



Indonesian's Mathematics Teacher Comprehension Towards Geogebra

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Abstract

Numerous studies have mentioned that Geogebra provides positive impacts towards mathematics lessons and suggested to integrating this software into the classroom activity. In order to prepare the teacher for Geogebra integration, study for teacher comprehension of Geogebra is required as the basic for future study. This paper aimed to capture Indonesian mathematics teacher comprehension about Geogebra. This was descriptive study using survey method. The sample was 296 junior high school mathematics teachers. The teachers were asked to fulfilled the questionnaire to obtain their comprehension towards Geogebra. The results revealed that 50% teachers were at level 1 in understanding the features of Geogebra and more than half of them has never been utilized Geogebra in their mathematics lesson and never been construct an applet Geogebra as their instructional media. Those results suggest the urgency to provide the Geogebra training for mathematics teacher in order to enhance students comprehension towards Geogebra.

Keywords: geogebra; comprehension, mathematics teacher

Abstrak

Banyak penelitian meberikan hasil bahwa Geogebra memberikan efek positif terhaddap pembelajaran matematika. Penelitian-peneltian tersebut merekomendasikan pengintegrasian perangkat lunak ini ke dalam aktivitass pembelajaran. Untuk mempersiapkan pengintegrasian tersebut, studi mengenai pemahaman awal guru terhadap Geogebra diperlukan sebagai fondasi awal studi lebih lanjut. Penelitian ini bertujuan untuk mengetahui pemahaman guru di Indonesia terhaddap Geogebra. Penelitian ini adalah penelitian deskriptif menggunakan teknik survey. Sampel yang digunakan meliputi 296 guru matematika yang mengajar di sekolah menengah pertama. Guru diminta untuk mengisi kuisisioner terkait pemahamannya terhadap Geogebra. Hasil yang diperoleh adalah 50% guru memiliki pemahaman Geogebra pada level 1. Lebih jauh, lebih dari setengah sampel penelitian belum pernah menggunakan Geogebra dalam pembelajaran. Dan membuat applet Geogebra secara mandiri sebagai media pembelajaran. Hasil ini mengimplikasikan perlunya pelatihan bagi guru matematikan untuk meningkatkan kompetensinya mengenai Geogebra.

Kata Kunci: geogebra, pemahaman, guru matematika

1. INTRODUCTION

Every element of life has been touched by technology. On the positive side, technology has emerged as a possible teaching resource. Numerous softwares, such as Geogebra and Geometry Pad, have been created to support mathematics learning. GeoGebra is an application designed for teaching and learning mathematics and science at all levels, from elementary school to university level, which includes features for geometry, algebra, statistics, and calculus (Majerek, 2014). This software allows teacher to create interactive learning with their students through its Applet Geogebra. Students could see the visualization of geometry object of 3-D shapes, such as cube, beam, and paraboloid using this application. Geogebra help to make abstract concept become more concrete (Celen, 2020).

Numerous scholars believe that Geogebra give great impact for student. In the terms of student, Geogebra facilitate student to enhance their acquisition of mathematical and reduce the difficulties that happened in learning (García-Lázaro & Martín-Nieto, 2023). Geogebra also help to simplify the complex mathematical concept by stepwising the visualization of geometrical objects (Lee et al., 2023). The utilization of this software could trigger student motivation to learn math (Arbain & Shukor, 2015).

Geogebra also give positive influence to teacher. For in service mathematics teacher who have just received Geogebra training, they show positive feedbacks about Geogebra (Marange & Tatira, 2023). They believe that teaching mathematics especially in geometry topics, using Geogebra will improve their self-confidence and increase the chance to provide student-center learning. Mukamba & Makamure (2020) explain that teacher in their study would recommend other mathematics teachers to use Geogebra especially for the topics which require learners to visualize and modify the object. The drawings from Geogebra are neater and clearer than on chalkboard. Hence, some studies urge the necessity to including Geogebra in teaching, e.g. Munyaruhengeri et al. (2023) and (Uwurukundo1 et al., 2022).

Several studies have been conducted on mathematics teacher comprehension towards Geogebra. Putra (2021) there was a need to give the training for prospective primary teacher should be introduced to Geogebra in their early course to prepare them integrating learning to technology. This in line with (Oliveira et al., 2018) who assert that it is critical that preservice and in service teachers have opportunity in their professional development courses to integrate ICT into their teaching and learning processes.

Teachers have pivotal factor in integration of Geogebra (Mokotjo & Mokhele, 2021). In order to prepare the teacher for technology integration, we need to know the initial comprehension of teacher about Geogebra as the foundation background. In this context, this study aimed to investigate Indonesia mathematics teacher comprehension towards Geogebra.

2. RESEARCH METHOD

This study was descriptive study using survey as the method to collect the data. The population of this research was the junior high school mathematics teacher in Indonesia. Stratified random sampling was used to take the sample. The sampel was 296 junior high school mathematics teachers from main island in Indonesia, namely a) Java Island, b) Bali and Nusa Tenggara, c) Sumatera Island, d) Sulawesi Island, e) Kalimantan Island, dan f) Maluku and Papua Island. The composition of each island respectively, 60%, 11%, 11%, 4%, 11%, and 2%.

The instrument of this research is questionnaire in Google Form to capture participant comprehension towards Geogebra. The instrument was included the participant perception about their comprehension towards Geogebra, how many times they have used Geogebra in their class lesson, how many times they have create their own Geogebra's Applet.

This research followed the data analysis technique from Miles dan Huberman. This technique including data collection, data reduction, data description, and conclusion (Sugiyono, 2013). Diagram 1 presents the data analysis technique utilized in this study.

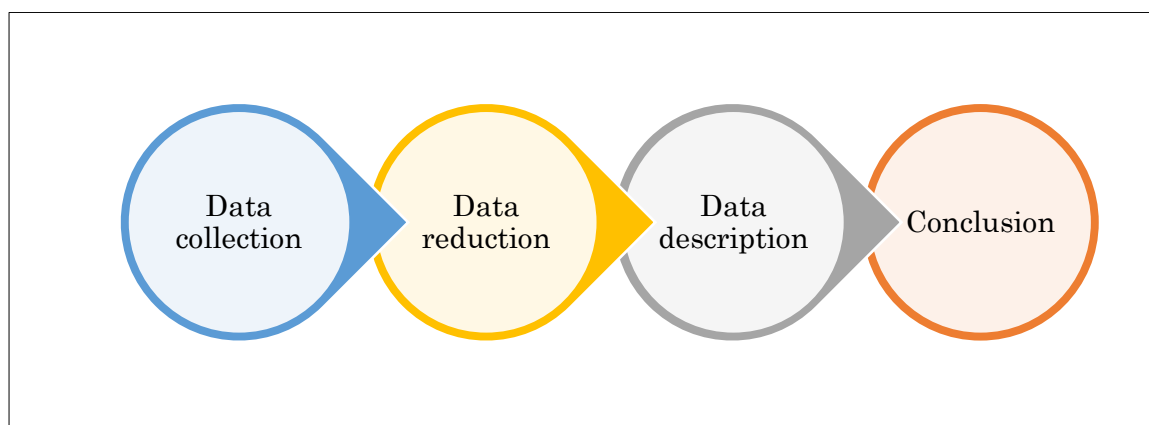


Diagram 1. Data Analysis Technique

According to Diagram 1, the data was collected from Google Form questionnaire. Then, the data was reduced by dividing data into certain categories (Rijali, 2018). The data which had been reduced, were presented using tables or charts. The conclusion was reached after observe the tables or the charts.

3. RESULT AND DISCUSSION

The instrument shows the result of the participant comprehension towards Geogebra in each main island. Level 1 to level 4 represent the comprehension level from low to high.

Table 4.1. The Level of Participant Comprehension towards Geogebra

	Jawa Island	Bali and Nusa Tenggara	Sumatera Island	Sulawesi Island	Kalimantan Island	Maluku and Papua	Total
Level 1	95	15	8	8	16	3	50%
Level 2	62	11	19	3	16	2	37%
Level 3	21	6	5	1	2	1	12%
Level 4	0	1	0	1	0	0	1%

Table 4.1. depicts that majority of participant have low comprehension towards Geogebra. Half of the participant were in level 1. In four main islands, namely Java Island, Sumatera Island, Kalimantan Island, Maluku and Papua, there were no participant which claim that they had very high-level comprehension of Geogebra. This result in line with the result from Zayyadi & Lanya (2019) which stated that numerous teachers still had limited comprehension about Geogebra. According to participant response in questionnaire, 30% participant with level 1 comprehension toward Geogebra still did not know about geogebra. Another 70% of participants in level 1 tend to had perception about Geogebra as the tools to make graph and Geometri object. The number of participants who had level 2 comprehension towards Geogebra accounted for 37%. They perceive Geogebra as the learning media to help mathematics learning in class. More than 50% of this participant had utilized Geogebra to help them visualize line, algebra, and geometri objects.

This study also investigated the frequency of teacher teaching using Geogebra. We classified the frequency into four groups, namely never, 1-2 topics, 3-5 topics, and more than 5 topics. Table 4.2. presents the data about that frequency.

Table 4.2. The Frequency of Teacher Using Geogebra in Their Classroom Activity

Frequency	Jawa Island	Bali and Nusa Tenggara	Sumatera Island	Sulawesi Island	Kalimantan Island	Maluku and Papua	Total
Never	111	20	10	10	19	5	59%
1-2 topics	51	9	16	2	13	1	32%
3-5 topics	8	2	3	1	2	0	5%
More than 5 topics	8	2	3	0	0	0	4%

According to Table 2, more than half participant never utilized Geogebra in their classroom activity. Around 31% of them included Geogebra in their classroom learning for 1 until 2 topics. Meanwhile, less than 10% of them used Geogebra to teach for more than 3 topics.

Furthermore, this study also captured how often participant create Geogebra Applet to be teaching aid in their classroom learning. Table 4.3. presents the frequency of how many times teacher generating applet Geogebra.

Table 4.3. The Frequency of Participant Generating Applet Geogebra

Frequency	Jawa Island	Bali and Nusa Tenggara	Sumatera Island	Sulawesi Island	Kalimantan Island	Maluku and Papua	Total
Never	135	22	17	11	27	5	73%
1-2 topics	33	8	12	2	6	1	21%
3-5 topics	6	1	3	0	1	0	4%
More than 5 topics	4	2	0	0	0	0	2%

Table 4.3. revealed that more than 70% of participants never experience creating Geogebra Applet by themselves. There was participant who have created the Applet once or twice, accounted for 21% of the participants. In line with the frequency of teaching using Geogebra, there was less than 10% participant who already made the Applet Geogebra by themselves.

According to Table 4.1, Tabel 4.2., and Table 4.3, half of the subjects are categorized as level 1 in algebra comprehension, never employing algebra in the classroom, and never producing algebra applets. Based on their answers to the questionnaire, majority of the level 1 individuals were unable to use Geogebra's basic functions, such drawing lines or creating geometric objects. Their limited comprehension may prevent them from using algebra in the classroom (Agyei & Benning, 2015). This explains the study's findings, which showed that half of the participants who were at level 1 in algebra had never been taught the subject using Geogebra in their own class.

As seen by Table 4.2, 32% of the individuals reported using Geogebra at least once or twice. This figure exceeded the number of participants in Table 4.3 who had created their own Geogebra Applet. This outcome was most likely brought about by the time needed to create a Geogebra applet. The ability to adopt another user-made applet is available to teachers when using Geogebra in their lessons. Teachers don't have to start from scratch when creating an applet; instead, they can modify the one that is already accessible to fit the needs of their class. The process of creating a new applet can take some time. Zulnaidi et al. (2020) claim that teachers require a specific length of time to get used to using GeoGebra in the teaching and learning process.

4. CONCLUSION

According to data analysis, 50% teachers were at level 1 in understanding the features of Geogebra and more than half of them has never been utilized Geogebra in their mathematics lesson and never been construct an applet Geogebra as their instructional

media. Those results suggest the urgency to provide the Geogebra training for mathematics teacher in order to enhance students comprehension towards Geogebra.

6. REKOMENDATION

In this current research, the participant was from five main islands in Indonesia. In the future, we wonder if the next scholars can do the survey with larger participants with the proportional composition in each area and describe the level of each Geogebra in more detail description.

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