

BUKTI KORESPONDENSI

Judul Artikel: Students' thinking preferences in solving mathematics problems based on learning styles a comparison of paper-pencil and geogebra.

➤ **Submission (28 Oktober 2017)**



ICCGANT 2017 submission

1 pesan

Dari: ICCGANT 2017 <iccgant2017@easychair.org>

Kepada: Umi Farliah <u_farliah@yahoo.com>

Terkirim: Sabtu, 28 Oktober 2017 pukul 13.00.27 WIB

Judul: ICCGANT 2017 submISSION 126

Dear authors,

We received your paper:

Authors : Umi Farliah

Title : The Effect of Geogebra toward Students' Visual and Non-Visual Thinking Preference In Mathematic Problem Solving Based on Their Learning Styles

Number : 126

The paper was submitted by Umi Farliah <u_farliah@yahoo.com>.

Thank you for submitting to ICCGANT 2017.

Best regards,
EasyChair for ICCGANT 2017.

➤ Letter of Acceptance (9 Januari 2018)



Publication

1 pesan

----- Pesan yang Diteruskan -----

Dari: Ridho Alfarisi <alfarisi38@gmail.com>

Kepada: "u_farlhah@yahoo.com" <u_farlhah@yahoo.com>

Terkirim: Selasa, 9 Januari 2018 pukul 09.44.48 WIB

Judul: Publication

Dear Authors,

Thank you for participating in the First International Conference of Combinatorics, Graph Theory and Network Topology 2017. I am very grateful to say that the conference has been successfully held. Following your paper which you have submitted to the ICCGANT 2017 and also based on the review result of your paper, I am pleased to inform you that your paper is potentially to be published either in JOP: Conferences Series, IJC, Pancaran Pendidikan and CGANT JMA with some conditions. Please kindly revise your paper based on the feedback given by the reviewer as attached in your email. Please follow the guideline of the journal publication for the author to help you to organize your paper.

The list of ICCGANT papers for publication based on the referee results can be download in the **FOLLOWING**. All relevant files will be sent through easychair to your email. Please check your mail box and make sure that you will have four files all together, namely:

1. LOA for publication (LOA_ICCGANT_2017_PAPERID.pdf)
2. Paper Corrections and Comments (ICCGANT_2017_PAPERID_Corrected.pdf)
3. Referee Report (ICCGANT_2017_PAPERID_RefereeReport.pdf)
4. Copyright Agreement (ICCGANT_2017_Copyright.pdf)

The revised paper together with relevant files should be compressed into one file with the following name: AUTHORNAME_ICCGANT2017_PAPERID. It should be resubmitted to the committee no longer than 20th January 2018 by emailing the organizing committee cgant@unej.ac.id and cc to alfarisi38@gmail.com and ralantikap@gmail.com. Once you have completed to revise your paper, please kindly make a payment for the reviewing process and publication fee to ICCGANT Bank Account. Payment shall be made before 22th January 2018.

Please do your best to revise your paper to meet the publication standard, as rejection from journal publication *will not make your money back*, but you are still entitled to publish your paper in our journal without making a payment process.

Ridho Alfarisi, S.Pd, M.Si
Organizing Committee
CGANT RG Member
Lecturer at FKIP UNEJ
University of Jember
Jember, Indonesia



The First International Conference on Combinatorics, Graph Theory
and Network Topology (ICCGANT 2017)
THE UNIVERSITY OF JEMBER
CGANT RESEARCH GROUP

Kampus Bumi Tegal Boto Jln. Kalimantan 37 Jember 68121, Indonesia Telp/Fax (0331) 334988

Number : 01/UN25.3/CGANT/ICCGANT17/I/2018
Subject : IOP Publication

8th January 2018

Umi Farihah
IAIN Jember

Paper ID : ICCGANT_2017_paper_126
Title : The Effect of Geogebra toward Students' Visual and Non-Visual Thinking Preference in Mathematic Problem Solving Based on Their Learning Styles

Dear Authors,

Thank you for participating in the First International Conference of Combinatorics, Graph Theory and Network Topology 2017. I am very grateful to say that the conference has been successfully held. Following your paper which you have submitted to the ICCGANT 2017 and also based on the review result of your paper, I am pleased to inform you that your paper is potentially to be published in the **Journal of Physics: Conference Series (JPCS), IOP Publishing (Indexed by Scopus)**, with the following conditions.

1. Please kindly revise your paper based on the feedback given by the reviewer as attached in the email.
2. Please follow the guideline of **JPCS manuscript**, see jc.cgant.unej.ac.id or see the JOP website: <http://iopscience.iop.org/journal/1742-6596> to help you to organize your paper.
3. The revised paper together with relevant files should be **compressed into one file** with the following name: AUTHORNAME_ICCGANT2017_PAPERID. It should be resubmitted to the committee by no longer than January 20th by emailing the organizing committee cgant@unej.ac.id and cc_to_alfaris138@gmail.com and raifiantikap@gmail.com
4. Please kindly make a payment for the IOP publication fee, each paper will be charged USD 120 for international author or IDR 1,250,000 for indonesian author. Payment shall be made before January 22th, 2018 to the following details.

Bank name : BNI SYARIAH JEMBER
Account name : Panitia Seminar International CGANT
Account number : 0569729037
Address : BNI Syariah Cabang Jember, Jember, Indonesia
(For international transfer, the SWIFT Code is SYNIIDJ1)

Should you have any problem or enquiry, please do not hesitate to contact us.

5. After making payment, please notify us by sending the payment record to secretariat email or by whatsapp to +6282141226069 (Ika Hesti Agustin).
6. Note: Please do your best to revise your paper to meet the publication standard, as rejection from journal publication will not make your money back, but you are still entitled to publish your paper in our journal without making a payment process.

Chairperson for ICCGANT 2017

➤ Review (01 Februari 2018)



The First International Conference on Combinatorics, Graph Theory
and Network Topology (ICCGANT 2017)

THE UNIVERSITY OF JEMBER

CGANT RESEARCH GROUP

Kampus Bumi Tegal Boto Jln. Kalimantan 37 Jember 68121, Indonesia Telp/Fax (0331) 334988

REVIEW FORM

Paper ID : ICCGANT_2017_paper_126

Paper Title : The Effects of Geogebra on Students' Visual and Non-Visual Thinking Preferences in Solving Mathematics Problems Based on Their Learning Styles

Yes Partially No

| | Yes | Partially | No |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| Do you think the title is appropriate? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Does the abstract summarize the article clearly and effectively? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Are the objectives set clearly? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Is the issue stated clearly? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the literature review adequate? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is the design of the research appropriate, and the exemplary, if any, suitable? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is the methodology consistent with the practice? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Are the findings expressed clearly? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is the presentation of the findings adequate and consistent? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are the tables, if any, arranged well? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the conclusions and generalizations based on the findings? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are the suggestions meaningful, valid, and based on the findings? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are the references adequate? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is the language clear and understandable? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is cohesion achieved throughout the article? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is the work contributing to the field? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Evaluation:

- The article can be published as it is.
- The article can be published after some minor revision.
- The article must undergo a major revision before it can be resubmitted to the journal.
- The article cannot be published.

Recommendation for Publication

- JOP: Conference Series indexed by Scopus (*Additional publication fee is Rp. 1.250.000,-*).
- IJC: indexed by DOAJ.
- Pancaran Pendidikan indexed by Crossreff (*Additional publication fee is Rp. 400.000,-*).
- CGANT JMA indexed by Crossreff (*Additional publication fee is Rp. 350.000,-*).

REFEREE REPORT

1. The language is good
2. A few grammatical errors appear in the paper
3. The paper needs to concern more on paragraph coherence
4. No acknowledgment is available in the conclusion
5. The research data is weak
6. Some of the references are not up to date
7. The discussion of the results of the study is not discussed in detail for students who are high-ability, moderate, and low.
8. The formal result involving such keywords as influence, effect, impact, and correlation has to include statistical inferential method, be it parametrical or non-parametrical analysis.
9. The data collection method also to comply with standard procedures, such as random sampling, proportional sampling, purposive sampling, and proportional sampling
10. Need to improve the english grammar.

The downsides in the research writing include:

1. Incorrect sentence construction
2. Incorrect use of cohesive devices
3. Poor construction of simple sentences, compound sentences, and complex sentences
4. The word choices are oftentimes inappropriate
5. The sentence style tends to be monotonous
6. The use of tenses has not complied with the requirement for research writing



The action research should employed cyclical procedure which is usually implemented in classroom action research

the research data is weak

Some of the references are not up to date

The Effects of Geogebra on Students' Visual and Non-Visual Thinking Preferences in Solving Mathematics Problems Based on Their Learning Styles

[REDACTED]

[REDACTED]</p

By using an innovative technology, visualization has become an important part of mathematics education. Curriculum reformation efforts in the mathematics education proved the importance of the process of visual and the use of visual representations [8]. Besides, the connecting of the visual and non-visual representations, it is expected to be able to produce a better understanding about mathematics [11], [12], [13]. It is proved that technology build the relationship with the difference computer program and offer a wide range of students' perspective with the visual support [14].

The importance of visualization in the problem solving is also stated by Rif'at. He argued that to solve the mathematics problems, there is a need a visual presentations beside analytical presentations. Despite the presentation has been exploited in the instruction, it is taken a part as a device to assist the instruction, so the problem solving analytically done. Whereas, the visual presentations is not only exploited as a tool to assist but also exploited as a strategy as well as a thinker in solving a problem specifically a visual-characterized and visualized problem [15]

Technology devices are not only support visual representation but also show the relationship among different representations. NCTM proved the importance of students' ability in choosing, implementing, and interpreting mathematics representation [8]. According to Aspinwall and Shaw, the students had got a deep understanding about the concept after they investigate and synthesize the relationship between graphic and analytic representation [16]. The effective mathematics product might be exist through the coordination for both graphic and numeric representation as well as algebra [14].

Technology assists coordinating the difference representation. It consists of a set of computer which specifically designed to serve this coordination like Geogebra [17]. Geogebra software supports several representations by offering several devices to make a graph function, show the expression of algebra, and performing numeric counting. It also support the data from numeric into visual representation. Some researchers state that the ability to employ every representative and interpret among representations will reveal a deep understanding about mathematics [18], [3].

The effect of thinking preferences in the students' learning and working during the use of technology has been the most important subject in the late decade. The study of the topic shows the different result. Study the effect of instruction of dynamic geometry environment of students' work toward the geometry task such as determining the width of triangle and parallelograms [19]. They also investigate whether or not using a dynamic geometry can reduce students' cognitive burden by accommodating their different thinking preferences. The research result shows that there is no relationship between thinking preference and the students' work toward the geometry tasks. In his research, verbalizer utilizes visual instruction more than a dynamic geometry software. However, the result come into a contrary with the previous research result in the mathematics education [20]. It states that optimal learning is happened since the students are thought with the appropriate way of their thinking preference. Ridling and Douglas also found out that verbalizer can accomplish the assignment better than those visualizer (analytical thinking) in the text-based environment while visualizer can do better than those verbalizers in every visual and graphic presentation [21].

Krutetskii's research concluded that there is a correlation between the ability of visualizing abstract relationship and the ability of geometry concept of space. Nevertheless, both of them are not the important component of the mathematics ability. Furthermore, he found out that the strength or weaknesses of visual or analytical thinking does not determine how far the students' mathematics ability is but determines the kind of it. It means that someone who have a different correlation mathematics ability between two components mentioned in the previous sessions (visual-pictoral, verbal-logical). This correlation determine thinking domain (analytic, geometric, and harmonic) where the people comes from [9].

Yerushalmy's research report states that the students experience the positive effect from the use of technology in the Algebra instruction, specifically in the field of symbol, equality, and the problematic context [22]. In addition, Yerushalmy, Shternberg and Gilead conducted a research focused on the software that support visualization [23]. Sirin Coskun conducted a multi-cased research about the effect of technology of the students' visual and non-visual thinking preference by comparing the

strategy to solve the Algebra paper-based test (PBTs) of Senior High School students in Florida, USA. In his research, Coskun found out the comparison between their PBTs and GBTs shows is this dynamic software can influence their solution method [5].

2. Research Method

This current research has employed a qualitative descriptive method. The subject of this research was eight graders of the second semester academic year 2015-2016. This current research was conducted in MTsN 2 Trenggalek, East Java Indonesia which consisted of six students who had different learning style: two visual students, two auditory students, and two kinesthetic students. Students who were selected as participants in this study were those who have a good communication, good in operating Geogebra program, and have one of dominant learning styles among others which was shown by a higher score obtained from learning styles test for all learning styles consisting of auditory, kinesthetic, and visual learning style.

Table 1. Research Subject Based on Their Learning Style

| No | Code | Visual Score | Auditory Score | Kinesthetic Score | Learning Style |
|----|------|--------------|----------------|-------------------|----------------|
| 1 | LN | 36 | 27 | 24 | Visual |
| 2 | ESP | 37 | 32 | 29 | Visual |
| 3 | ATR | 36 | 38 | 34 | Auditory |
| 4 | NDP | 33 | 36 | 24 | Auditory |
| 5 | FAM | 30 | 32 | 36 | Kinesthetic |
| 6 | YE | 28 | 31 | 36 | Kinesthetic |

The data collection was obtained from questionnaires, test, observation, and interview. Questionnaires of learning style were used to get the data about the students' learning style. Meanwhile, a test in this study was in the form of paper and pencil-based test (PBTs) and Geogebra-based test (GBTs) which were used to get the data about the effect of geogebra on students' visual and non-visual thinking preferences in solving mathematics problems. The questionnaires used in this study had been employed by Sagitasari which consisted of 30 items [24], while PBTs and GBTs tests were adopted from Sirin Coskun that consisted of 10 mathematic problem [5] which many adaptation compatible with the students of MTs or secondary level as a subject of this study, they were number 6, 7, and 8.

The data analysis used in this study was obtained from two sources; first, students' learning style analysis by adding all scores obtained by the students based on their learning style, they were visual, auditory, and kinesthetic learning style. Those data were then compared by those three sources obtained by the students. The highest score obtained by the students indicates their learning style; second, the effect of geogebra data analysis on students' visual and non-visual thinking preferences in solving mathematics problems employed a model of Miles & Huberman. The activity of data analysis were reduction, data display, and drawing conclusion or verification [25].

3. Research Result

The result of the research showed that all of the students who have either visual learning style, auditory learning style, or kinesthetic learning style used non-visual method to solve PBTs which consists of 10 items except number 1 and 2. Both of them were solved by kinesthetic students using visual method. The students who have visual learning style used a procedural way, while the students who have auditory learning style prefer using verbal logic. This was shown from the result of the students presentation in solving PBTs as shown in this following question:

| | |
|--------|---|
| PBTs 1 | <i>Altogether there are 8 tables in a house. Some of them have four legs, and the others have three legs. Altogether they have 27 legs. How many tables are there with four legs?</i> |
|--------|---|

The students with visual learning style solved PBTs 1 by using non-visual solution method, that was separated the table with four legs as x and a table with three legs as y , they used elimination mixed method and substitution. Subject LN eliminate x earlier so that she found the value of y , then, she found the value of x by substituting it. Meanwhile, subject ESP eliminated y earlier so that she found the value of x , then, she found out the value of y by substituting it. However, both of them found out the same result.

1. Misal : meja yang memiliki 4 kaki = x
meja yang memiliki 3 kaki = y
jumlah seluruh meja = 8
jumlah kaki meja = 27
Maka : $x + y = 8 \dots \text{pers. I}$
 $4x + 3y = 27 \dots \text{pers. II}$
Eliminasi y
 $\begin{array}{r} x + y = 8 \\ 4x + 3y = 27 \\ \hline -x = -3 \\ x = 3 \end{array}$
Mencari y
nilai x disubstitusikan ke pers. I
 $x + y = 8$
 $3 + y = 8$
 $y = 8 - 3$
 $y = 5$
Meja yang memiliki kaki 4 = $x = 3$

Figur 1. The solution of Subject ESP in Solving PBTs 1

All of the students who have an auditory learning style solved PBTs 1 using non-visual solution method by guessing the number. ATR guessed the number if there were three tables that consisted of four legs so $4 \times 3 = 12$, legs left = 15, then, it was divided by 3, it became 5. She found out that there were 3 tables that has four legs. Meanwhile, NDP guessed that there were 5 tables that has three legs so it became 27 if they add them. Even though they used different way to count but they have the same way of thinking, they prefer using their logical way of thinking.

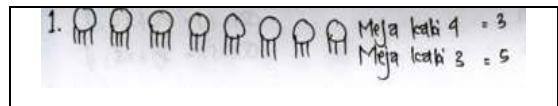
(1) Seumpama :

| | |
|-----|----|
| III | IV |
| 5 | 3 |

dari pernyataan diatas dapat diperoleh jika meja yang memiliki kaki 3 = 5
 \Rightarrow Maka $3 \times 5 = 15$
 \Rightarrow Maka $4 \times 3 = \underline{\underline{12}} + 27$
Jawaban : Meja yang memiliki kaki 4 = 3 meja

Figur 2. The solution of Subject NDP in Solving PBTs 1

The students who have kinesthetic learning style, they tend to solve PBTs 1 using visual solution method. Subject FAM solved this problem by drawing a table. Firstly, she pulled the tables as if they have only three legs, then she added the legs to the table and it reaches 27. On the other hands, subject YE drew a table that has four legs and three legs so she found out the numbers of legs are 27. Secondly, subject FAM and YE found out the same final result they were the tables that has four legs and three legs.



Figur 3. Solution of Subject FAM in Solving PBTs 1

PBTs 3, PBTs 5, PBTs 6, and PBTs 7 were solved by all students who have visual, auditory, and kinesthetic learning style using elimination and substitution mix method. Meanwhile, PBTs 4, PBTs 8, PBTs 9, and PBTs 10 were solved using verbal logic and logical way of thinking. The following figure is the result of students presentation towards PBTs 4 and PBTs 9.

| | |
|--------|--|
| PBTs 4 | <i>Budi rode his bike to his friend Eko's house, which was 18 miles away. After he had been riding for half an hour, he got a flat tire. He walked his bike the rest of the way. The total trip took him 3 hours. If his walking rate was one-fourth as fast as his riding rate, how fast did he ride?</i> |
|--------|--|

All of the research subjects either visual, auditory, or kinesthetic learning style used the same way in solving PBTs 4 by using the speed formula and reducing into the formula of $distance (s) = speed (v) \times time (t)$. After they find $v_2 = 4$, then they find v_1 by multiply v_2 with 4, therefore they found v_1 equal to 16. So, they found that the speed is 16 mil/hour.

$$\begin{aligned}
 4. v = \frac{s}{t} \rightarrow s = vt & \quad \begin{aligned} s_1 = v_1 \times t_1 \\ s_2 = v_2 \times t_2 \end{aligned} \\
 s_1 + s_2 = 18 \text{ mil} & \\
 v_1 \cdot t_1 + v_2 \cdot t_2 = 18 & \quad \begin{aligned} v_1 = 4 \cdot v_2 & \quad t_1 = \frac{1}{2} \text{ jam} \\ (4v_2) \frac{1}{2} + v_2 (2 \frac{1}{2}) = 18 & \quad = 4 \cdot 4 & \quad t_2 = 3 - \frac{1}{2} = 2 \frac{1}{2} \text{ jam} \\ 2v_2 + 2,5v_2 = 18 & \quad = 16 \end{aligned} \\
 4,5v_2 = 18 & \quad \text{Jadi kecepatan naik sepeda Budi} \\
 v_2 = \frac{18}{4,5} = 4 & \quad \text{adalah } 16 \text{ mil/jam}
 \end{aligned}$$

Figur 4 Solution of Subject LN and ESP in Solving PBTs 4

| | |
|--------|---|
| PBTs 9 | <i>There are 9 boys to every 10 girls in a particular high school. There are 2622 students at the school. How many girls are there?</i> |
|--------|---|

All the subjects of the research solved PBTs 9 by using non-visual method, it is a guessing numbers. If the number of the girls were 10, it would be 9 for boys, but their numbers reach = 19 (wrong), then they guessed other numbers. If the number of the girls were 100, it would be 90 for the boys, but their numbers reach = 190 (wrong). Finally, they found the number of the girls were 1380 girls and 1242 boys. Therefore, the number of them were 2622 (correct).

| ④ | PF | LK | PR + LK | |
|---|------|------|---------|---|
| | 10 | 9 | 19 | ✗ |
| | 100 | 90 | 190 | ✗ |
| | 1000 | 900 | 1900 | ✗ |
| | 1380 | 1242 | 2622 | ✓ |

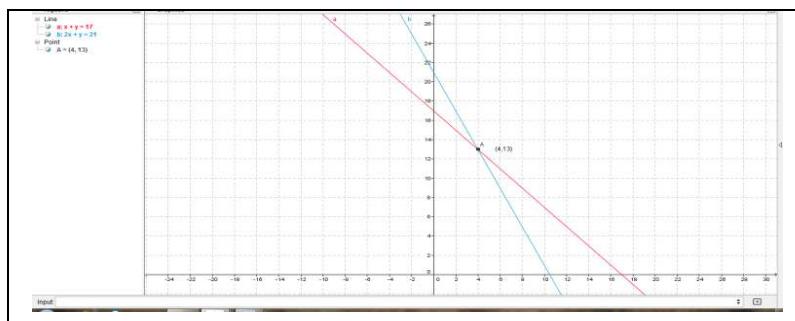
Figur 5. Solution of Subject NDP in Solving PBTs 9

After accomplishing all Paper-based Tasks, they turned to the following steps, it was delivering Geogebra-based Tasks (GBTs) that consisted of 10 items followed by conducting an interview. While the students work and solve the problem using GBTs, it had been provided by an installed dynamic software called Geogebra where the students can select to use visual solution method in the form of graph as well as non-visual solution method in the form of numeric by opening the window *spreadsheets* as well as Algebra by opening the window *Computer Algebra System* (CAS).

The result of the research shows that all the students who have visual, auditory, and kinesthetic learning style employed visual solution method to solve all the Geogebra-based Tasks, except GBTs 4, GBTs 8, GBTs 9, and GBTs 10. The following is the solution method used by the students in solving GBTs 1, GBTs 4, and GBTs 9.

| | |
|--------|--|
| GBTs 1 | <i>Bill had Rp 10.500 coin money, in one thousand coins and five hundred coins. If he had 17 coins, how many coins he had?</i> |
|--------|--|

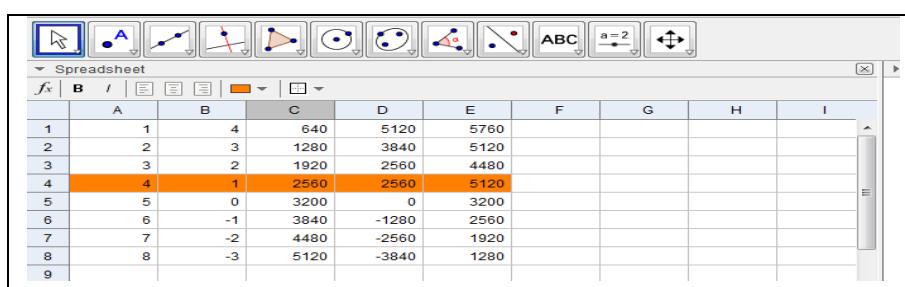
All the subjects used the same solution method to solve GBTs 1, it is a graph representation assisted by the window of Algebra. They told that x as a coin of five hundreds while y as a coin of one thousand. They made equations $x + y = 17$ and $1000x + 500y = 10500$, then they drew a graph of both equations, then they found out intersection point of graphs. They interpreted the intersection point and stated that there had to be 4 coins of one thousand and 13 coins of five hundreds.



Figur 6. Solution of All Subject in Solving GBTs 1

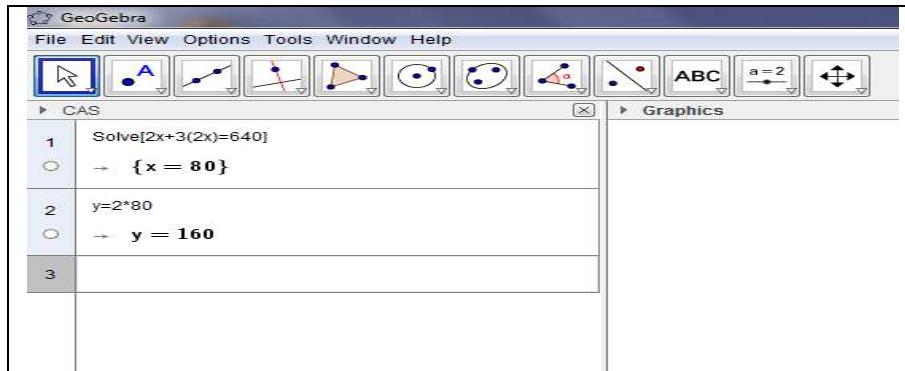
| | |
|--------|---|
| GBTs 4 | <i>An airplane trip for five hours is 640 mil. It is flight by different speed. After flying for two hours, the pilot flies the airplane twice faster than the first flight. How fast the speed for the first and second flight in that trip?</i> |
|--------|---|

Subject LN, ATR, and FAM used solution method which were different from the subject ESP, NDP, and YE which are still categorized as non-visual. Subject LN, ATR, and FAM use numeric method assisted by spreadsheet display till they found the same value in cell C4 and D4, it was 2560.



Figur 7. Solution of Subject LN, ATR, and FAM in Solving GBTs 4

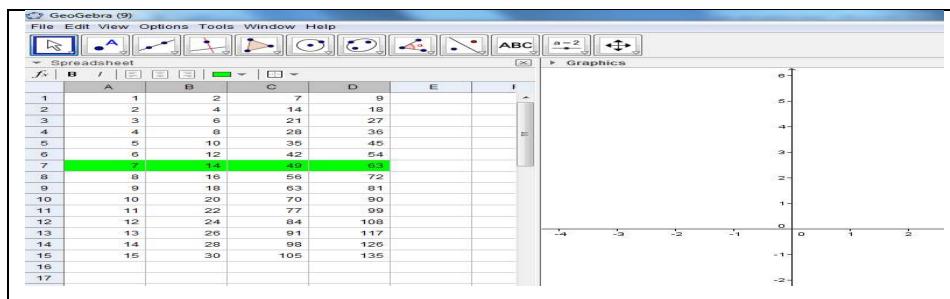
Meanwhile, the subject ESP, NDP, and YE used Algebra representation by opening the window CAS, they assumed the first speed = x and the second flight speed = y until they found the value of $x = 80$ and $y = 160$. They interpreted the first flight speed was 80 mil/hour and the second flight speed was 160 mil/hour.



Figur 8. Solution of Subject ESP, NDP, and YE in Solving GBTs 4

| | |
|--------------|--|
| GBT 9 | <i>There are 2 students wearing glasses to every 7 students not wearing glasses in a particular classroom. There are 63 students in that classroom. How many students are wearing glasses?</i> |
|--------------|--|

All subjects of visual, auditory, and kinesthetic learning style solved GBTs 9 using numeric method. They inserted 2 into cell B1 and 7 in cell C1 to represent the number of students who wear glasses and those who don't wear glasses. In the second row, they inserted 4 to cell B2 and 14 in cell C2. They selected cells to create the remnant from the pattern. They drag the pattern till the fifteenth row. After they investigated the seventh row number till it was found 63 in cell D7, they stated that there were 14 persons who wore glasses



Figur 10. Solution of All Subject in Solving GBTs 9

At the first step, they would like to use graph representation but they couldn't solve the problem using a graph because they couldn't make equations.

4. Discussion

Technology devices give an opportunity to the students to use some representations. However, all the students who have either visual, auditory, or kinesthetic learning style state that they prefer solving GBTs problem using graph representation because it is accessible easily. The Geogebra program has

provided the Algebra window to draw a graph even the smallest scale of that graph. Yet, If they could not make a comparison from mathematic problems given such as in GBTs 4, GBTs 8, GBTs 9, and GBTs 10, they would solve the problem by numeric or algebra representation. The comparisons which were could not made by them are the comparisons which were could not found by them as they learn in the class. The comparison which is not in the form of $ax + bv = c$ as stated in the example of GBTs 9 above. ← look at the paragraph coherence

This result supported the finding of Harskamp et. al. He reported that the function of automatic graphic picture of Geogebra and the availability of coordinate system are the important factor that caused this result. Whereas, the Geogebra did not support the visualizers. The automatic creation from the toolbar in *spreadsheet* page supported the non-visualizer. However, the students tend to use visual solution more often in solving GBTs than those in PBTs [26]. Slavit's research result shows that the students who use a graph is only when they found a problem that should be solved with a graph. This research finding was not support Slavit's finding because the students often use a graph in this study in solving mathematics problem although they did not found problems must be solved using a graph [27].

These overall research findings shows that there were different solution methods used by the students as they accomplish the paper and pencil-based task and Geogebra-based task. All the subjects of this research either students of auditory, kinesthetic, or visual have a powerful preference to think verbal logic as they solve paper and pencil-based task. The most selected main method is a numeric and an algebra, so it can be stated that most of them have non-visual preference thinking as they solve mathematics problem without any Geogebra assistant. Nevertheless, while they are provided by Geogebra, their thinking preference turn to change into a powerful preference to think visually. As they solve Geogebra-based task using a main method, they prefer to use a graph. This evidence proved that there is an effect of Geogebra on students' visual and non-visual thinking preferences in solving mathematics problems. This research support the previous finding performed by Suwarsono and Coskun who found an effect of Geogebra on students' non-visual and visual thinking preferences.

This current study also support the finding of Ruthven [28], Harskamp et al.[26] and Yerushalmey [4]. They reported that the students use different solutions as they solve the problem using technology. Harskamp et al. stated that the group of experiment use a strategy of graph more than a controlled group. However, there is no significance differences between the use of Heuristic (Guess and Check) and Algorithmic strategy [26].

Due to the use of Geogebra affects students preference to use visual representation compared with the paper pencil-based solution, the second usage of this technology might support the second usage of visual and non-visual representation which involve their visual and non-visual thinking. As has been stated in the previous session, researchers argue that the ability to use visual and non-visual representation as well as interpret both of them will affect a deep understanding about a mathematics [18], [3].

The National Research Council identifies the significant indicator of conceptual understanding as the ability to use a different representation in the mathematic situation as well as to know how the form of different representation could be beneficial for different purposes [29]. For this reason, there is a close relationship between the representation fluency and conceptual understanding as well as improve the result of representation fluency in developing a conceptual understanding [3].

Some representation theories argue that the most important factor to understand the idea of mathematics is the ability to interrelate the representation to obtain the representational fluency and interpret the ideas of mathematics in different representation [30]. The result of this research shows that the use of a dynamic software facilitate the process of students interpretation to support previous findings performed by Choi-Koh [31] and Huntley et al. [32]. Therefore, the use of a dynamic software might contribute the students' conceptual understanding by supporting their representation fluency.

5. Conclusion

Based on the result of questionnaires, tests, observation, and interview to the students, the researcher found out that a dynamic software like a Geogebra has an effect on students' visual and non-visual thinking preferences in solving mathematics problem for the students who have visual, auditory, and kinesthetic learning style. The students' responses toward PBTs and GBTs reveal the important information about their thinking. They use various type of representations as they solve the mathematics problems. They have a difference solution between PBTs and GBTs, this difference indicate the changing of their preference to think visually or non-visually as they solve the problem within two different instructional media.

This current research selects the mathematics problems that can be solved by the linier equality. For further research, this research can be broaden by changing the students accomplishment in the form of interview, for example; mathematics involvement task that can be solved by using polynomial. Presmeg stated that the teacher preference to think visually or non-visually is one of the important things that affect students' preference. Hence, the research result will reveal the effect of the thinking preference of the students and the teacher in the Geogebra technology environment

References

- [1] Heid, M. K., & Blume, G. W. 2008. Algebra and function development. In M. K. Heid & G. W. Blume (Eds.), *Research on technology and the teaching and learning of mathematics: Research syntheses* (1, pp. 55–108). Charlotte, NC: Information Age.
- [2] Janvier, C. 1978. The interpretation of complex cartesian graphs representing situations: Studies and teaching experiments. Unpublished Ph.D Dissertation. University of Nottingham.
- [3] Lesh, R., Post, T., & Behr, M. 1987. Representations and translations among representations in mathematics learning and problem solving. In C. Janvier (Eds.), *Problems of Representation in the Teaching and Learning of Mathematics* (pp. 33-40). Hillsdale, NJ: Lawrence Erlbaum Associates.
- [4] Yerushalmy, M. 2006. Slower algebra students meet faster tools: Solving algebra word problems with graphing software. *Journal for Research in Mathematics Education*, 37, No.5: 356-387.
- [5] Coskun, Sirin 2011. A Multiple Case Study Investigating The Effect of Technology on Students' Visual and Nonvisual Thinking Preferences: Comparing Paper-Pencil and Dynamic Software Based Strategies of Algebra Word Problem. Unpublished Ph.D Dissertation. University of Central Florida.
- [6] Presmeg, N. C. 1985. *The role of visually mediated processes in high school mathematics: A classroom investigation*. Unpublished Ph.D Dissertation. University of Cambridge Another reference
- [7] Suwarsono, S. 1982. *Visual imagery in the mathematical thinking of seventh-grade students*. Unpublished Ph.D Dissertation. Monash University.
- [8] NCTM. 2000. *Principles and Standards for School Mathematics*. USA
- [9] Krutetskii, V. A. 1976. *The Psychology of Mathematical Abilities in Schoolchildren*. In J. Kilpatrick & I. Wirsup (Eds.). Chicago: The University of Chicago Press.
- [10] Presmeg, N. C. 1986. Visualization and Mathematical Giftedness. *Educational Studies in Mathematics*, 17, 297-311.
- [11] Ainsworth, S., Bibby, P. A., & Wood, D. J. 1997. Evaluating principles for multi representational learning environments. Paper presented at the 7th European Conference for Research on Learning and Instruction, Athens.
- [12] Seufert, T. 2003. Supporting coherence formation in learning from multiple representations. *Learning and Instruction*, 13, 227-237.
- [13] van Labeke, N., & Ainsworth, S. 2001. *Applying the DeFT framework to the design of multi-representational instructional simulations*. Paper presented at the AIED'2001 - 10th

International Conference on Artificial Intelligence in Education, San Antonio, Texas.

- [14] Borba, M. C., & Villarreal, M. E. 2005. Visualization, mathematics education and computer environments. In B. S. Jones, & R. Z. Smith (Eds.), *Humans-with-Media and the Reorganization of Mathematical Thinking* (pp.89). New York: Springer.
- [15] Rif'at M. 2001. Pengaruh Pola-pola Pembelajaran Visual dalam Rangka Meningkatkan Kemampuan Menyelesaikan Masalah-Masalah Matematika. Unpublished Dissertation. UPI Bandung.
- [16] Aspinwall, L., Shaw, K. L., & Presmeg, N. 1997. Uncontrollable mental imagery: Graphical connections between a function and its derivative. *Educational Studies in Mathematics*, **33**, 301-317.
- [17] Hohenwarter, M. 2002. Geogebra - Ein Software system für dynamische Geometrie und Algebra der Ebene. Master thesis, University of Salzburg.
- [18] de Jong, T., & van Joolingen, W. R. 1998. Scientific discovery learning with computer simulations of conceptual domains. *Review of Educational Research*, **68**, 179-201.
- [19] Pitta-Pantazi, D.,& Christou, C. 2009. Cognitive styles, task presentation mode and mathematical performance. *Research in Mathematics Education*, **11**(2), 131-148.
- [20] Bishop, A. J. 1989. Review of the research on visualization in mathematics education. *Focus On Learning Problems in Mathematics*, **11** (1), 7-16.
- [21] Riding, R. and Douglas, G. 1993. The effect of cognitive style and mode of presentation on learning performance. *British Journal of Educational Psychology*, **63**, 297-307.
- [22] Yerushalmy, M. 1997. Emergence for new schemes for solving algebra word problems: The impact of technology and the function approach. In E. Pehkonen (Ed.), *Proceedings of the 21st PME International Conference*, **1**, 165-172
- [23] Yerushalmy, M., Shternberg, G., & Gilead,S. 1999. Visualization as a vehicle for meaningful problem solving in algebra. In O, Zaslavsky (Ed.), *Proceedings of the 23rd PME International Conference*, **1**, 197-211.
- [24] Sagitasari, Dewi A. 2010. Hubungan antara Kreativitas dan Gaya Belajar dengan Prestasi Belajar Matematika Siswa SMP. Unpublished Essay. Universitas Negeri Yogyakarta.
- [25] Miles, M.B. & A.M. Huberman 1994. *Qualitative Data Analysis*. New Delhi: SAGE Publication.
- [26] Harskamp, E. Suhre, C. & Van Streun, A. 2000. The graphics calculator and students' solution strategies. *Mathematics Education Research Journal*, **12** (1), 37-52.
- [27] Slavit, D. 1998. Three women's understandings of algebra in a Precalculus course integrated with the graphing calculator. *Journal of Mathematical Behavior*, **17** (3), 355-372.
- [28] Ruthven, K. 1990. The influence of graphic calculator use on translation from graphic to symbolic forms. *Educational Studies in Mathematics*, **21**, 431-450.
- [29] National Research Council 2001. *Adding it up: Helping children learn mathematics*. J. Kilpatrick, J. Swafford & B. Findell (Eds.) Mathematics Learning Study Committee, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.Nemirovsky, R., & Noble, T. 1997. On mathematical visualization and the place where we live. *Educational Studies in Mathematics*, **33**, 99-131.
- [30] Pierce, R. & Stacey, K. 2010. Mapping pedagogical opportunities provided by mathematics analysis software. *International Journal of Computers for Mathematical Learning*.
- [31] Choi-Koh, S. S. 2003. Effect of a graphing calculator on a 10th-grade student's study of trigonometry. *The Journal of Educational Research*, **96** (6). 359-369.
- [32] Huntley, M. A., Rasmussen, C. L, Villarubi, R. S., Sangtong, J., & Fey, J. T. 2000. Effects of Standards-based mathematics education: A study of the Core-Plus Mathematics Project algebra and functions strand. *Journal for Research in Mathematics Education*, **31**(3), 328-361.

➤ Publication (27 April 2018)



JOP for ICCGANT

1 message

Subject: JOP for ICCGANT
To: Umi Farihah <farihahumi84@gmail.com>

Dari: dafik dafik <d.dafik@unej.ac.id>

Kepada: Sholihin Hin <hin00308@yahoo.com>; Inge Wiliandani Septiani Putri <ingewiliandani@unej.ac.id>; Gulpi Qorik Oktagalun Pratamasunu <gulpi@sttnj.ac.id>; Jero Darmayasa <jeromath@student.upi.edu>; Mardiningsih Mardiningsih <mardiningsih@usu.ac.id>; Brelyanes Zully Fambudi <brelyanes@gmail.com>; Sutarto Sutarto <sutarto@kipmataram.ac.id>; Teguh Herlambang <teguh@unusa.ac.id>; Yusep Muslih Purwana <ymuslih@yahoo.com>; Budiyono Budiyono <budiyono@uns.ac.id>; Roslan Hasni <hroslan@umt.edu.my>; Moch. Anshori <ansori@dosen.umaha.ac.id>; Januar Adi Putra <januaradi.putra@gmail.com>; Chanesia Nabila <chanesia.nabila@yahoo.co.id>; Ririn Faridah <ririnfaridah16070785010@mhs.unesa.ac.id>; Rafiantika M Prihandini <rafitantikap.fkip@unej.ac.id>; Ani Nurwijayanti <aniinurwijayanti@gmail.com>; Isnaini Rosyida <isnaini@mail.unnes.ac.id>; Zu'Ma Wihdatul Qur'Ani <zuma.157785039@mhs.unesa.ac.id>; As'Ad Tri Wahyudi <asad3.w@gmail.com>; Hasih Pratiwi <hasihpratiwi@gmail.com>; Abdur Rahman As'ari <abdur.rahaman.fmipa@um.ac.id>; Makbul Muksar <makbul.muksar.fmipa@um.ac.id>; Scristia Scristia <bae_tia@yahoo.com>; Meilia Nur Indah Susanti <meilia@sttpln.ac.id>; Noor Noor Hidayati <noorhidayatiadinda@gmail.com>; Novita Anggraini <anggraini.novita18@gmail.com>; Aprilia Lutfitasari <aprilialutfitasari23@gmail.com>; Suhadi Wido Saputro <suhadi@math.itb.ac.id>; Mudrig Triyanto <riniwd52@gmail.com>; Diari Indriati <diari.indriati@uns.ac.id>; Henry Kurniawan <henry.stk@gmail.com>; Dedi Lealdi <dedi_math07@yahoo.co.id>; Ermita Rizki Albirri <mitalby.ma@gmail.com>; Nelly Oktavia Adiwijaya <nelly.oa@unej.ac.id>; Wahyu Lestari <wahyu.lestari2016@student.uny.ac.id>; Luthfaturrohmah <luthfaturrohmah17@gmail.com>; Muhammad Ali Syakur <syakuralis@gmail.com>; Rut Herlina Parastuti <rutherlinap@gmail.com>; Dwi Suciati Putri Isdiansyah <putriisdiansyah@yahoo.co.id>; Tita Khalis Maryati <tita.khalis@uinjkt.ac.id>; Ika Desianna <ikade08@gmail.com>; Raden Sulaiman <sulaiman@unesa.ac.id>; Susanzeピー Susan <susanzeピー@yahoo.com>; Endah Budi Rahaju <endah_math_unesa@yahoo.com>; Kiki Ariyanti Sugeng <kiki@sci.ui.ac.id>; Novia Indriyani <nov.indriyani8@gmail.com>; Nur Afni Fitriana <nurafni.math@gmail.com>; Sesi Winarni <sssessii@gmail.com>; Wilda Qonita <wildaqonita@mhs.unesa.ac.id>; Ach. Khozaimi <khozaimi@trunojoyo.ac.id>; Broto Apriliyanto <apriliyanto.broto@gmail.com>; Intan Dwihastuti <intanhastuti@ummah.ac.id>; Noor Endah <noormochtar@gmail.com>; Suwarno <warnomtk@gmail.com>; Dwi Juniatyi <dwijuniati@unesa.ac.id>; Priza Pandunata <priza@unej.ac.id>; Ema Priliawati <emma_prilya@ymail.com>; Tri Winarsih <tri3.wiwin@gmail.com>; Ika Oktavia Suzanti <iosuzanti@trunojoyo.ac.id>; Endah Rm Putri <endahrmp@gmail.com>; T. Dwi Hastuti <teresiadwihastuti@yahoo.co.id>; Diah Ayu Retnani Wulandari <diah.retnaniw@gmail.com>; Irmatul Hasanah <irmatul.hasanah@uinbanten.ac.id>; Bagus Eko Nugroho <bagusekonugroho381@gmail.com>; Faiz Latif Usman <ziafvital@gmail.com>; Maulidil Jannah <maulidiljannah22@gmail.com>; Reza Ambarwati <reza.ambarwati@unej.ac.id>; Eka Mala Sari Rochman <ekamala.sari@yahoo.com>; Tatang Mulyana <tatangmulyana51@yahoo.com>; Nur Hamid <hamidelfath@gmail.com>; Riyadi <riyadifkipuns@gmail.com>; Agus Hidayat <agushidayat2251@gmail.com>; Darsono - <darsono.uns.fisika@gmail.com>; Elah Nurlaelah <elah_nurlaelah@upi.edu>; Mila Widyaningrum <milawidyaningrum4@gmail.com>; Zainatul Mufarrikhoh <zainatul@unusa.ac.id>; Erna Apriliani <aprilmath12@gmail.com>; Siti Aisyah <aisyah_rasyid84@yahoo.com>; Ichsan Saderi <ichsansaderi@gmail.com>; Bagus Juliyanto <bagus14@mhs.matematika.its.ac.id>; Toto Nusantara <totonusantara@yahoo.com>; Salwa Amaliyah <salwa.19@gmail.com>; Rachmat Hidayat <rachmatcematx@gmail.com>; Mega Budiarto <megatbudiarto@unesa.ac.id>; Muchamad Noto <balimath61@gmail.com>; Muhammad Yusuf <muhammadyusuf@trunojoyo.ac.id>; Mega Budiarto <megatbudiarto@gmail.com>; Haryadi Haryadi <haryadi_ump@yahoo.co.id>; Indrianto . <indrianto@sttpln.ac.id>; Rizky Nurul Hafni <rizkynurulhafni@upi.edu>; Iva Fendi Kurnia <ivafendikurnia@gmail.com>; Dafik Dafik <d.dafik@unej.ac.id>;

Rosana Dian Edy Prismana <rosanadianedyprisman@yahoo.co.id>; Dany S Kurniawan <dany.samsuryakurniawan@gmail.com>; Raden Sulaiman <radensulaiman@unesa.ac.id>; Indaryanti <iin_pasca@yahoo.com>; Hasbi Albayas <staimlentera@gmail.com>; Cecil Hiltimartin <hiltimartincecil@yahoo.com>; Ria Sari <riafibrianasari74@gmail.com>; Nessy Pattimukay <n355y_p@yahoo.com>; Tri Atmojo Kusmayadi <tri.atmojo.kusmayadi@gmail.com>; Ervi Awalah <erviawalah16070785039@mhs.unesa.ac.id>; Yuyun Mintarsih <yuyunaziz2@gmail.com>; Nella Arsita <nellaarsitatumara@gmail.com>; Fitri Damayanti <fitri2708@yahoo.com>; Ridho Alfarisi <alfarisi.fkip@unej.ac.id>; Akbar Sutawidjaja <akbar.sutawidjaja@gmail.com>; Dadang M. Ma'soem <dadangm@gmail.com>; Denny Riama Silaban <denny@sci.ui.ac.id>; Matilde Niis Molo <matildemolo1993@gmail.com>; Hariyanti Hariyanti <yusnidaryusuf@uhamka.ac.id>; Aditya Kurniawan <adityakurniawan0066@gmail.com>; Mochamad Edoward Ramadhan <edowarditsdesain@gmail.com>; Nurul Kistatuhu <nurulkista1@gmail.com>; Dedi Yulhendra <dediyulhendra@ft.unp.ac.id>; Wisnu Aribowo <wisnu.aribowo@uinjkt.ac.id>; Sumarsih Sumarsih <smarsih74@yahoo.com>; Rudhita Kislamiyanti Nur Karimah <rudhita.kislamiyanti@gmail.com>; Titin S Martini <titinmartini@gmail.com>; Tri Utomo <tri.utomo@ma.itera.ac.id>; Nurcholif Diah Sri Lestari <nurcholifdiahsl@gmail.com>; Frida Noor Fatimah <nf.frida@gmail.com>; Nyimas Aisyah <nys.aisyah@yahoo.co.id>; Ila Mardianti <ilamardianti@yahoo.com>; Ahmad Fatih Fudhla <fatih_fudhla@dosen.umaha.ac.id>; Ratih Y. Mayasari <ratihyuniayamasari@student.uns.ac.id>; Sarjana Ana <sarjana.ana@yahoo.com>; St Suwarsono <stsuwarsono@gmail.com>; Nur Syafiqoh <nursyafiqoh16070785028@mhs.unesa.ac.id>; Siti Maghfirotun Amin <sitiamin@unesa.ac.id>; Ismail Mulia Hasibuan <imhasibuan@gmail.com>; Riyadi <yadi_laras@yahoo.com>; Mardiyana <mardiyana@lycos.com>; Siti M Amin <amin3105@yahoo.com>; Bambang Supriadi <bambangsupriadi.fkip@unej.ac.id>; Subanji Subanji <subanjimat@yahoo.co.id>; Susilo Wati <susilowati.maths@gmail.com>; Jaka Fadlin <jakafadlin16070785045@mhs.unesa.ac.id>; Muhammad Hasbi Ash-Shiddieqy <hidupcumasekali@student.uns.ac.id>; Asih Ciptaningtyas <asihche25@gmail.com>; Imam Setiadi Putra <imamsetiadi44@gmail.com>; Supama Supama <supama@ugm.ac.id>; Rissa Martiana <rissameyriana@gmail.com>; Yusuf Setiawan <yusuf.11as12y13@gmail.com>; Hasanuddin Alhabib <hasanuddin.alhabib@gmail.com>; Della Anggraini <dellaramandha@gmail.com>; Supari Supari <supari.bmg@gmail.com>; Muhammad Muzaini <ucha.2610@gmail.com>; Asep Rosadi <aseprosadi@mhs.unesa.ac.id>; Zainur Rasid Ridlo <zainur.fkip@unej.ac.id>; Ade Restu Pratama <ade.restu@student.uns.ac.id>; Depi Puspita Arum <depi.arum@gmail.com>; Arika Indah Kristiana <arikakristiana@gmail.com>; Muhammad Ikhsan Setiawan <ikhsan.setiawan@narotama.ac.id>; Yusep Cus Angkoso <joe_choose@yahoo.com>; Arista Nur Jannah Ar <arista.hikaru64@gmail.com>; Yanti Ekasari <warlock.eka92@gmail.com>; Mohammad Tohir <tohir.unej@gmail.com>; Isnaini Rosyida <iisnaini@gmail.com>; Shanty Galuh Perdanawati <shanty.galuh93@gmail.com>; M. Eris Isthoriq Al Amin <m.amin16070785049@mhs.unesa.ac.id>; Ikhsan Abdul Latif <al_ikhsan@student.uns.ac.id>; Alexander Shepeta <shepeta@aenet.ru>; Rismawati Ramdani <rismawatiramdani@gmail.com>; Wahyu T. Budianto <wahyutri25@gmail.com>; Nyimas Aisyah <nys_aisyah@yahoo.com>; Ruslimin A <ruslimin_a@yahoo.com>; Arif Widayanto <arifwidayanto23@gmail.com>; Agung Lukito <agunglukito@unesa.ac.id>; Robert Setiawan <robertsetiawanp@gmail.com>; Widha Sunarno <widhasunarno@staff.uns.ac.id>; Umi Farihah <u_farihah@yahoo.com>; Sri Nurdiani <nurdiani@ipb.ac.id>; Ahmad Akrom Nur Fuqoha <ahmadakrom001@gmail.com>; Gysberth Maurits Wattimena <mauritswattimena@gmail.com>; Dewi Retno Sari Saputro <dewiretnoss@staff.uns.ac.id>; Iwan Setiawan <gilang_setiawan54@yahoo.com>; Isnandar Slamet <isnandar06@yahoo.com>; Admizal Nazki <adnaz@rocketmail.com>; Saib Suwilo <saib@usu.ac.id>; Liliek Susilowati <lilik-s@fst.unair.ac.id>; Mardiyana <mardiyana@staff.uns.ac.id>; Loviga Denny Pratama <loviga.denny2016@student.uny.ac.id>; Abdul R. Taufik <taufik_abdulrachman@yahoo.com>; Siti Khabibah <sitikhreibah@unesa.ac.id>; Aeri Rachmad <aery_r@yahoo.com>; Rahma Febriyanti <rahmafebriyanti16070785041@mhs.unesa.ac.id>; Alexander Sorokin <ultramagnus88@gmail.com>; Yanuar Nurdiansyah <yanuar_pssi@unej.ac.id>; Budi Usodo <budi_usodo@yahoo.com>; Mardiningsih Mardiningsih <mardiningsih.math@gmail.com>; Masriyah Masriyah <masriyah@unesa.ac.id>; Srihandono Budi Prastowo <srihandono.fkip@unej.ac.id>; A Suparmi <soeparmi@staff.uns.ac.id>; Suidah Nur Aini Aziz <suidahnurainiez@gmail.com>; Sri Sri Subanti <sri_subanti@yahoo.com>; Yudha Herlambang C.P <yudhahimasif@gmail.com>; Laila Fitriana <lailafitriana_fkip@staff.uns.ac.id>; Sri Subanti <subanti@mipa.uns.ac.id>; Cintia Agtasia Putri <cintiaagtasiaputri@gmail.com>; Saladin Uttunggadewa <s_uttinggadewa@math.itb.ac.id>; Cynthia Dhevy Retno Palupi <cynthia.dhevy13@mhs.uinjkt.ac.id>; Widodo Widodo <widodo_mathugm@yahoo.com>; La Misu - <lamisuhamid@yahoo.co.id>; I Ketut Budayasa <iketutbudayasa@yahoo.com>; Kartika Fithriasari <kartikafithriasari@gmail.com>; Abdul Fahman Lupojo <abdul.fahman.lupojo@yahoo.com>; A.N.M. Salman <msalman@math.itb.ac.id>; Sawaludin Nasution <sawal@usu.ac.id>; Kristianus Viktor Pantaleon <christianvictor1979@gmail.com>; Windi Eka Yulia Retnani <windi.ilkom@unej.ac.id>; Ridho Alfarisi <alfarisi38@gmail.com>; Niyan Fajar Kusuma <niyankusuma@gmail.com>; Riza Yulianto <yuliantoriza48@gmail.com>; Diari Indriati <diari.indri@yahoo.co.id>; Resy Nirawati <resynirawaty@gmail.com>; Harmerita <harmerita@yahoo.com>; Alfian Futuhul Hadi <afhadi@gmail.com>; Hafidhyah D Wahyuna <dwhafidhyah@gmail.com>; Wanda Eka Jayanti <wandaekajayantih@yahoo.co.id>; Lela Nur Safrida <lelanurs@unej.ac.id>; Rafiantika M Prihandini <rafiantikap@gmail.com>; Umi Chotimah <hjumich@gmail.com>; Ni Putu Kartika Sari <nisari16070785005@mhs.unesa.ac.id>; Yessy Vita Oktaviana <yessyvitaoktaviana@gmail.com>; Yusuf Hartono <y.hartono@yahoo.com>; Ika Hesti Agustin <ikahestiagustin@gmail.com>; Yusuf Fuad <yusuffuad@unesa.ac.id>; Dwi Juniatyi <dwi_juniati@yahoo.com>; Utomo Utomo <utomo@student.uns.ac.id>; Ardhasena Sopaheluwakan <ardhasena@bmkg.go.id>; Yusnidar Yusuf <yusnidar_yusuf@yahoo.co.id>; Mohammad Hasan <hasan@unej.ac.id>; Arista Wibowo <aristawibowo0@gmail.com>; Abi Suwito <abi.fkip@unej.ac.id>; Lutvia Citra Ramadhani <lutviacitraramadhani19@gmail.com>; Mohammad Rofiq <mohammadrofiq@mhs.unesa.ac.id>; Mulya Gusman <mgusman1974@gmail.com>; Zainal Abidin <zainal.abidin.phs@gmail.com>; Budiyono <budiyono53@yahoo.com>; Arwanto Arwanto <adearwan49@gmail.com>;

Muh. Barid Nizarudin Wajdi <baridnizar84@gmail.com>; Ika Fitriyatul Mukaromah <ikafitriya99@gmail.com>; Farikah Hanum <hanumfarikah2@gmail.com>; Puspandam Katias <puspandam@unusa.ac.id>; Milia Putri <putrimilia01@gmail.com>; Muhammad Assegaf Baalwi <assegafmuhammad22@gmail.com>; Ikrar Pramudya <ikrarpromudya@staff.uns.ac.id>; Bagus Juliyaanto <bagus2780@gmail.com>; Yudhi Lastiasih <yudhi.lastiasih@gmail.com>; Munakip Munakip <pekkepek.ful@gmail.com>; Robiatul Adawiyah <robiatul@unej.ac.id>; Ikhlas P Sandy <ikhlas.ps@gmail.com>; Siti Ma'Rifatin <siti.marifatin94@gmail.com>; Ika Hesti Agustin <hestyarin@gmail.com>; Hobri Hobri <hobri.fkip@unej.ac.id>; Emilia Hesti Emil <emiliahesti@ymail.com>; Hasih Pratiwi <hasihpratiwi@ymail.com>; Wahyu Lestari <lestaripratama90@gmail.com>; Meryansumayeka <meryansumayeka@yahoo.com>; Intan Permatasari <intanentung@gmail.com>; Diksy Media Firmansyah <next.rasmus@gmail.com>; Nurul Fadhilah <nurul_fadhiyah@yahoo.com>; Fendy Septyanto <fendy.septyanto41@sci.ui.ac.id>; Sri Handono Budi Prastowo <srihandono94@gmail.com>; Anggik Yulianto <anggik3006@gmail.com>; Indra Adhitama <indranisa69@gmail.com>; Mohamad Nazri Husin <nazri.husin@umt.edu.my>; Retna Kristiana <retna.kristiana@mercubuana.ac.id>; Abdurrasyid . <rasyid@sttpln.ac.id>; Zainal <zainalle84@gmail.com>; Devie Rosa Anamisa <devros_gress@yahoo.com>; Helmi Rahmawati <helmirahmawati18@gmail.com>; I Ketut Budayasa <ketutbudayasa@unesa.ac.id>; Alfian Futuhul Hadi <afhadi@unej.ac.id>; Fitakhul Inayah <fitakhulinayah@mhs.unesa.ac.id>; Rooselyna Ekawati <rooselynaekawati@unesa.ac.id>; Atok Zulijanto Zuljanto <atokzuljanto@ugm.ac.id>; Mohammad Zulfi <mohammadzulfi94@yahoo.com>; Ika Setyana <ikasetyana1@gmail.com>; Hilda Assiyatur <hilda@math.itb.ac.id>; Sinta Nur Rizqi Listanti <sintanurrizqi95@gmail.com>; Gama Wisnu Fajarianto <gamawisnuf@unej.ac.id>; Slamin Slamin <slamin@unej.ac.id>; Edy Tri Baskoro <ebaskoro@math.itb.ac.id>; Mohammad Imam Utomo <m.i.utoyo@fst.unair.ac.id>; Budiyono <budiyono@yahoo.com>; Diana Purwita Sari <diana.witasari94@gmail.com>; Riki Ruli Afandi S <riki.ruli@sttpln.ac.id>; Ikrar Pramudya <ikrarpromudya@yahoo.com.sg>; Dian Anggraeni <dian_a.fmipa@unej.ac.id>; Roro Rasi Putra <putra.roro21@gmail.com>; Rokhana A Solekhah <rosasolekhah@gmail.com>; Basuki Widodo <b_widodo@matematika.its.ac.id>; Dinita Rahmalia <dinitarahmalia@gmail.com>; Hari Sumardi <arie_gundul@rocketmail.com>; Kuncahyaing Santoso <zaicha.ria22@gmail.com>; Mega Teguh Budiarto <megatbudiarto@yahoo.com>; Trapsilo Prihandono <trapsilo.fkip@unej.ac.id>; Imam Sujadi <imamsujadi@ymail.com>; Mohammad Hasan <hasan@mipa.unej.ac.id>; Samsul Bahri <samsulbahri96.sb57@gmail.com>; Raden Sulaiman <sulaimanraden@yahoo.com>; Denis Fidita Karya <denisfk@unusa.ac.id>; Bambang Supriadi <bambangsscmsc@gmail.com>; Ermita Rizky Albirri <ermitara@unej.ac.id>; Pradnyo Wijayanti <pradnyowijayanti@unesa.ac.id>; Syahriol Sitorus <syahriol@usu.ac.id>; Agus Handoko <agushandoko001@gmail.com>; Rahmad Hidayat <rhhadisubroto@gmail.com>; Irawan Hadi Adi <irawanhadidi07@yahoo.com>; Siti Nurohmah <zuhriena@gmail.com>; Hariratuz Zulfa <hariratuz@yahoo.com>; Chairul Imron <imron_its@matematika.its.ac.id>; Yanne Irene <yanne.irene@uinjkt.ac.id>; Ermita Rizky Albirri <mitalbi@sci.ui.ac.id>; Isnandar Slamet <isnandarslamet@staff.uns.ac.id>; Ikrar Pramudya <ikrarpromudya@yahoo.com>; Surjono Surjkusumo <surjono_kusumo@yahoo.co.id>; Bagas Riantono <bagas.riantono@gmail.com>; Swastika Andini <andini08@yahoo.com>; Tri Atmojo Kusmayadi <trikusma@uns.ac.id>; Sri Subanti <sri_subanti@yahoo.co.id>; Ahmad Kamsyakawuni <kamsyakawuni@gmail.com>; Miftahul Hasanah <hasanahm341@gmail.com>; Dafik Dafik <d.dafik@gmail.com>; Konstantine Denny Pareira Meke <dennyz.pareira@gmail.com>; Mike Prastuti <mike_p@statistika.its.ac.id>; Sri Retnowati <rrara410@gmail.com>; Maifulinda Fatra <maifulinda.fatra@uinjkt.ac.id>; M. Zainudin <zain.akhmad@yahoo.com>; Adree Octova <adree.octova@gmail.com>; Wahyudin <wahyudin_mat@yahoo.com>; Febrian Nurdyani <febiannurdyani@gmail.com>; Pratnya Paramitha Oktaviana <paramitha.oktaviana@gmail.com>; Tatag Y.E Siswono <tatagsiswono@unesa.ac.id>; Hasnawati - <hasna_fkip@yahoo.co.id>; Ni'Matur Rohmah <justniksma20@gmail.com>; Suhadi Wido Saputro <codesherly_aptx98@yahoo.co.uk>; Wardatus Syarifah <syarifah13.ws@gmail.com>; Vina Armilia Suganda <vinaamilia@fkip.unsri.ac.id>; Dewi Retno Sari S <dewi_rss@yahoo.com>; Dipo Aldila <aldiladipo@sci.ui.ac.id>; Rezzy Eko Caraka <rezzyekocaraka@gmail.com>; Ubay Dillah <scb.surabaya@gmail.com>

Terkirim: Jumat, 27 April 2018 22.13.18 WIB

Judul: JOP for ICCGANT

Dear All authors

We are pleased to inform you that JOP: Conference series for ICCGANT has been available **ONLINE**. Please visit JOP website: <http://iopscience.iop.org/issue/1742-6596/1008/1>

On behalf of the organising committee, we would like to thank to all authors who participated in our First International Conference of Combinatorics, Graph Theory and Network Topology 2017. We are looking forward to seeing you in our next conference "ICCGANT 2018"

Cheers
Prof. Dafik

-- Dafik
d.dafik@gmail.com

d.dafik@unej.ac.id

Scopus Author ID: 24281263600

Professor

Dean of FKIP the University of Jember

Combinatorics, Graph Theory and Network Topology (CGANT) Research Group

Department of Mathematics Education

JL. Kalimantan no 37 Kampus Tegal Boto

Jember 68121- Indonesia