspect, we explore four questions regarding satisfaction, challenges and difficulties, happiness when pursuing doctoral studies. The findings from the results of student responses are as follows:

Table 3. Findings of intrinsic motivation responses

Sub-indicators	Findings
Satisfaction	• Improve knowledge and skills • Write and publish articles • Have new friends and relationships • Finish a task • Get good marks • Job opportunities
Challenges and difficulties	• Stress management • Limited access to data • Many tasks to be completed in a short time • Pressure for Scopus indexed publications • Difficult time management in study, work, tasks and other activities • Difficulty in compiling and developing research proposals
Happiness	• Can learn effectively • Pride in facing challenges • Successfully completing the research phase • Freedom to explore topics of interest • Deepen knowledge in a particular field • Can interact with professional experts • Can become a lecturer • Become part of an academic community • Sharpen creativity and critical thinking through research

3.2.2. Integrated Motivation

In the integrated aspect, we explore four questions regarding expectations when pursuing a doctoral program, hopes after completing doctoral program, research and publication. The findings from the results of student responses are as follows:

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Table 4. Findings of integrated motivation responses

Sub-indicators	Findings
Expectations when pursuing a doctoral program	• Become an expert in science • Contribute new knowledge through research • Develop research skills • Build networks and collaborate with researchers • Expand career prospects • Improve teaching skills • Get positive energy from Professors, college friends, or anyone to learn continuously • Graduate quickly with satisfactory results • Get published in reputable journals Scopus Q1 or Q2 • Improve educational quality
Hopes after completing doctoral program	• Become an expert in science • Contribute new knowledge through research • Develop research skills • Build networks and collaborate with researchers • Expand career prospects • Improve teaching skills • Get positive energy from Professors, college friends, or anyone to learn continuously • Graduate quickly with satisfactory results • Get published in reputable journals Scopus Q1 or Q2 • Improve educational quality
Research	• Become an expert in science • Contribute new knowledge through research • Develop research skills • Build networks and collaborate with researchers • Expand career prospects • Improve teaching skills • Get positive energy from Professors, college friends, or anyone to learn continuously • Graduate quickly with satisfactory results • Get published in reputable journals Scopus Q1 or Q2 • Improve educational quality
Publication	• Become an expert in science • Contribute new knowledge through research • Develop research skills • Build networks and collaborate with researchers • Expand career prospects • Improve teaching skills • Get positive energy from Professors, college friends, or anyone to learn continuously • Graduate quickly with satisfactory results • Get published in reputable journals Scopus Q1 or Q2

Sub-indicators	Findings
	• Improve educational quality

3.2.3. Identified Motivation

In the identified aspect, we explore two questions regarding reason and support system for pursuing a doctoral program. The findings from the results of student responses are as follows:

Table 5. Findings of identified motivation responses

Sub-indicators	Findings
Reason	• Get opportunities to become lecturers or researchers • Develop research according to interests • Improve competence, knowledge and skills as lecturers • Build collaboration networking • Government regulations that lecturers must be doctorally qualified • Inspire the younger generation to be interested in science
Support systems	• Material support such as funding for both lectures and publications. • Moral support such as thoughts, increasing self-confidence, reminders to manage time, reducing burdens and stress.

4. Discussion

This research examines the motivation profile of science education doctoral students at Universitas Negeri Yogyakarta. Data collection was carried out by conducting a survey in the form of a Google form which contained ten questions related to doctoral student motivation (see Table 1). This research involved eight students as respondents (can be seen in Table 2). Most respondents are women with a percentage of 75% and the average respondent is 34-35 years old. The average age of doctoral students is more than 30 years [25]. Age 30 years and above is a mature age. This is because at this age doctoral students have had academic experience which makes them more emotionally and intellectually prepared [26]. Apart from that, career demands can influence students to continue studying in doctoral programs. Furthermore, based on city of origin, all students come from the island of Java with some students coming from Yogyakarta (see Figure 1). Based on this, there is a connection between students continuing their studies which depends on their location of origin and the location of the institution.

The findings of this research examine the motivation of science education doctoral students at Universitas Negeri Yogyakarta which focuses on three aspects, namely intrinsic, integrated and identified motivation. First, intrinsic motivation is encouragement that comes from within the individual [27]. Intrinsic motivation contains several elements in it such as satisfaction, challenges, difficulties and happiness. The

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results of intrinsic motivation response mapping can be observed in Table 3. Students feel satisfied with the increase in knowledge and skills, the opportunity to write and publish articles, and establish professional relationships. Career opportunities after study are also an intrinsic motivation to contribute more widely. However, students face challenges, such as stress management due to pressure to complete assignments in a short time, limited data access, and the demand for publication in Scopus-indexed journals as an academic standard. Time management between study, work, and other tasks is also an obstacle, especially for those who are already teaching. Despite the challenges, students feel satisfied in overcoming these difficulties, completing the research stage, and enjoying the freedom to explore interesting topics. Interaction with experts, teaching opportunities, and being part of an academic community also provide their own happiness and encourage creativity and critical thinking in their study process.

Second, integrated aspects of doctoral student motivation include expectations, hopes, research, and publications. The results of integrated motivation response mapping can be observed in Table 4. In expectation, students hope to become experts in science [28], contribute to new knowledge [29], develop research skills [30], build professional networks [31] expand career prospects [32], and improve teaching skills [33]. They also hope to get positive support from professors and colleagues, graduate on time with satisfactory results, and be published in reputable journals. After graduating, students hope to apply research results, build stronger professional networks, improve teaching skills, and contribute to educational solutions in Indonesia. In research, they aim to meet academic demands through access to databases such as Scopus, apply various research methods, take courses that support research, and participate in international conferences. For publications, students strive to publish research results in reputable journals to achieve functional positions, collaborate across disciplines, gain recognition for dedication, and obtain funding or sponsorship for further research.

Third, the identified motivation aspect for doctoral students highlights their reasons and support systems in pursuing the program. The results of intrinsic motivation response mapping can be observed in Table 5. Students are motivated by opportunities to work as lecturers or researchers, develop research aligned with personal interests, and enhance their competence, knowledge, and skills as educators. Additionally, building collaborative networks [34], fulfilling government regulations requiring doctoral qualifications for lecturers [35], and inspiring younger generations toward science are significant motivators [36]. The support systems include material support [37]like funding for coursework and publications, and moral support [38] such as encouragement, time management reminders, and stress relief.

The limitation of this research is that the research sample was only taken from one doctoral study program, so that further research can expand the research sample. These results emphasize the importance of academic support and research facilities in improving the motivation of doctoral students, as well as the need to develop support programs that are in accordance with their needs. These findings can help institutions design more effective support strategies to ensure the academic success and contribution of graduates to the advancement of science education in Indonesia.

5. Conclusion

This research provides an overview of the motivation of doctoral students in science education at Universitas Negeri Yogyakarta, focusing on intrinsic, integrated, and identified motivational aspects. Most students are motivated by the desire to deepen their knowledge, improve research skills, and build professional networks in the academic field. Environmental factors, such as moral and material support from family, friends, and institutions, also play an important role in maintaining their motivation. Intrinsic motivation, such as satisfaction in completing assignments and the freedom to explore research topics, is one of the main drivers of students in pursuing doctoral studies. Meanwhile, from the integrated motivational aspect, the hope of contributing to improving the quality of education and publication in reputable journals is a significant target. Identified motivations such as demands from government regulations and the ideal of becoming a lecturer also influence their decision to continue their studies to the doctoral level.

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