International Journal of Business, Law, and Education
E-ISSN : 2747-1349
Publisher: IJBLE Scientific Publications Community Inc.
Volume 5, Number 2, 2024
https://ijble.com/index.php/journal/index

Research Capability of Doctoral Students in Utilizing Multivariate Statistics, Writing Research Proposal and Publishable Paper

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ABSTRACT
Advanced studies aim to produce highly competent graduates in areas like research and publication. These expectations necessitate research capabilities in graduate students. To assess doctoral students' research abilities and inform instruction, a research course evaluates them at the beginning of the term. Employing a descriptive design, this study investigated 21 individuals enrolled in an advanced research course during the second term of the academic year 2022-2023. Data were collected using an adapted instrument. The results indicated that doctoral students possessed moderate capabilities in writing a research proposal. However, they reported feeling neutral regarding their ability to write publishable papers. Additionally, these individuals indicated a slight or limited capability for utilizing multivariate statistics. These findings hold implications for instruction and future research, particularly in prioritizing course content to address areas where doctoral students have limited research capabilities.

Keywords:
Research capability; research proposal writing; publishable paper

INTRODUCTION

Advanced education is expected to develop graduates into highly competent researchers, skilled in research, publication, and adherence to the norms and values of the field (Mydin & Surat, 2021). A doctoral program's aim should be to produce graduates equipped with the skills for knowledge generation, which involves developing theories or building models of natural and social realities. Doctoral programs are believed to be drivers of research productivity (Belavy et al., 2020). Specifically, a research doctorate program entails undergoing an independent research process that allows students to make an original contribution to the existing body of knowledge (Baptista et al., 2015). Graduates of doctoral programs must possess advanced research skills and knowledge that contribute to both individual and institutional research performance (Bao et al., 2018; Bernstein et al., 2014).

Research capability encompasses research skills, competency, and abilities. Operationally, it de-fines the ability to "solve problems in a systematic way that brings transformation" (Ormond & Williams, 2013, p. 24). Individuals who have made substantial contributions to the body of knowledge demonstrate high research capability (Caingcoy, 2020). It also entails an individual, organization, or system's capacity to effectively and efficiently implement research plans and disseminate high-quality research (Salom, 2013). However, most literature focuses research capability on the individual's knowledge, attitudes, and skills necessary to conduct research, communicate results, and publish them in reputable journals.

Advancing research capability requires considering a plethora of factors, including an individual's motivation, attitudes, and the skills needed to undertake the systematic and often tedious processes of inquiry. When these factors are addressed, improving research capability necessitates the consistent application of knowledge and skills to generate research outputs and innovations (Caingcoy, 2020). Over time, regular assessment of research capability is necessary to inform practical and

responsive actions at the graduate program or institutional level to enhance capability and maintain research rigor. Hughes (2019) emphasizes that "research capacity must build over a program and this requires coherent research skill development and assessment that is progressive" (p. 394).

Universities and graduate professors often conduct assessment or self-report studies with their graduate students to determine their entry-level research capabilities and how these capabilities change after taking a research course. These studies yield varied results across different contexts. For example, one study found that graduate students perceived themselves as moderately capable of writing re-search proposals and publishable research papers (Agatep & Villalobos, 2020). However, they perceived themselves to have lower capabilities in developing research frameworks and methodologies, collecting, cleaning, and encoding data, performing data analysis, preparing presentations, and writing research articles (Orpia, 2022). Additionally, another study found doctoral students lacking the skills to conduct high-quality research (Ali et al., 2021).

Previous studies highlight the need for further exploration of graduate student research capability development from the students' perspective (Ryan et al., 2012). Agatep and Villalobos (2020) suggest that understanding students' needs can inform efforts to improve their research capabilities and knowledge production practices. Notably, previous research has tended to be generic, not specifying whether the assessed capabilities are related to quantitative, qualitative, or mixed methods designs. Most studies focus on research processes and paper sections common to most research designs and approaches (Caingcoy, 2020; Agatep et al., 2020; Orpia, 2022).

The proponent was teaching a course for a nationally funded program sponsored by a prestigious state university of teacher education in the Philippines. This course prepares doctoral students in conducting theoretically grounded and methodologically sound quantitative research. It starts with a brief exploration of the theoretical, conceptual, and discursive perspectives of quantitative research method-ologies, with a focus on multivariate designs, and culminates with instruction on managing and analyzing quantitative data using technologies (David, n.d., p. 2). It was assumed that each doctoral student had prior research knowledge and experience, as they had all completed their master's theses. Based on this assumption, the proponent deemed it necessary to assess the doctoral students' research capabilities before the course began.

This paper investigated doctoral students' research capabilities by seeking answers to the following questions:

1. To what extent do doctoral students possess research capabilities in the following areas:
    1.1 Writing a research proposal
    1.2 Writing a publishable paper
    1.3 Utilizing multivariate statistics?
2. What are the implications of doctoral students' research capabilities for instruction and future research?

Framework

This study draws on the key areas proposed by Calma (2009) that contribute to developing research skills and capabilities in graduate students enrolled in research degree programs. Several areas are directly applicable to doctoral students in the

Quantitative Design and Data Management course, such as research opportunities (conferences), department-sponsored research training programs (seminars, colloquia), research methods courses, and other coursework (statistics, technical writing, research-based activities in various subjects).

The study adopts the capability approach to evaluating researchers developed by O'Donovan et al. (2022). This approach focuses on what researchers can do. The framework utilizes a four-part, conceptually driven heuristic: individual capabilities, collective capabilities, cognitive capabilities, and contextual influences on capabilities. However, this study specifically focuses on the first and third heuristics. Individual capabilities refer to tacit knowledge, skills, and experiences researchers acquire over time. Cognitive capabilities are necessary to perform scientific and technical work. These capabilities are honed through graduate and post-graduate education and training and include skills and techniques formally taught in schools, such as conducting interviews and performing statistical analysis.

This study finds support in three existing standards for professional teachers, school heads, and supervisors. Domain one of the Philippine Professional Standards for Teachers expects teachers to demonstrate research-based knowledge and principles of teaching and learning (DepEd, 2017). Similarly, school heads are expected to demonstrate a capability for research and innovation (DepEd, 2020a). This capability is vital for them to provide strategic leadership for the school system. Finally, supervisors are expected to cultivate a culture of research, which is necessary for fostering a culture of continuous improvement in the school district system (DepEd, 2020b). These standards are relevant to the development of doctoral students' research capabilities. Such capabilities are not only necessary to complete a course or program but are also a requirement for these educators to excel in their respective roles.

METHOD

This study employed a descriptive quantitative research design to investigate the extent of doctoral students' research capabilities in three areas: 1) writing a research proposal, 2) writing a publishable paper, and 3) utilizing multivariate statistics. Descriptive studies aim to "describe individuals, events, or conditions as they naturally exist" (Siedlecki, 2020, p. 8). They do not manipulate variables to test hypotheses or establish causal relationships. A retrospective approach was used, where participants self-reported their research capabilities based on past experiences. These experiences might include thesis writing, dissertation writing, or participation in research presentations within their regions or divisions.

The study involved 21 doctoral students enrolled in the ED803 Quantitative Design and Data Management course offered by a prestigious university of teacher education in the Philippines, where the researcher was a part-time instructor. These students were taking Doctor of Philosophy in Curriculum and Instruction program and participated in the study during the second term of the academic year 2022-2023. Three students from the original class of 24 did not complete the voluntary self-assessment. A convenience sampling approach was used, as participation could not be required from them. All students were properly invited to participate in the self-assessment. Their informed consent was obtained electronically through a Google form designed specifically for this study.

Self-reporting is a common method for gauging graduate students' research capabilities. It is considered a "primary assessment method in psychology and education" (Pekrun, 2020, p. 186). This study employed an adapted questionnaire developed by Agatep and Villalobos (2020) with some modifications. The wording of certain items was adjusted for better clarity (e.g. conceptualizing a problem was changed to conceptualizing a research problem, writing the scope and limitation became writing the scope and delimitation, and writing the hypothesis was rephrased as formulating the hypothesis. The questionnaire consisted of three sections. The first set (15 items) focused on students' ability to conceptualize a research proposal. The second set (10 items) assessed their research capability in writing a publishable paper. Finally, the third set of questions (developed by the researcher based on coverage of the course) comprised 7 items to gauge participants' capability in using multivariate statistics.

The self-assessment was administered during the class orientation session, the first meeting between the graduate students and the instructor (the proponent). The assessment aimed to gather information about the students' prior knowledge and skills relevant to quantitative research, particularly those acquired during their master's programs. It also assessed their existing knowledge and skills in applying quantitative research to their own research and publications within their respective school systems. This information was used to inform the curriculum design and plan for the entire term. After providing the class with a module, the proponent collected the self-assessment data to enrich the instruction and tasks tailored for the students. Thus, the self-assessment serves as a diagnostic assessment.

The data sets were analyzed using descriptive statistics. Frequency and percentage were used in presenting their demographic profile and experiences in their previous post graduate programs. Means and standard deviations were calculated to assess the extent of doctoral students' research capabilities in three areas: writing research proposals, utilizing multivariate statistics, and writing publishable papers. For interpreting the mean scores, the following guide was used: 1.00-1.79- not capable; 1.80-2.59- slightly capable; 2.60-3.39- neutral; 3.40-4.19-moderately capable; 4.20-5.00-highly capable.

RESULTS AND DISCUSSION

Table 1. Demographic Profile and Experiences of Participants

Profile	Categories	f (n=21)	%
Sex	Male	8	38.09
	Female	13	61.90
HEQ	Graduated from a master's degree	9	42.85
	Earned Units in Doctorate program or Completed Academic Requirements	5	23.80
	Graduated from a doctorate degree	7	33.33
Position	Master Teacher I	12	57.14
	Master Teacher 2	3	14.28
	Head Teacher I	2	9.52
	Head Teacher II	1	4.76
	Assistant Principal II	1	4.76

Public School District Supervisor	1	4.76
Chief Education Supervisor	1	4.76
Publication Experience		
With publication	2	9.52
Without publication	19	90.47
Research Design/Approach used in Thesis Writing		
Quasi-experimental design	1	4.76
Mixed methods	2	9.52
Quantitative Design	5	23.80
Descriptive-Correlational Design	5	23.80
Qualitative	2	9.52
Exploratory Descriptive/ Descriptive-qualitative	2	9.52
Descriptive Research/ Descriptive survey	4	19.04
Research Design/Approach used in Dissertation Writing		
Quantitative	2	9.52
Grounded Theory	1	4.76
Quantitative-correlational	1	4.76
Descriptive - Developmental	1	4.76
Cross sectional survey	1	4.76
Causal design	1	4.76

The table reveals a diverse participant pool. Over sixty-one percent of the participants were female, with the remaining portion male. Educational attainment is varied, with over forty percent holding a master's degree and more than thirty percent possessing a doctorate. A small number had earned units in a doctoral program or completed some academic requirements. Notably, over fifty percent of the participants were classified as Mater Teacher 1, while close to fifteen percent were Master Teacher 2.

Over ninety percent of the participants reported no prior experience publishing a paper, which aligns with the findings from the second set of questionnaire items where very few participants indicated prior publication experience. Their prior thesis writing experiences revealed a focus on quantitative designs, with most participants having dealt with descriptive and correlational approaches only. The experiences of the seven participants who had written dissertations were varied as well.

Table 2. Research Capability of Doctoral Students in Writing a Research Proposal

Indicators	Mean	SD	Interpretation
1. Conceptualizing a research problem.	3.86	0.73	Moderately capable
2. Writing rationale/introduction.	3.71	0.78	Moderately capable
3. Writing the significance of the study.	4.00	0.77	Moderately capable
4. Writing the statement of the problem.	3.81	0.87	Moderately capable
5. Writing the scope and delimitation.	3.90	0.77	Moderately capable
6. Writing the review of related literature and studies.	3.67	1.02	Moderately capable

7.	Writing the theoretical and conceptual framework.	3.38	0.86	Neutral
8.	Writing the definition of terms.	4.10	0.83	Moderately capable
9.	Formulating the hypotheses.	3.62	0.80	Moderately capable
10.	Writing the research methodology.	3.67	1.06	Moderately capable
11.	Identifying appropriate research design.	3.52	0.81	Moderately capable
12.	Determining sample size using the appropriate sampling technique.	3.52	0.75	Moderately capable
13.	Writing the bibliography according to the requirements.	3.67	0.08	Moderately capable
14.	Applying the APA7th edition in-text citation.	3.43	1.03	Moderately capable
15.	Developing research instruments.	3.38	1.02	Moderately capable
	Overall Mean	3.68	0.73	Moderately capable

"Doctoral education in the social sciences has yet to fully resolve what students need to be taught in quantitative research skills to be able to cope with life beyond their own degree" (Brown, 2017, p. 2). This is why a self-assessment may aid professors on which areas of quantitative research the instruction would concentrate. Every group of graduate students is unique in terms of trainings, education, and experiences. A self-reported needs based on the current research capability of graduate students can help the professor design the curriculum that is responsive to their current needs. Thomson and Walker (2010) put it "Supervisors now need to be attentive to, and aware of, such differences amongst students" (p. 13).

The data in table 2 suggests that prior to taking the Quantitative Design and Data Management course, doctoral students possessed a moderate self-assessment of their ability to write a research proposal. However, one item revealed a neutral self-assessment regarding their capability in writing a theoretical and conceptual framework, indicating some uncertainty about their skills and knowledge in this area. Notably, two items received the highest responses, relating to writing the definition of terms and the significance of the study. Overall, the results suggest that doctoral students have a moderate capability in writing research proposals, but they would likely benefit from further professional learning and formal training to enhance their skills.

The present study partially aligns with the findings of Agatep and Villalobos (2020), who reported a moderate level of research capability in writing a research proposal among graduate students. Their study identified conceptualizing a research problem as the area of lowest capability, followed by applying APA guidelines in proposal writing. Similarly, Ocbian and Gamba (2015) found that graduate students encountered difficulties in several areas: conceptualizing a research problem, reviewing literature and studies, determining the right research methodology and procedures, and selecting the correct statistical tools. Additionally, students struggled with data collection and analysis.

In contrast, Casanova (2021) investigated graduate students' research capability through the lens of research performance. Their study found participants to have high capability in several areas: formulating research titles, hypotheses, conclusions, and recommendations; writing the statement of the problem, introduction, significance of the study, and results and discussion sections; developing a conceptual

framework; defining terms; designing the methodology; developing research tools and instruments; and analyzing data.

Agatep et al. (2020) reported that graduate students were very capable in writing the keywords in the abstract, while they were less capable of writing the results and discussion of the paper. The overall results indicated that graduate students deemed themselves moderately capable of writing a publishable paper. Specifically, they are moderately capable in writing the abstract, rationale and introduction, statement of the problem and objectives, research methodology, conclusion, recommendation, bibliography as well as the application of APA. This is contrary to the present investigation in which graduate students doubted their capability in writing a publishable paper.

A mixed methods research study revealed multiple obstacles faced by doctoral students in publishing articles internationally. These obstacles included limited writing skills and difficulties with the submission process. Additionally, students reported insufficient time for writing, high publication costs, and limited technology skills as challenges (Purwanto et al., 2021).

A pre- and post-training study evaluated the knowledge and skills in research of eleven doctoral students. The initial data set revealed that the graduate students possessed moderate knowledge and skills in research. However, their capabilities improved after undergoing the training program. The assessment covered these areas: argumentation, paragraph writing, academic language, coherence within paragraphs, writing for publication, organizing themes in literature reviews, and identifying journals for publication (Dorimana et al., 2021).

Table 3. Research Capability of Doctoral Students in Writing a Publishable Paper

Indicators	Mean	SD	Interpretation
1. Writing the abstract.	3.48	1.08	Moderately capable
2. Writing the keywords.	3.57	0.98	Moderately capable
3. Writing the introduction using CARS model.	2.38	1.07	Slightly capable
4. Writing the statement of the problem and objectives.	3.62	1.02	Moderately capable
5. Writing the research methodology.	3.48	1.08	Moderately capable
6. Writing the results and discussion.	3.52	0.93	Moderately capable
7. Writing the conclusion.	3.62	0.97	Moderately capable
8. Writing the recommendations.	3.67	0.91	Moderately capable
9. Writing the bibliography following the requirements of the journal.	3.43	0.87	Moderately capable
10. Applying the APA 7th edition both in in-text citation and references	3.14	0.91	Neutral
Overall Mean	3.39	0.82	Neutral

The Commission on Higher Education (2019) issued new policies, standards, and guidelines for graduate programs, including a requirement for students to publish an article in a reputable, well-indexed journal before graduation. This highlights the importance of doctoral students developing strong research knowledge and skills to progress in their degrees (Lepp et al., 2016). As Marrs et al. (2022) argue, doctoral

graduates are expected to be competent in research design and execution. Ndanguza and Mutarutinya (2017) further emphasize the need for well-trained doctoral students who can think critically, initiate research, and innovate to enhance their overall research capabilities.

Table 3 presents the research capabilities of doctoral students in writing a publishable paper. The results show that participants are slightly capable of writing an introduction structured according to John Swales' CARS model (Create a Research Space). This indicates their ability to apply the three moves of establishing a territory, niche, and occupying that niche in the introduction.

However, participants expressed a neutral self-assessment regarding their capability in applying the APA 7th edition for both in-text citations and referencing sources. Mastering this skill is crucial, as many social science journals require manuscripts to follow APA 7th edition guidelines. Proficiency in APA 7th edition can increase the likelihood of a manuscript passing the initial evaluation stage before peer review.

For the remaining eight indicators, participants rated themselves as moderately capable. These indicators included writing an abstract, keywords within the abstract, statement of the problem and objectives, research methodology, results and discussion, conclusion, recommendations, and bibliography according to publication requirements. Despite the moderate self-assessment in eight areas, the overall results suggest a neutral capability in writing a publishable paper.

Table 4. Research Capability of Doctoral Students in Utilizing Multivariate Statistics

	Indicators	Mean	SD	Interpretation
1.	Structural Equation Modelling	1.95	1.07	Slightly capable
2.	Multiple Regression	2.14	1.15	Slightly capable
3.	Multivariate analysis of variance	2.10	1.18	Slightly capable
4.	Cluster Analysis	2.05	1.02	Slightly capable
5.	Exploratory Factor Analysis	2.00	1.05	Slightly capable
6.	Confirmatory Factor Analysis	2.05	1.02	Slightly capable
7.	Analysis of Covariance	2.19	1.17	Slightly capable
	Overall Mean	2.06	1.06	Slightly capable

The table above presents the research capabilities of participants in utilizing multivariate statistics covered in the course. All indicators and the overall results revealed a self-assessment of slightly capable. This suggests that participants have limited knowledge and skills in applying the multivariate tests commonly required in quantitative dissertation and publication. The lowest self-assessment was in structural equation modelling (SEM). This is understandable, as SEM requires proficiency in other multivariate tests, including correlation, regression, path analysis, measurement modelling, and factor analysis. Unfortunately, there is no existing research that investigated knowledge and skills of doctoral students on multivariate statistics.

CONCLUSION

This study assessed doctoral students' research capabilities before the start of an advanced course. The assessment focused on three areas: writing research

proposals (including dissertation proposals), writing publishable papers, and utilizing multivariate statistics. The results revealed that students possessed a moderate self-assessment of their ability to write research proposals. However, they expressed uncertainty regarding their capability in writing a publishable paper. Furthermore, the study identified limited self-reported capability among participants in utilizing multivariate statistics.

One limitation of this study was the small sample size, as it only involved a single intact group. Future research could benefit from a larger sample to confirm the current findings. Additionally, exploratory studies could employ qualitative methods, such as conversations with doctoral students, to delve deeper into specific areas of struggle related to proposal preparation, article writing, and applying advanced statistics. Future research might also involve analyzing completed dissertation proposals, written articles, and the application of advanced statistics in published dissertations. This approach could provide valuable insights to better prepare graduate students for meeting the statutory requirement of publishing a paper in an internationally indexed journal before graduation.

The findings signal a significant need for ongoing research education and training. The Quantitative Design and Data Management course directly addresses this need and has the potential to significantly enhance students' research capabilities. The study suggests that graduate students require more support in developing theoretical and conceptual frameworks, preparing publishable papers, and utilizing multivariate statistics.

The course curriculum, tasks, activities, and assessments can be tailored to emphasize these areas. To build a strong foundation in proposal writing and article publication, the course could focus on practical application. Providing datasets that allow students to use software and answer research questions through multivariate analysis would be beneficial. Additionally, incorporating continuous feedback with reflective prompts can encourage students to critically evaluate their work, fostering metacognitive learning. Finally, requiring individual and collaborative output can capitalize on the opportunity for students to develop their research skills. A collaborative quantitative research project between doctoral students and professors while the former are still on their academic journey would be advisable to expose them and enhance their research capability.

Acknowledgment

I would like to extend my deepest gratitude to my doctoral students in the ED803-Quantitative Design and Data Management course for taking time and effort to accomplish the self-assessment.

Reference

Agatep, J. L. E., & Villalobos, R. N. (2020). Research Capabilities among Selected Graduate School Students in Philippines. *Science Insights Education Frontiers, 6*(2), 691-705. https://doi.org/10.15354/sief.20.or037

Ali, F., Shet, A., Yan, W., Al-Maniri, A., Atkins, S., & Lucas, H. (2017). Doctoral level research and training capacity in the social determinants of health at universities and higher education institutions in India, China, Oman and Vietnam: a survey of needs. *Health Research Policy and Systems, 15*(1), 1-11. https://doi.org/10.1186/s12961-017-0225-5

Bao, Y., Kehm, B. M., & Ma, Y. (2018). From product to process. The reform of doctoral education in Europe and China. *Studies in Higher Education, 43*(3), 524–54. https://doi.org/10.1080/03075079.2016.1182481

Baptista, A., Frick, L., Holley, K., Remmik, M., Tesch, J., & Âkerlind, G. (2015). The Doctorate as an Original Contribution to Knowledge: Considering Relationships between Originality, Creativity, and Innovation. *Frontline Learning Research, 3*(3), 55-67. https://doi.org/10.14786/flr.v3i3.147

Belavy, D. L., Owen, P. J., & Livingston, P. M. (2020). Do successful PhD outcomes reflect the research environment rather than academic ability?. *PloS one, 15*(8), e0236327. https://doi.org/10.1371/journal.pone.0236327

Bernstein, B. L., Evans, B., Fyffe, J., Halai, N., Hall, F. L., Marsh, H., & Jensen, H. S. (2014). The continuing evolution of the research doctorate. In M. Nerad & B. Evans (Eds.), *Globalization and its impacts on the quality of PhD education: Forces and forms in doctoral education worldwide (pp. 5-30).* Sense Publishers. https://doi.org/10.1007/978-94-6209-569-4_2

Brown, G. T. L. (2017). Doctoral Education in Quantitative Research Methods: Some Thoughts about Preparing Future Scholars. Frontiers in Applied Mathematics and Statistics, *3*, 25. https://doi.org/10.3389/fams.2017.00025

Caingcoy, M. (2020). Research Capability of Teachers: Its Correlates, Determinants and Implications for Continuing Professional Development. *Journal of World Englishes and Educational Practices, 2*(5), 1-11. https://doi.org/10.32996/jweep.2020.2.5.1

Calma, A. (2009). The context of research training in the Philippines: Some key areas and their implications. *Asia-Pacific Education Researcher, 18*(2), 167-184.

Casanova, V. S. (2021). Predictors of Graduate Students' Research Performance in the Philippine State-Run Higher Education Institution. *Journal of Education and Learning, 10*(5), 170-176. https://doi.org/10.5539/jel.v10n5p170

Commission on Higher Education. (2019). *CMO No. 15 series of 2019- Policies, Standards and Guidelines for Graduate Programs*. CHED.

David, A. P. (n.d.). *ED803 - Quantitative Design and Data Management: An Academic Module for LisQup Course Program (unpublished).* Philippine Normal University.

Department of Education. (2020a). *DepEd Order No. 24, s. 2020: National Adoption and Implementation of the Philippine Professional Standards for School Heads.* DepEd.

Department of Education. (2020b). *DepEd Order No. 25, s. 2020: National Adoption and Implementation of the Philippine Professional Standards for Supervisors.* DepEd.

Department of Education. (2017). *DepEd Order No. 42, s. 2017: National Adoption and Implementation of the Philippine Professional Standards for Teachers.* DepEd.

Dorimana, A., Ndihokubwayo, K., & Uworwabayeho, A. (2021). Doctoral Student Research Skills: Case of the University of Rwanda - College of Education. *Rwandan Journal of Education*, 4–20.

Hughes, G. (2019). Developing student research capability for a 'post-truth'world: Three challenges for integrating research across taught programmes. *Teaching in Higher Education, 24*(3), 394-411. https://doi.org/10.1080/13562517.2018.1541173

Lepp, L., Remmik, M., Leijen, Ä., & Leijen, D. A. (2016). Doctoral students' research stall: Supervisors' perceptions and intervention strategies. *Sage Open, 6*(3), 2158244016659116. https://doi.org/10.1177/2158244016659116

Marrs, S. A., Quesada-Pallarès. C., Nicolai, K.D., Severson-Irby, E. A., & Martínez-Fernández, J. R. (2022). Measuring Perceived Research Competence of Junior Researchers. Frontiers in Psychology, *13*, 834843. https://doi.org/10.3389/fpsyg.2022.834843

Mydin, F., & Surat, S. (2021). Research Capability: Early-Career Academics' Perception of Doctoral Studies. *European Journal of Educational Research, 10*(4), 1893-1905. https://doi.org/10.12973/eu-jer.10.4.1893

Ndanguza, D., & Mutarutinya, V. (2017). A model perception on the independence of PhD students in promoting the research capability at University of Rwanda. *Rwandan Journal of Education, 4*(1), 4-12.

Ocbian, M. M., & Gamba, M. P. (2015). SSC Graduate Students' Difficulties in Doing Research. *JPAIR Institutional Research, 5*(1), 49–64. https://doi.org/10.7719/irj.v5i1.345

O'Donovan, C., Michalec, A., & Moon, J. R. (2022). Capabilities for transdisciplinary research. *Research Evaluation, 31*(1), 145-158. https://doi.org/10.1093/reseval/rvab038

Ormond, A., & Williams, L. R. T. (2013). Indigenous research capability in Aotearoa. *The Australian Journal of Indigenous Education, 42*(1), 24-31. https://doi.org/10.1017/jie.2013.11

Orpia, C. B. (2022). The Determinants and Correlation of graduates Students Research Capability, Interest, and Satisfactions. *Social Sciences, Humanities and Education Journal, 3*(3), 537-549. http://doi.org/10.25273/she.v3i3.14169

Pekrun, R. (2020). Commentary: Self-Report is Indispensable to Assess Students' Learning. *Frontline Learning Research, 8(3),185 – 193*. https://doi.org/10.14786/flr.v8i3.637

Purwanto, A., Ardiyanto, J., & Sudargini, Y. (2021). Inhibiting Factors for Publishing in Reputable International Journals among Doctoral Students: An Exploratory Mixed Method Study. *Journal of Industrial Engineering & Management Research, 2*(2), 1-20. https://doi.org/10.7777/jiemar.v2i2.123

Ryan, M. M., Yeung, R. S., Bass, M., Kapil, M., Slater, S., & Creedon, K. (2012). Developing research capacity among graduate students in an interdisciplinary environment. *Higher Education Research & Development, 31*(4), 557-569. https://doi.org/10.1080/07294360.2011.653956

Salom, M. D. (2013). Research Capability of the Faculty Members of DMMMSU MID Campus. *E-International Scientific Research Journal, 5*(2), 45-55.

Siedlecki, S. L. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist, 34*(1), 8-12.

Thomson, P., & Walker, M. (2010). *Doctoral education in context: The changing nature of the doctorate and doctoral students.* In the Routledge doctoral student's companion (pp. 9-26). Routledge.