

# The Difference of Mathematics Teachers' Content Competency in Indonesia

*by* R Pratiwi

---

**Submission date:** 28-Jan-2020 08:07AM (UTC+0700)

**Submission ID:** 1247400834

**File name:** Pratiwi\_2018\_J.\_Phys.\_\_\_Conf.\_Ser.\_1097\_012100.pdf (694.37K)

**Word count:** 3277

**Character count:** 19013

PAPER • OPEN ACCESS

## The Difference of Mathematics Teachers' Content Competency in Indonesia

To cite this article: R Pratiwi and Jailani 2018 *J. Phys.: Conf. Ser.* **1097** 012100

View the [article online](#) for updates and enhancements.



**IOP | ebooks™**

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the collection - download the first chapter of every title for free.

# The Difference of Mathematics Teachers' Content Competency in Indonesia

R Pratiwi<sup>1</sup> and Jailani<sup>2</sup>

<sup>1,2</sup> Postgraduate Program of Mathematics Education, Yogyakarta State University  
Depok, Sleman, Yogyakarta, Indonesia

[rahayu.pratiwi2016@student.uny.ac.id](mailto:rahayu.pratiwi2016@student.uny.ac.id)

**Abstract.** The role of teachers is very important so that students get the knowledge optimally when studying at school. That role can be played well when the knowledge has been mastered by the educators. One of the teachers' knowledge is knowledge content. This knowledge can be seen through the content competency owned by the teacher. Content competency is a set of knowledge, skills, and attitudes that must be possessed by the teachers in performing their duties as an educator. Content competency is still rarely found as the discussion topic among the society. Therefore, survey research is conducted to explore the content competency of mathematics teachers in Indonesia. The data was obtained through a subject which was selected randomly. The subject of this research is the mathematics teachers of the senior high school in Indonesia. The data collected using the question test and questionnaire. The results show that mathematics teachers in Indonesia get the content competency of 82.7%. Content competency of the teachers in Indonesia can be categorized as good. The improvement of competency should be continued with the provision of a varied and sustainable training.

## 1. Introduction

Teachers are one of the main components of education. Teachers play a role in creating or exacerbating an innovation found in the curriculum so that teachers have been known to do an experiment in the form of sabotage of change [1]. In other words, the curriculum can work properly through the teachers' role. Teachers are good members of society and citizens, who are required to master their competency as educators [2]. The teacher is not only a teacher but also an educator, in which a teacher needs adequate competency.

Teachers' competency is a hot issue to be discussed in education. Basically, competency is the ability owned by someone in carrying out the task. That ability has several characteristics: (1) a competency consists of one or more skills whose mastery would enable the attainment of the competency; (2) a competency is linked to all three of the domains under which performance can be assessed: knowledge, skills, and attitudes; (3) possessing a performance dimension, competencies are observable and demonstrable; (4) since competency is observable, it is also measurable [3]. Hence, the teachers' competency of is a set of abilities, skills from various domains that must be owned by professional teachers which are used in carrying out their work [2][4][5][6][7].

A professional teacher is a teacher who has competency in performing their duties. A professional teacher's degree can be obtained after passing the certification test. However, in fact, the competency of post-certification teachers showed less optimal results [8][9][10][11]. The measurement of teachers' competency is done by the education authorities in every area in Indonesia. That measurement is done through teachers' competencies test (UKG). The test results in one of the provinces in Indonesia, West Borneo, which was done in 2016 have not shown the satisfying result. Out of the 403 teachers who took the test, the modus obtained was 59.6. The test was in the form of a written test. The written



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd

examination is a portrait of the accumulation of several teacher competency standards. This shows that the teachers were still lacking content knowledge.

The content knowledge in teaching is a practice-based theory that represents knowledge of related content in the teaching of a subject. The theory is built on the analysis of the work done by the teacher [12]. Additionally, the content knowledge refers to the number and organization of knowledge which is in the teacher's mind. Teachers' knowledge can be measured through understanding. Teachers do not only need to understand something but must understand better why something happens, what reasons can guarantee the truth of things and what situations that cause the truth can be attenuated or even denied [13].

The teachers' ability to master content competency is called content competency. Content competency is a standard of competency that contains mastery of knowledge, teaching skills and attitudes of a teacher [6]. The qualification of knowledge which should be owned by teachers are pedagogical knowledge [14]. The pedagogical knowledge which can be measured are: (1) students' knowledge, consisting of character development of the students; (2) curriculum knowledge, the curriculum which is applied in Indonesia and its rules including the related to the knowledge of textbooks; (3) pedagogical knowledge, which is related to classroom management and organization to engage students' motivation and attention to learn; (4) knowledge of teaching methods, that is the teachers' ability to describe teaching methods that will be applied whether from learning planning, teaching performance or teaching evaluation [14]; (5) knowledge of the context, including connection, application of theory, principles and concepts of a particular algorithm procedure which is reflected in mathematical material [14] [15] [16] [17]. In addition to the mastery of knowledge and teaching skills, the teachers are required to have a teachers' attitudes. Such attitudes arise because of the complexity and interconnectedness of today's world demands of thinking in systems, an increasingly open view, analytical and reductionist thinking are not sufficient for a sustainable future or to solve current problems [15].

Therefore, this research seeks to explore the content competency of mathematics teachers in Indonesia. It is expected that with the portrait of teachers' content competency, the evaluation and improvement of an education system can be taken into account in order to become more qualified. Qualified teachers with good knowledge are expected to breed a better-qualified generation as well.

## 2. Method

The portrait of teachers' competency is described quantitatively through survey research conducted less than a month. This research was conducted in Indonesia, precisely in five provinces (i.e: DI Yogyakarta, Central Java, West Borneo, Riau and NTT). The main subject of this research is mathematics teachers who are actively teaching in high schools spread across the five provinces. The subject of this research also acts as the research respondents. The number of respondents was 30 mathematics teachers. The teachers selected randomly for each province.

The data obtained through test questions representing aspects of knowledge of the student, curriculum, pedagogy, and context. Other instruments, namely questionnaires, representing data about aspects of open-minded. These aspects were chosen as a reference for measuring teachers' content competency with the consideration that data collection can be obtained through a test question and questionnaire. The number of questions of test and statements of questionnaires is 29 points. They are consist of 24 points of questions test and 5 points of statements. Questions test represented aspects of the student, curriculum, pedagogic and context knowledge. Statements represented an aspect of open-minded.

The instruments have been validated by experts to collect data according to what they want to measure. After the data was collected, then it was analyzed quantitatively. The analysis was done by categorizing according to each classification (age, academic background, teaching period, province). Based on the categorization can be obtained a description of the competency of teachers' content competencies in Indonesia. Categorization is done referring to the table 1.

**Table 1.** The tendency of the assessment of teachers performance.

Score Range	Categories
$\bar{X} \leq 50\%$	Poor
$50\% < \bar{X} \leq 60\%$	Meagre
$60\% < \bar{X} \leq 75\%$	Moderate
$75\% < \bar{X} \leq 90\%$	Good
$90\% < \bar{X} \leq 100\%$	Excellent

### 3. Result and Discussion

After conducting this research, the researcher got the data from several classifications of mathematics teachers. The classification consists of age, academic background, teaching period, and the province where the teachers teach. Based on the classification, the description of the teachers' content competency is obtained. The following is the explanation and further discussion.

#### 3.1. Result

The research was conducted to obtain data from the mathematics teachers' content competency. The overall achievement of the mathematics teachers' content competency in Indonesia is 82.7%. This shows that the mathematics teachers' content competency in Indonesia can be categorized as good. In addition to the whole analysis, the analysis is also done based on age classification, academic background, teaching period, and the province where the teacher teaches. The data representation based on those classifications can be seen as follows.

**Table 2.** Categories of teachers' content competency based on the classification.

	Classification	Number of Subject Research	Content Competency Categories
<b>Age (year)</b>	23 – 33	76,7%	Good
	34 – 44	6,7%	Good
	45 – 55	16,7%	Good
<b>Academic Background</b>	Bachelor	86,7%	Good
	Diploma	6,7%	Good
	Senior High School	6,7%	Good
<b>Teaching Period (year)</b>	< 12	86,7%	Good
	12 – 23	3,3%	Good
	> 23	10%	Good
<b>Province</b>	DI Yogyakarta	13,3%	Excellent
	Central Java	6,7%	Good
	West Borneo	40%	Good
	Riau	10%	Good
	NTT	23,3%	Good

#### 3.2. Discussion

The Global developments cannot be avoided by developing countries. Global climate change can serve as a prototype of a sustainable problem with high levels of complexity in terms of the strong linkages between ecological, social and economic dimensions that have important consequences for future generations [15]. Teacher demands are also increasing so that the students become the successor of a knowledgeable and moral nation. To achieve these objectives, teachers as professional experts should have adequate competency. One of such competencies is the content competency.

Content competency of mathematics teachers in Indonesia as a whole is categorized as good. Based on age classification, there is no difference between the various age ranges. This is because all age ranges are still in the productive age category. For the academic background classification, teachers are also categorized as good. This indicates that the teacher's academic background does not determine the teachers' competency category. Teachers' competency depends on their own motivation



to undertake educational development and teachers self-development [18]. For the teaching period classification, it can be seen which one is the junior or senior teachers. However, it does not matter since all the teaching periods give a good effect on the teachers' content competency. In the classification of the province where the teachers come from, it can be concluded that DI Yogyakarta is categorized better than the other provinces. This is because DI Yogyakarta province is known as the city of students, where supporting facilities and infrastructure are more optimal to improve teachers' competency.

The teachers' competency is influenced by several factors, some of which are the principal's leadership role, work motivation, teaching experience and teachers' involvement in an association of teachers in the field of study [19][20]. The principal is the highest position at school as a leader. The principal plays a role in determining the quality of education since the principal is a central figure who plays an important role in managing education personnel at school [21][22]. One way of managing education personnel in schools is to require all mathematics teachers to be actively involved in an association of teachers of mathematics. It is intended that teachers can exchange ideas and teaching experience in the learning process. Learning is the result of experience [23]. Such experiences can occur because of the teachers' own encouragement or eagerness to try things to make them creative and innovative. This encouragement or desire is called work motivation. The motivation of work is essential for the life of the teachers especially for the development of education and self-development of the teachers [18].

Education development and teachers self-development have a positive effect on the competency of mathematics teachers. One of them is to provide opportunities for teachers to increase their knowledge and to do brainstorming. The opportunity is found in the teacher's competency training activities which are conducted continuously. Training of teachers located in out of reach areas have an important influence on the development of the national education system [24]

Teacher training is done so that teachers' skills become better [25]. In addition, training can: (1) prepare pre-service teachers; (2) improve the academic qualifications; (3) continue professional development, content areas and instructional methods [26]. The existence of training can provide benefits for teachers who attend it.

The participation of teachers in training can be done directly or indirectly or through online training. Direct training can be conducted at a meeting that offers experience in an independent (creative) work on the appropriate level in the form of problem-solving seminars or in other appropriate forms [23]. Training to improve teacher competency can be done by course method [26]. The course method involves instructors who are experienced in mathematical research as well as in its teaching [26]. The other form is training indirectly or online training. Online training is done through the web to develop teachers' professionalism in teaching [24]. In addition to the web, the technology infrastructure used can be radio, audio, video, television and writing material [24].

The researcher hopes the authorities to be active in the supervision and implementation of education improvement in guaranteeing the quality of education in Indonesia. They can provide facilities and motivation for educators to conduct sustainable training. For the mathematics teacher, the training is as a way to gain new knowledge through the sources trusted by the organizers. The knowledge can be given in the form of pedagogic science, evaluation, content and so forth. Specialized content science is to train teachers to do the reasoning stronger. Mathematics is a science that requires more reasoning than other fields of study. Reasoning can be trained through the simplification of mathematical language, contextual representation, solving problems for higher order thinking skills. Additional activities that need to be done to support sustainable training is the teacher's organization of mathematics studies in one region. The sustainable training can give teachers for brainstorming and discuss easier. It is hoped that the discussion will result in a new understanding of content in teaching. The content in question is teacher insight into students' knowledge, curriculum, general pedagogy, context and teaching methods.

Through this research, researchers can explore how the competency of mathematics teachers content in Indonesia. Based on these results, at least the researcher puts the great hope of the existence of further research that can explore the competency of mathematics teachers more deeply and cover the area of the wider respondents. Hopefully, the authorities such as the policymakers of the education

system and structure, the local education office and the principal can support the quality improvement of the educator, especially the mathematics teacher.

#### 4. Conclusion

Teachers' content competency in Indonesia is categorized as good by reaching 82.7% of the total achievement goals. The mathematics teachers classification based on age, academic background, teaching period, and province refer to category good for almost all classifications mentioned earlier. Even though the content competency shows good result, the improvement is still suggested regularly and in continuity. Training is one of the steps that can do. Training is a place where teachers can acquire new knowledge, exchange ideas and information with colleagues. It is not only done through face to face meeting but can also be done through online.

#### 5. Acknowledgments

The researcher would like to thank the subject, who are respondents in Indonesia. Without the participation of the respondents, the data cannot complete. And then, thank you to the lecturers of mathematics education in Yogyakarta State University and friends had given me support for this research. Hopefully, the research will contribute to policy making by the authorities in order to improve the teacher's competency in Indonesia.

#### 6. References

- [1] Kelly A V 2004 *The Curriculum Theory and Practice Fifth Edition* (Trowbridge: Sage Publications)
- [2] Suyanto and Jihad A 2013 *Menjadi Guru Profesional: Strategi Meningkatkan Kualifikasi dan Kualitas Guru di Era Global [Become professional teacher: strategies to improve teacher qualification and quality in the global]* (Jakarta: Erlangga)
- [3] Nessipbayeva O 2012 *Part 2: Pre-service and In-service Teacher Training* pp 148-154
- [4] Sembiring M G 2009 *Mengungkap Rahasia dan Tips Mengajar Menjadi Guru Sejati [Reveal the secrets and tips of teaching to be a real teacher]* (Yogyakarta: Best Publisher)
- [5] Janawi 2013 *Metodologi dan Pendekatan Pembelajaran [Methodology and learning approach]* (Yogyakarta: Ombak)
- [6] Danim S 2011 *Pengembangan Profesi Guru: dari Pra-jabatan, Induksi, Keprofesional Madani [Professional development of teachers: from pre-service, induction, civil professional]* (Jakarta: Kencana Prenada Media Group)
- [7] Leba U T and Padmomartono T 2014 *Profesi Kependidikan [Educational profession]* (Yogyakarta: Ombak)
- [8] Kartowagiran 2011 *Cakrawala Pendidikan [Education Horizon]* **XXX** 463-473
- [9] Sunhaji 2014 *Jurnal Kependidikan [Education Journal]* **II** 30-46
- [10] Fahdini R et al 2014 *Mimbar Sekolah Dasar [Platform of Elementary School]* **1** 33-42
- [11] Supriyatno A et al 2016 *Jurnal Profesi Pendidik [Educator Profession Journal]* **3** 171-181
- [12] Educational Testing Service 2011 *Content knowledge for teaching: innovations for the next generation of teaching assessments* The Praxis Client Conference (New Jersey: Universitas Princeton University)
- [13] Shulman L S 1986 *Educational Researcher* **15** 4-14
- [14] Liakopoulou M 2011 *International Journal of Humanities and Social Science* **1** 66-78
- [15] Sleurs W 2008 *Competencies for ESD (Education for Sustainable Development) Teachers: A Framework to Integrate ESD in the Curriculum of Teacher Training Institutes* (Brussels: Colophon)
- [16] National Council of Teachers of Mathematics 2012 *National Council of Teachers of Mathematics Council for the Accreditation of Education Preparation program standards-secondary (initial preparation)* Standards for Mathematics Teacher Preparation [Online]. Available: [www.nctm.org](http://www.nctm.org). [Accessed: December 1, 2017]
- [17] Australian Institute for Teaching and School Leadership 2017 *Professional Knowledge* [Online]. Available: <https://www.aitsl.edu.au> [Accessed: March 14, 2018]
- [18] Ikenyiri E and Maduenyi R I 2012 *Mediterranean Journal of Social Sciences* **3**
- [19] Hilliyani 2012 *Pengaruh peran MGMP dan kepemimpinan kepala sekolah menurut persepsi*

- guru terhadap kompetensi guru Matematika SMP/MTs di Kabupaten Aceh Tengah [The influence of the role of MGMP and leadership of school principals according to teachers' perceptions of the competence of Mathematics teachers in SMP/MTs in Central Aceh District]* (Yogyakarta: Thesis of Yogyakarta State University)
- [20] Wea M Y 2012 *Hubungan antara pengalaman pembelajaran, partisipasi dalam kegiatan MGMP dan motivasi kerja dengan kompetensi profesional guru matematika SMP di Kabupaten Manggarai, Nusa Tenggara Timur [The relationship between learning experience, participation in MGMP activities and work motivation with the professional competence of junior high school mathematics teachers in Manggarai District, East Nusa Tenggara]* (Yogyakarta: Thesis of Yogyakarta State University)
- [21] Mulyasa 2004 *Kurikulum Berbasis Kompetensi Konsep, Karakteristik dan Implementasi [Curriculum based on conceptual, competence, characteristics and implementation]* (Bandung: Rosdakarya)
- [22] Bahri S 2010 *Optimalisasi Kinerja Kepala Sekolah [Performance optimazation of principals]* (Jakarta: Gibson Books)
- [23] Gurney P 2007 *New Zealand Journal of Teacher's Work* **4** 89-98
- [24] Amadi M N 2013 *The Annual Meeting of the Bulgarian Comparative Education Society* pp 173-180
- [25] The United Nations Educational, Scientific and Cultural Organization 2014 *UNESCO Operational Strategy on Youth 2014-2021* (Paris: UNESCO)
- [26] Polya G 1963 *The American Mathematical Monthly* **70** 605-619



# The Difference of Mathematics Teachers' Content Competency in Indonesia

## ORIGINALITY REPORT

3%

SIMILARITY INDEX

3%

INTERNET SOURCES

2%

PUBLICATIONS

3%

STUDENT PAPERS

## PRIMARY SOURCES

1

[mafiadoc.com](http://mafiadoc.com)

Internet Source

2%

2

[theses.gla.ac.uk](http://theses.gla.ac.uk)

Internet Source

<1%

3

Submitted to Program Pascasarjana Universitas Negeri Yogyakarta

Student Paper

<1%

4

[digitalcommons.cwu.edu](http://digitalcommons.cwu.edu)

Internet Source

<1%

5

[www.scirp.org](http://www.scirp.org)

Internet Source

<1%

6

[www.emuni.si](http://www.emuni.si)

Internet Source

<1%

Exclude quotes

Off

Exclude matches

Off

Exclude bibliography

On

# The Difference of Mathematics Teachers' Content Competency in Indonesia

## GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7