Teachers’ perception of media tools in mathematics learning at senior high school

M Mukhni*, M Mirna1, K Khairani1,
1 Mathematics Department, Universitas Negeri Padang, Padang, Indonesia

*corresponding author: mukhniajoo@yahoo.co.id

Abstract. Media tools are always been believed can increase students’ learning outcomes. This study is to describe mathematics teachers’ perspective of media tools in mathematics learning. Instrument is a questionnaire about media tools in Likert scale. Questionnaire was delivered to 35 mathematics teachers in Padang Pariaman. The result shows that mathematics teachers have good perspective of media tools in mathematics learning at senor high school but the frequency of using it is still low.

1. Introduction
Mathematics is well known as abstract subject in Indonesia education curricula. It always becomes subject that students feel hard to understand. Many students think that mathematics is not been rarely used in their daily life [1]. But, in fact, many application of mathematics happen in real life. For a long time, mathematics is has been felt abstract because it has been learned as calculation subject not as application subject. Students just memorize the formula to solve mathematics problems without understand mathematics concepts [2-3]. In many school, mathematics learning is done by teacher centered [4]. Mathematics is learned by using whiteboard and its marker only. There is no other media to bring out the concept of mathematics to real life. As consequence, mathematics becomes abstract subject and students feel difficult to understand it.

In order to bring concept mathematics to real life application, there is necessary to use media tools in mathematics learning. Implementation of media tools in mathematics learning have been proven can increase learning quality. It is effective to increase students’ achievement [5]. With media tools, students can understand mathematics concept better than not. The concept of mathematics is felt more realistic and close to them, so it is easy to understand. The implementation of media also can increase students’ self-efficacy and motivation in mathematics learning [6-7]. With media tools, students find that mathematics learning is interesting and it make them motivated. It also make students learn independently and not depended to teacher because teacher just has position as facilitator. In learning with media tools, students learn in teamwork and they need to communicate their idea to each other. As result, in collaboration learning, using media tools also can strengthen students’ team works and their communication skills [7-8]. The implementation of media tools in mathematics learning is not only can increase students’ achievement, it also can correct students’ misconception and it is effective to students with low prior knowledge to help them understanding mathematics concepts [8-9]. Integrating media tools based on technology is necessary in future education [10].

The benefit of using media tools in mathematics learning have been proven and it also been believed of many people in education world. Teachers in Kuala Lumpur, Malaysia, believe that using
media tools, such as ICT, in classroom have better learning outcomes than traditional instruction [11]. The implementation of ICT helps teachers to bring out the concepts of mathematics in interesting ways, realistic and close to students’ environment. But, the implementation of media tools is not supported by school thoroughly. Teachers feel that school does not provided enough ICT nor it is not in good condition. It makes them difficult to implement ICT learning in classroom [11]. In Trinidad and Tobago, there had been implement technology in mathematics learning. It’s finding is teachers has new perspective about teaching and learning in classroom with technology. They feel that the relation between mathematics problem and real-life experience can be obtained by using media technology [12]. In Tabuk, Saudi Arabia, teachers have used social media as one of media tools in mathematics learning and they believe that it can give positive effect to learning outcomes [13]. The using of social media helps teachers to give information in more free way, anytime and anywhere. It also can facilitates students to give their response and answer in more unimpeded form.

From explanation above, it is shown the benefit of implementing media tools in mathematics learning and also the obstacle that block it. So, how Indonesia teachers’ perception about using media tools in mathematics learning and how school’s supports? This research was done to understand it.

2. Method
The method was descriptive research with qualitative approach. This study used questionnaire as its instrument to collect data from research’s objects. Questionnaire was consists of six aspects. That was belief about the importance of media tools in mathematics learning; frequency of using media tools in classroom; self-assessment of levels of computer proficiency; self-assessment of levels of teaching aid proficiency; computer resources, teaching aid and support at teachers’ school; and belief about effect of using media tools in the classroom. Every aspect has one positive statement and one negative statement. Overall, it has 12 statements in questionnaire.

The questionnaire was delivered to 35 mathematics teacher of senior high school at Padang Pariaman, West Sumatera, Indonesia. Their teaching experience was about 3 years to 32 years. The questionnaire was analyzed by using Likert scale in 11 point interval from 1 to 11. This research used 11 point interval to increase generalizability social work [14].

3. Result and discussion
Every aspects questionnaire was analyzed by using Likert scale. Result of analyzing is show in table below.

| Table 1. Result of analyzing questionnaire |
|------------------------------------------|
| Aspect                                | Agreement percentage of positive statement | Disagreement percentage of negative statement |
| Belief about the importance of media tools in mathematics learning | 94.29 | 85.29 |
| Frequency of using media tools in classroom | 42.86 | 60 |
| Self-assessment of levels of computer proficiency | 36.67 | 52.94 |
| Self-assessment of levels of teaching aid proficiency | 57.58 | 82.86 |
| Computer resources, teaching aid and support at teachers’ school | 85.29 | 48.57 |
| Belief about effect of using media tools in the classroom | 88.24 | 68.57 |

The explanation for every aspect is described as below.

3.1. Belief about the importance of media tools in mathematics learning
In this aspect, there were two statements. The positive statement was, “I believe that using media tools can increase learning quality in the classroom”. And the negative statement was “I think that using
media tools cannot increase students’ mathematics understanding”. In Table 1, data analysis from this aspect gets 94.29% teachers agree to the first statement and 85.29% disagree to the second statement. The difference between two statements about 9% or about 3 teachers give different response from the same aspects. The different response from teachers can because the careless in reading statement. But, the difference is no significant. It can be concluded that most teachers have strong belief about the importance of media tools in mathematics learning.

Teachers’ responses also can be divided into four categories based on teaching experience. Responses from teachers who have teaching experience below 10 years are they show strong belief about the importance of media tools. From teachers who have teaching experience between 10-20 years give responses that they also show strong belief about the importance of media tools. Teachers who have teaching experience between 20-30 years give responses that they show strong belief about the importance of media tools. The last, teachers have teaching experience more than 30 years give responses that they also believe the importance of media tools in mathematics learning.

3.2. Frequency of using media tools in the classroom
In this aspect, the positive statement was “I always use media tools in mathematics learning”. And the negative statement was “I only bring textbook and whiteboard marker to classroom”. In Table 1, the percentage from data analysis is 42.86% teachers agree to the first statement and 60% teachers disagree to the second statement. The difference from two statements is 17.14% or about 6 teachers give different response from the same aspects. The difference is significant, but it can be due to many factors, such as careless in reading. But, from that analysis, it can be concluded that teachers use media tools in mathematics learning at the classroom but not very often.

Responses from teachers who have teaching experience below 10 years are they often use media tools in mathematics learning. From teachers who have teaching experience between 10-20 years give responses that they rarely use media tools in mathematics learning. Teachers who have teaching experience between 20-30 years give responses that they rarely use media tools in mathematics learning. The last, teachers have teaching experience more than 30 years give responses that they also that they rarely use media tools.

3.3. Self-assessment about computer proficiency
The positive statement in this aspect was “Beside PowerPoint, I can use other software computer in mathematics learning at classroom”. The negative statement was “I only can use PowerPoint in mathematics learning at classroom”. In Table 1, the percentage that is gotten by data analysis is 36.67% for first statement and 52.94% for second statement. The difference between them is 16.27% or about 5 teachers give different responses. The difference is also significant but it can be due to careless in reading. But, it can be concluded that teachers don’t have good computer proficiency.

Responses from teachers who have teaching experience below 10 years are they have good computer proficiency, besides power point, they can use Macromedia Flash and Frezzi. From teachers who have teaching experience between 10-20 years give responses that they do not have good computer proficiency but at least they can use Power point for media tools in mathematics learning. Teachers who have teaching experience between 20-30 years give responses that they do not have good computer proficiency. It is found that some of teachers cannot use Power point. And teachers who have teaching experience more than 30 years give responses that they also do not have good computer proficiency.

3.4. Self-assessment about teaching aid proficiency
The positive statement in this aspect was, “I always use teaching aid in mathematics learning”. And the negative statement was, “I never use teaching aid in mathematics learning”. In Table 1, data analysis from this aspect gets 57.58% for first statement and 82.86% for second statement. The
difference between them is 25.28% or about 9 teachers give different response from the same aspects. But, it can give image that teachers have good self-assessment about teaching aid proficiency.

Responses from teachers who have teaching experience below 10 years are they have good proficiency in basic teaching aids. From teachers who have teaching experience between 10-20 years give responses that they also have good proficiency in basic teaching aids. Teachers who have teaching experience between 20-30 years give responses that they have good teaching aids proficiency. And teachers who have teaching experience more than 30 years give responses that they also that they have good proficiency in basic teaching aids.

3.5. Computer resources, teaching aid and support at teachers’ school
The positive statement was, “My school provides learning facility that can be used as media tools”. And the negative statement was “My school only provides textbook and whiteboard maker as preparation to teach at classroom”. In Table 1, data analysis gets percentage 85.29% teachers agree for first statement and 48.57% teachers disagree for second statement. The difference between them is about 36.72% or about 13 teachers give different response. Both of responses have contradictive meaning so it is difficult to take conclusion for all teachers.

But, from teachers response based on teaching experience, it shows that responses from teachers who have teaching experience below 10 years are they believe that their schools give good facilities to teaching mathematics learning, such as projector. From teachers who have teaching experience between 10-20 years give responses that they also believe that their schools give good facilities to teaching mathematics but some teachers has contradictive responses. They feel schools don’t facilitated them with good learning tools and resource. Responses from teachers who have teaching experience between 20-30 years give responses that they believe that their schools give good facilities to teaching mathematics but they do not use it. They just use books and whiteboard marker that facilitated by schools. And responses from teachers who have teaching experience more than 30 years give responses that same with teachers who have teaching experience between 10-20 years.

3.6. Belief about effect of using media tools in classroom
The positive statement in this aspect was, “When I used media tools at classroom, students are more motivated to study mathematics”. And the negative statement was “Students are less motivated to study mathematics when I used media tools”. In Table 1, data analysis gets percentages 88.24% for agree to first statement and 68.57% for disagree to second statement. The difference between them is 19.67% or about 7 teachers give different response from the same aspect. But, it can give image that teachers have good belief about effect of using media tools in the classroom.

Responses from teachers who have teaching experience below 10 years are they believe that media tools can give good effect in mathematics learning. From teachers who have teaching experience between 10-20 years give responses that some of teachers also believe that media tools can give good effect in mathematics learning but some of them do not believe. They think media tools cannot motivate and increase students’ achievement. Responses from teachers who have teaching experience between 20-30 years give responses that they believe that media tools can give good effect in mathematics learning. And teachers who have teaching experience more than 30 years give responses that they also believe that media tools can give good effect in mathematics learning.

4. Conclusion
Result of this research shows that teachers has good perception about media tools in mathematics learning. They believe that media tools can improve mathematics learning quality and it can increase mathematics learning outcomes. But, the frequency of using media tools in classroom is still low and many teachers do not have computer proficiency that is needed in future learning based on 4th industry revolution. So, teachers need to improve their skill in computer specially and another media tools.
References

[1] Gebremichael A T 2014 Students’ perceptions about the relevance of mathematics to other school subjects Proceedings of the Frontiers in Mathematics and Science Education Research Conference Famagusta North Cyprus p 71-78

[2] Khairani, Mukhni and Aini F Q 2018 Problem analysis of calculus learning in higher education Advances in Social Science, Education and Humanities Research (ASSEHR) 285 75-78

[3] Mirna M 2018 Error analysis of students in mathematics department to learn plane geometry IOP Conf. Series: Journal of Physics: Conf. Series 335(2018) 012116

[4] Khairani, Amry Z and Rosalina 2018 Upaya meningkatkan kemampuan berpikir kritis siswa kelas X melalui pembelajaran kooperatif tipe numbered head together Jurnal Eksakta Pendidikan 2 85-92

[5] Rajendra I M and Sudana I M 2018 The influence of interactive multimedia technology to enhance students achievement on practice skills mechanical technology IOP Conf. Series: Journal of Physics: Conf. Series 953(2018) 012104

[6] Chun-Ming H, Iwen H and Gwo-Jen H 2014 Effect of digital game-based learning on students’ self-efficacy, motivation, anxiety and achievement in learning mathematics Journal of Computer and Education 1 151-166

[7] Neo M and Neo T-K 2009 Engaging students in multimedia mediated constructivist learning-students perception Journal Educational Technology & Society 12 254-266

[8] Karahan E, Canbazoglu-Bilici S and Unal A 2015 Integration of media design processes in science, technology, engineering and mathematics (STEM) education Eurasian Journal of Educational Research 60 221-240

[9] McLaren B M, Adams D, Mayer R E and Forlizzi J 2017 A Computer based game that promotes mathematics learning more than conventional approach International Journal of Game-Based Learning. 7

[10] Khairani, Mukhni and Aini F Q 2018 Pembelajaran berbasis STEM dalam perkuliahan perguruan tinggi Uninus Journal of Mathematics Education and Science 3 104-111

[11] Ghavitkar S and Rosdy W A W 2015 Teaching and learning with technology : effectiveness of ICT integration in schools International Journal of Research in Education and Science (IJRES) 1 175-191

[12] Warner S and Kaur A 2017 The perception of teacher and students of 21st century mathematical instructional model International Electronic Journal of Mathematics Education e-issn: 1306-3030. 2017 12 193-215

[13] Albalawali A S 2017 Mathematics teachers’ perception of using social media in their teaching, in Tabuk, Saudi Arabia International Electronic Journal of Mathematics Education e-issn: 1306-3030 12 111-131

[14] Huiping Wu and Shing-On Leung 2017 Can Likert Scales be Treated as Interval Scales?—A Simulation Study, Journal of Social Service Research 43 527-532