STATEMENT OF ORIGINALITY

This is to certify that to the best of my knowledge, the content dissertation entitled "**Mathematical Abstraction of Pre-Service Mathematics Teachers in Learning Non-Conventional Mathematics Concept**" is my own work. This dissertation has not been submitted for any degree or other purposes. I certify that the intellectual content of this dissertation is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged. I am not plagiarizing or citing in ways that are inconsistent with the ethics of science prevailing in scientific societies. On this statement, I am ready to bear the risks/sanctions if in the future found a violation of scientific ethics or there are claims from others to the authenticity of this work of mine.

Bandung, January 2018

Farida Nurhasanah

PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul "**Mathematical Abstraction of Pre-Service Mathematics Teachers in Learning Non-Conventional Mathematics Concept**" ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung resiko/sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, January 2018

Yang membuat pernyataan

Farida Nurhasanah

ACKNOWLEDGMENT OF AUTHORSHIP

This dissertation has led to several conferences, journal paper, and chapter book which are already published or in the process of publication. Some of the papers are prepared in collaboration with Prof. Yaya S. Kusumah, M.Sc., Ph.D., Prof. Jozua Sabandar, M.A., Ph.D. and Prof. Didi Suryadi, M.Ed. Two papers are prepared in collaboration with Prof. Yaya S. Kusumah, M.Sc., Ph.D., only. In addition, a paper published together with Prof. Turmudi, M.Ed., Ph.D. and Eyus Sudihartinih, M.Pd., and a paper published in collaboration with Ahmad Saddam Siregar, S.Si. I hereby would like to acknowledge the authorship and contribution of these academics to the relevant sections of this dissertation in which the contents of the jointly produced papers are used. A list of the papers stemming from this study is presented below.

Nurhasanah, F., Sabandar, J., & Kusumah, Y. S. (2013). Abstraction Processes in Learning Geometry Using GSP. *Proceeding of* 6th *East Asia Regional Conference on Mathematics Education* (*Earcome* 6) 17-22 March 2013. Phuket: Prince Songkla University.

Sabandar, J., & Nurhasanah, F. (2014). Hidden Curriculum in Promoting Self-Regulated Learning for Teachers. *Proceeding of International Seminar on Teaching and Learning in 21st Century: Challenge for Lecturer and teacher*, (pp.140-147). Bandung: Universitas Widyatama, Universitas Terbuka, Open Unversity of Malaysia.

Nurhasanah, F. & Siregar, A. S. (2015). Koordinat Paralel: Konsep Non-Konvensional untuk Mengembangkan Abstraksi Matematis Mahasiswa Calon Guru Matematika. *Proceeding of Seminar Matematika dan Pendidikan Matematika UNY* 2015, (pp. 1199-1205), Universitas Negeri Yogyakarta: Yogyakarta.

Kusumah, Y. S., & Nurhasanah, F. (2016). The Endless Long-Term Programme of Mathematics Teachers Professional Development in Indonesia, in B. Kaur, O. N. Kwon, and Y. H. Leong (eds), *Professional Development of Mathematics Teachers - An Asian Perspective*, (pp. 33-45). Singapore: Springer.

Nurhasanah, F., Turmudi, & Sudihartinih, E. (2017). Parallel Coordinates: The Concept That Pre- Service Mathematics Teachers Need To Know. *Proceeding of The 4th International Symposium On Mathematics Education Innovation Seameo Regional Centre For Qitep In Mathematics*, (pp, 152 – 159), PPPPTK-Matematka: Yogyakarta.

Nurhasanah, F., Sabandar, J., & Kusumah, Y.S. (2017). Concept of Triangle: Examples of Mathematical Abstraction in Two Different Contexts. *International Journal on Emerging Mathematics Education* (IJEME), 1(1), (pp.53-70).

Nurhasanah, F., Kusumah, Y. S., Sabandar, J., & Suryadi, D. (2017). Mathematical Abstraction: Constructing Concept of Parallel Coordinates. *Journal of Physics Conference Series*, 895(1):012076.

Nurhasanah, F., Kusumah, Y.S., Sabandar, J. & Suryadi, D. (2017). Context Design for Abstraction of Pre-Service Mathematics Teachers in Learning Non-Conventional Mathematics Concept: An Apriori Analysis. *Submitted and reviewed to Alberta Journal of Educational Research*.

Nurhasanah, F., Kusumah, Y. S., Sabandar, J., & Suryadi, D. (2017). The Role of Parallel Coordinates Concept in Analytic Geometry Classroom. *It has been presented in International Seminar on Mathematics, Science, and Computer Science Education, on October* 14, 2017.

Nurhasanah, F., & Kusumah, Y. S. (2018). The Investigation of Pre-Service Mathematics Teachers' Abstraction Processes in Group And Classroom Contexts Using Rbc + C Model. *Accepted to be presented in Earcome The 8th ICMI – East Asia Regional Conference on Mathematics Education*, in Taiwan on May 7 – 11, 2018.

ACKNOWLEDGMENTS

I would like to thank Allah SWT for giving me the best parents in the world who have an everlasting love for their daughter. Without their affection I could not reach this stage, completing my dissertation. I have never imagined that I could finish my thesis by having three periods of pregnancies and taking care of two babies and two children, but Allah SWT gives the strength through my parents' assistance. I will walk in a humble manner upon receiving my degree, knowing that it was Allah SWT who enabled me to reach this milestone in my life.

I owe my deepest gratitude to my supervisor, Professor Yaya S. Kusumah, MSc., Ph.D., the best supervisor a doctorate mathematics student can have. You have taught me by your own expert model how to create not only good but the best writing article through the comments and revision in the draft. Through a long discussion in your comfortable room, you show me how to be a patient, humble, and humorous scientist but still have a good critical thinking. You have a special skill of reviewing articles and selecting the words to express ideas in wonderful sentences. Most importantly, you bring me to experience the academic atmosphere in international forum that inspired me a lot. I am glad that I have had the opportunity to be one of those privileged to work with you.

I extend my sincere appreciation to Prof. Didi Suryadi, M.Ed., who has helped me in answering difficult questions that I ask to myself. My sincere appreciation also goes to Prof. Turmudi, M.Sc., M.Ed., Ph.D., Dr. Sufyani Prabawanto, M.Ed., Dr. Elah Nurlaelah, M.Si., and Eyus Sudihartinih, M.Pd., for all their valuable help, support, and unwavering assistance throughout the completion of this study.

I would like also to thank my extended family, my little sister, the big family of Mbah Hadiwijaya, Mbah H. Mawardi, and the big family of Mbah H. Madmasum, the big family of Marimun and Rasinah for their encouragement and prayer. Most of all, I would like to thank my loving husband, you have given me so much and loved me so well. I would not have accomplished this without you beside me.

Finally, I cannot thank Prof. Jozua Sabandar enough for encouraging me to pursue something that I never imagine before in academic level. He always helps me when I asked for it. I am impressed by the everlasting, enthusiastic attitude that he has for guiding and motivating students. I would not have reached this point in my career without the influence of Prof. Jozua Sabandar, M.A., Ph.D. He not only served as my advisor during my Master and Doctorate studies at Universitas Pendidikan Indonesia, but he has become a lifelong best friend.

The last but not least, I want to extend my high gratitude to my colleagues in Mathematics Education Department, Sebelas Maret University, for their sincere giving me the opportunity to take my doctorate degree. Also to my fellow friends, Nurfadillah Siregar for every single support that you gave, for Ibu Maria, Puji Lestari, Pak Joko, Pak Cecep, Ibu Laila, Pak Mujib, and all friends that cannot be mentioned one by one in this page, thanks for the friendship. Thanks also to all the committee of SEMDIKMAT 2016, thank you for trusting me! Thanks to Mr. Juanda for the opportunity that you gave to me during my refreshing time in finishing my dissertation.

Bandung, January 2018

Farida Nurhasanah

DEDICATION

I dedicate my dissertation to my beloved parents, Hartini and Kasan for their unlimited loves.

This dissertation is a proof of a woman's love for her husband, Agus Fitriandi, and the children Mote, Moza, Mota, and baby Moze.

I dedicated this dissertation to every special person in my life who has been creating mosaics of my wings so that I can fly high out of the sky.

I dedicate this dissertation to myself who deserved to be happy for the choices of life that have been taken.

This love has guided me to find a long journey of a wonderful time of study in a wonderful place with wonderful people.

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