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Mathematics teacher competency analysis during online learning

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Abstract

This study aims to find out where the difficulty of teacher competence is when implementing online mathematics materials. When online learning mathematics material, many students complain and get low learning outcomes. There are 92% of students have difficulty learning mathematics online. The basis of this problem needs to be analyzed where the difficulty of mathematics teacher competence in online learning. Data collection techniques with observations and shared instruments. The analysis is done by presenting the data, reducing it, and drawing conclusions. Results, 1) Online learning with the 2013 curriculum is still 95%. 2) There is no preparation and only the provision of package books. Student assessment of professional teacher competence 62% disagree and 45% pedagogically disagree, this disagreement is because the module was not prepared by the teacher himself. 3) 57, 14% disagree with the assessment method, the material being tested is more difficult than what is taught, and this is the cause of low learning outcomes. 4) Difficulty operating media, writing symbols, proving, explaining concepts, internet network, and correcting assignments. In conclusion, the difficulty lies in teachers with pedagogical competence with minimal learning aids and professional competence who cannot explain concepts in

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Online Learning; Teacher Competence; Mathematics difficulty; Mathematics Learning

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Title and Abstract

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Research Article

Mathematics teacher competency analysis during online learning

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ABSTRACT

This study aims to find out where the difficulty of teacher competence is when implementing online mathematics materials. When online learning mathematics material, many students complain and get low learning outcomes. There are 92% of students have difficulty learning mathematics online. The basis of this problem needs to be analyzed where the difficulty of mathematics teacher competence in online learning. Data collection techniques with observations and shared instruments. The analysis is done by presenting the data, reducing it, and drawing conclusions. Results, 1) Online learning with the 2013 curriculum is still 95%. 2) There is no preparation and only the provision of package books. Student assessment of professional teacher competence 62% disagree and 45% pedagogically disagree, this disagreement is because the module was not prepared by the teacher himself. 3) 57, 14% disagree with the assessment method, the material being tested is more difficult than what is taught, and this is the cause of low learning outcomes. 4) Difficulty operating media, writing symbols, proving, explaining concepts, internet network, and correcting assignments. In conclusion, the difficulty lies in teachers with pedagogical competence with minimal learning aids and professional competence who cannot explain concepts in the media and are not assisted by self-made modules.

Keywords: Online Learning; Teacher Competence; Mathematics difficulty; Mathematics Learning

1. INTRODUCTION

The purpose of the curriculum is to build the knowledge and character of students in a better direction. Knowledge can be transferred through communication and positive touch between educators and students. This is proven, the 2013 curriculum has succeeded in building the character of students (Doorn & Doorn, 2014). However, this success occurred during the conventional learning process. In 2019 a disease emerged that caused a new problem, namely the Corona virus (Meo et al., 2020). (Nyamnjoh, 2020) With this corona virus disease, making the situation unclear, unclear information has a big enough impact on community activities, especially in the field of education, in this case students and educators. In 2020 the ministry conducted a survey of more than 4000 and the number of respondents came from 34 provinces under the auspices of Indonesia. From the results of the survey, there were as many as 58% of students and students were very burdened during the implementation of the online learning process, 38% of students thought that there was a lack of direction in understanding the lessons given, communication and discussion were lacking between teachers and students. The fluency of conveying the material is the most important problem.

In research conducted by (Lesmana et al., 2020), In the opinion that 62% of students need smooth internet access, this is considered necessary in activities to support the learning process carried out. In general, the ways of communicating and the tools used to support the learning process are readily available and continue to be developed by experts and media experts, which means that the process of implementing online learning is not the cause of the failure of the 2013 curriculum implementation. In this pandemic period is the online method or what is familiarly called online media-based learning ?. The early history of the emergence of the term online in 1980, another understanding that can be known in the world of education is the term e-learning (Belawati & Terbuka, 2021). There are 188 countries around the world that already use online learning methods, such as Google class room learning, schools via television, and independent learning assistance processes through special applications provided by educators. There are many methods of transferring knowledge that can be done, for example Zoom, Slack, Google Meet, Google Classroom and Edu Page, such media can be used to support and become tools in the transfer of knowledge that educators want to convey to students (Basilaia & Kvavadze, 2020).

In Indonesia itself, e-learning learning methods have developed from 2015. However, it must be admitted that the community in its use is still in the low category, especially in the field of education. The process of thinking like this raises

doubts about the applied online learning. Online methods in the field of education are considered not to facilitate the learning process, especially in the field of mathematics which requires an accurate explanation of the concept of a complete problem (Asnawi et al., 2020).

In research conducted by (Asnawi et al., 2020) Shows that in the situation of transitioning the learning implementation process from face-to-face to online methods, from 100% of students 60.5% are of the opinion that they are very ready to use and adapt and are able to use technology as a tool in implementing learning, but there are 59.5% of students who object to tasks given by teacher education to be done at home during learning from their respective places. In this case, the given task resulted in the burden and stress level of students being high, there were around 60% who expressed stress on the given task. The researcher discussed with several teachers using the telephone communication method in the Bekasi area, West Java. The teachers are of the opinion that the distance learning process encounters obstacles and difficulties, both when preparing learning materials and when implementing learning materials.

The teacher also said that the implementation of the learning process carried out during this pandemic was not in accordance with the expectations of the 2013 curriculum which had been carried out face-to-face or conventionally. The teacher honestly reveals that the learning outcomes obtained by students during this pandemic do not guarantee the quality of the learning process. The value given is no longer because it is entirely due to the assessment of conventional indicators but has used non-standard assessment indicators. The influence of the use of online learning technology in Indonesia greatly affects the mentality of students, knowledge and attitudes of students and influences teachers in preparing materials and implementing the curriculum and the objectives of the curriculum itself (Patria et al., 2020).

Another fact was also discovered by (Kuipers et al., 2021). Another fact in the research conducted by SMRC was obtained, in the online learning process during the pandemic in Indonesia 92% of respondents felt many difficulties and obstacles. SMRC researcher, Tati D. Wardi said, respondents who gave responses were people aged 17 years and over. From 100% of the respondents answered, 5% of the learning process is carried out at school and the rest is learning from home. Of the respondents who study online, 92% of people find it difficult. The data implicitly says that learning done from home is not effective. The government in 2020 will conduct a learning process from home. This aims to reduce the increase in the number of people infected with the new virus. By learning from home, the educational process becomes unstructured and not well organized. Mathematics teaching activities are not well conceptualized and not in line with the curriculum.

Whereas the purpose of the mathematics curriculum is to prepare the nation's children to have a good and structured mindset. Mathematics teachers are of the opinion that online learning methods are not appropriate to be used to convey material in mathematics to students. This is contrary to what the students expressed above, that students are ready for online learning but do not want assignments from the teacher. This difference of view needs to be analyzed because there is a cross of opinion between students and educators. Teacher success can be measured from four competencies that have been defined and are standard (Fajar et al., 2018). (Dan et al., 2003) As a teacher, of course, you must be able to achieve the goals of the curriculum.

The goal that must be achieved by the teacher, the first part is the suitability of the competence of educators with the ability to design and prepare all materials that are in line with the curriculum. The second part has three points, namely (a) the teacher must develop a module or arrange material according to the abilities of the students taught by the teacher himself; (b) the government must provide continuous assistance for the smooth learning process; and the last part is (c) strengthening school management and school integrity in carrying out conventional and online learning. Research purposes, 1) To find out how the process of implementing online learning during the Covid pandemic, 2) Knowing how prepared the teacher's competence is, 3) Knowing the teacher's difficulties in preparing the material, 4) Knowing the assessment method used by the teacher when online.

There are two factors that cause difficulties experienced by teachers, namely internal and external. Internal is the lack of motivation in carrying out the profession and obligations as educators to carry out the curriculum (Aulia & Sontani, 2018). In addition to the task of the teacher as a center for student learning, educators take on the role of assessing learning outcomes and facilitating students (Lumbantoruan & Male, 2020). While external actors are teachers who have needs from a conducive and social environment both in carrying out their duties as educators. The needs in question are comfortable work, learning aids provided, feeling needed, respecting opinions and getting help or materially (Lumbantoruan, 2019). Nature of the Learning Process (Tumurun et al., 2016) argues that learning is a process from those who do not know to know, from those who cannot become capable and those who just understand become very proficient. The learning process is also defined as a change in a person's behavior through interaction with other people (Mariati & Sema, 2019).

Learners do not only interact as the main resource in the learning process, but interact with all learning resources. (Yani, 2021) argues that the efforts made in guiding students are one way to develop learning models and methods in accordance with the conditions taught by the teacher. (Sadipun, 2020) Learning is a structure that is interconnected with each other in carrying out a synergy that is expected to achieve the goals achieved. based on (Seminar et al., 2019) the learning process carried out by educators and students is the main goal of what is expected by the curriculum (Handarini & Wulandari, 2020) learning is a structured combination which is divided into human elements, materials, facilities, equipment, and procedures that influence each other to achieve learning objectives.

Teachers who become facilitators in the teaching and learning process are in accordance with the form of curriculum material that has been prepared. Other procedures that must be submitted include schedules, models and methods as well as the media used in the learning process (Qurrotaini et al., n.d.). Procedures influence each other in achieving learning objectives. Teachers who compile learning resources are in accordance with the predetermined curriculum objectives. Other points that must be prepared by educators are schedules, models and methods as well as the media used in the learning process (Irsyad et al., 2020).

Learning objectives (Messakh, 2020). The learning objectives must meet the criteria, namely looking at the conditions and conditions of the environment, for example to see the smooth internet access used when delivering material. Learning objectives can measure student attitudes, assess and be easy to solve problems. Preparation for Learning Implementation (Dasar, 2018). The opinion is that in designing the material for one learning material, there are planning steps in achieving a goal that must be determined (Albertus et al., 2017). Designing methods, strategies, objectives, setting policies, determining programs, procedures and designs based on a schedule that has been prepared every day. All of that is called a collaborative process between teachers and students, both direct interaction using various media and online learning aids. Online World basically has the same idea as e-learning. Adult Learning and Technology Commission Report (On, Commission, & General, 2019) defines e-learning as "instructional content or learning experiences delivered or enabled by electronic technology". Online learning is defined as “a large collection of computers in a network tied together so that multiple users can share their vast resources”. The hope is that after educators and students are more independent in using online technology, online learning can be done en masse (Cholily et al., 2019).

2. RESEARCH METHOD

This the type of research used is descriptive qualitative (Eika et al., 2019). The time and place of the research was carried out at SMA 7, SMA Yadika 11 and SMK 4 Jatirangga, Jati Sampurna, Bekasi City. The research subjects were mathematics teachers in high school. Techniques for collecting direct observation/observation data and distributing instruments in the form of questionnaires to students as supporting data (Setiawan, 2018). Data analysis in this study by presenting data, reducing, drawing conclusions and verifying observational data on the results of student assessments. Conclusions are interpreted into sentence form and present a bar chart of the interpretation results and parallelized by crossing each other (Wolffe et al., 2019).

3. RESULTS AND DISCUSSION

3.1 Results

a. Implementation of the curriculum online learning process during

Based on the 100% of teachers who were observed and interviewed, 95% of teachers in schools were still in the form and the learning process still fully adhered to the K13 curriculum, in the interview session this was absolutely school policy due to delays in information from the government. So that the learning process becomes unstructured and difficult to implement the material.

Table 1. Coding of Research Observation Results

Code	Keywords in Research title	Interpretation
	Readiness	The schools surveyed do not have modules/materials prepared by the teacher themselves, do not have a smooth and supportive internet network, there is no formulation and learning objectives, the learning media used cannot help students understand the material, there is no suitable learning method for the participants. Students, there is no visible assessment, no evaluation is carried out, there is no learning activity plan.
	Difficulty	Difficulty compiling material according to the curriculum, difficulty using models, methods and strategies during implementation, Difficulty operating Google Meet, Zoom media used when delivering material.

Based on the **Table 1** It is clear that the readiness and difficulty of teachers in designing and implementing mathematics materials, there are no modules, methods, assessments and lesson plans (RPP) still adhere to the conventional ones. Meanwhile, in terms of difficulty, it is clearly seen in the difficulties in preparing materials, applying methods, strategies and difficulties in using google meet media.

$$12.\int\left[2x^2\left(3-\frac{1}{x}\right)\right]^3 dx = \text{example}$$

$$U = 3-\frac{1}{x}$$

$$du = \frac{1}{x^2}dx$$

$$dx = x^2 du$$

$$\int 2x^2\, u\, x^2 du$$

$$\int 2x^4\, u\, du = 2x^4\frac{1}{2}u^2 + c$$

$$2x^4\frac{1}{2}(3-\frac{1}{x})^2 + c$$

Figure 1. Observation difficulty writing symbols on google meet media

Computer facilities have been provided by the school to be used by teachers and some students to carry out learning from school. The facilities provided by the school are very helpful for educators and education staff in conducting learning to students and administrative services. The school hopes that with the facilities that have been prepared, the teacher is fully responsible for designing and preparing learning materials and providing monthly reports as a percentage of the person in charge. The form of interaction of the learning process used in schools is with the help of the Google Meet application. In addition, the school requires teachers to use WhatsApp (WA), Google Forms, Google Classroom, Google Drive, Youtube, WA group subjects, in sending assignments

Figure 2. Teacher and Student Interaction

The findings, the teacher does not have the module prepared, the teacher only uses the online version of the textbook. This is according to students feel burdened in learning independently. As a result, students only study textbooks and find many difficulties. Students give a professional competency assessment of 62%. The textbook provided by the teacher is less effective in building students' thinking power, so that the interaction in terms of discussing the material taught by the teacher is not in accordance with the expected learning outcomes. The students admitted that during the exam, students got answers from the internet. During the learning process, the teacher is not seen using models and strategies. This leaves students only listening to the teacher via Google Meet without two-way interaction or discussion. The learning process looks ineffective. The students provide responses and assessments of competence.

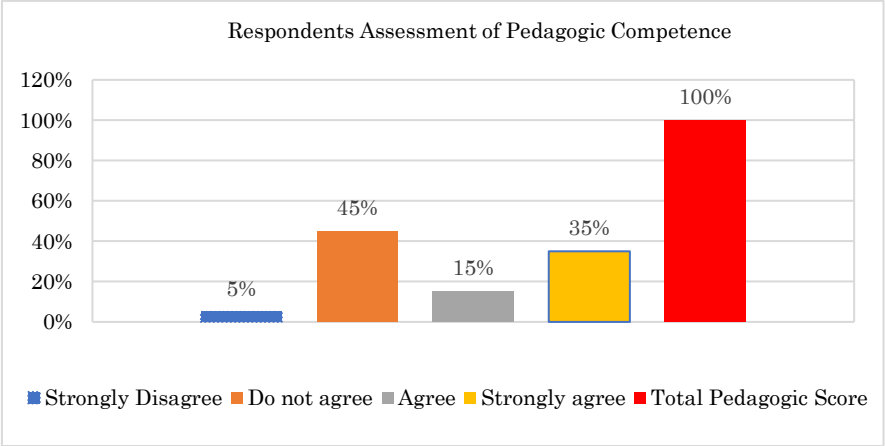

Figure 3. Percentage of Pedagogic Competence

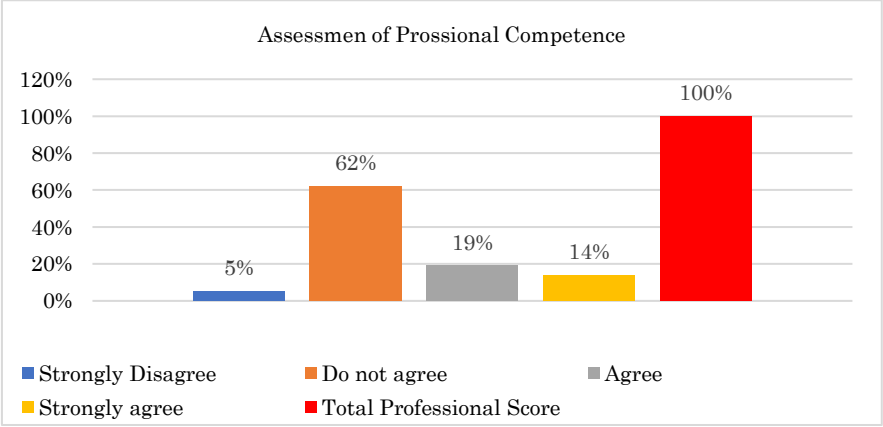

Figure 4. Indicators Professional Competency

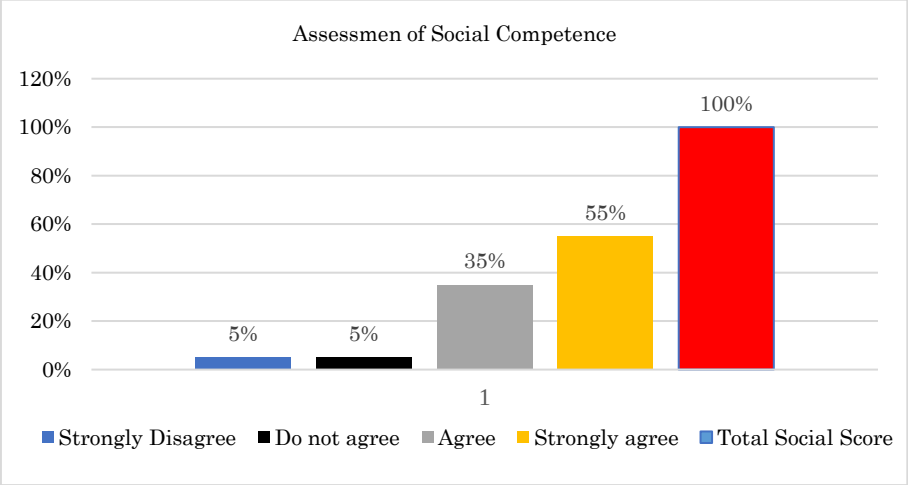

Figure 5. Percentage of Personality Competence

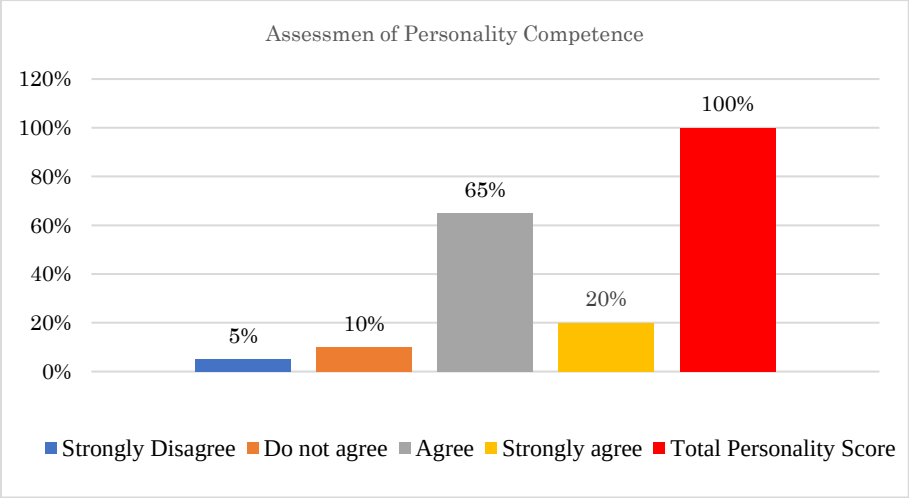

Figure 6. Percentage of Social Competency Indicators

b. The form of teacher readiness in designing learning during the pandemic

Based on the observations, the teacher only prepares the textbook which is the main source. The book given adopts the book used during conventional learning (https://bit.ly/3uKYUwE). The form of learning carried out still adopts the conventional way. Books used online cannot construct and attract students' interest in independent study. The methods and strategies used are still adopting the old ones. The researcher asked the students, what kind of material was expected? Students answer modules that are easy to understand and compiled by the teacher himself, the book given cannot be the main source. Based on the opinions of these students, the researchers interpreted that the mathematical logic concepts understood by students were not the same as the thinking concepts of teachers who used textbooks as the main basis for achieving success. In theory, one of the successes of an educator is compiling his own material by paying attention to the basic abilities he teaches. From the results of interviews with teachers regarding the teacher's view of the online learning process is very ineffective. In this case, it is proven that the teacher's recognition is in line with the opinions of students. As evidenced by the absence of material prepared by the teacher himself, resulting in difficulties and not attracting the interest of students to want to learn.

c. Teacher assessment methods in measuring the success of the online learning process

In online learning, the assessment method used by teachers in measuring the success of students during the pandemic already exists. The assessment is contained in the RPP. However, because the lesson plan still adopts the conventional which refers to cognitive, affective and psychomotor abilities, it causes difficulties in implementing it. In the lesson plans the teacher must give assignments for each material and the teacher must assess the assignments. While the fact is, teachers have difficulty checking assignments online and it takes a long time (https://bit.ly/3LBuPGt). The teacher's assessment method so far has received responses from students by giving scores.

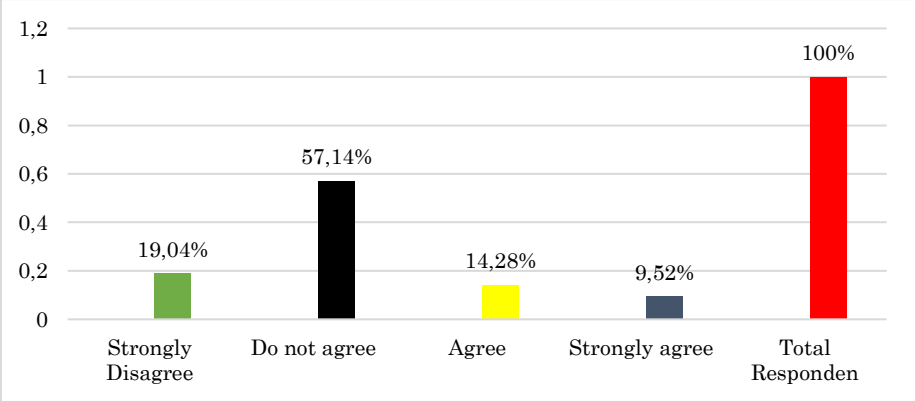

Figure 7. Percentage of Assessment Instruments

There are 19, 04% strongly disagree and 57, 14% disagree. This becomes an evaluation material for teachers not to use conventional assessors when implementing conventional learning. As a result, students to get good results, rely on the internet to answer exam questions given by the teacher.

d. Difficulties in implementing the 2013 Curriculum during the Covid 19 pandemic

The theory says that there are two factors of difficulty, namely factors from oneself and from outside. From the results of observations, interviews and student assessments, it looks like they overlap. Teachers during the implementation of the learning process have many difficulties operating the google meet application which is used as a media tool in the mathematics learning process. Difficulty in applying learning models and strategies, explaining concepts, proving formulas, and difficulties in writing symbols used in solving problems. From Figure 1, the teacher has difficulty writing symbols in the media used. Google meet media is not facilitated with mathematical symbols. The books provided by the teacher cannot stimulate students to learn independently, as a result, students ask a lot of questions. This results in the learning process being unstructured and spending the time that has been arranged in learning mathematics. The findings were also that during the learning process, there was no visible interaction from both sides. Learning is carried out only in one direction, namely the teacher explains without any discussion formed by fellow students. It was seen that the students were bored listening and only read the textbook given by the teacher. Students also provide an assessment of the learning process carried out by the teacher.

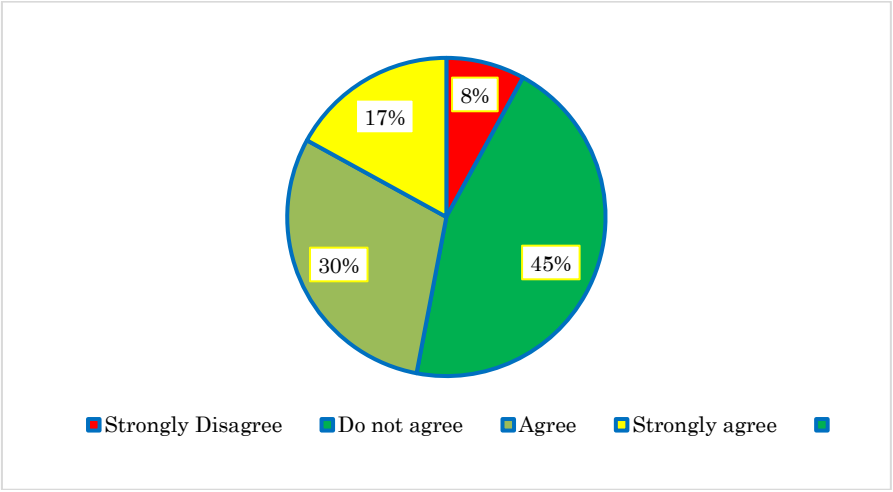

Figure 8. Percentage of Implementation

4. CONCLUSION

The school, teachers, educators and students in using Google meet media for the implementation of learning implementation. In addition to google meet, educators use Whatsapp media, google classroom as a medium for collecting assignments. However, in fact, there are still difficulties in achieving the objectives and new problems have emerged during implementation. Textbooks cannot be the main source of online learning. Difficulty in every learning process takes place, the teacher has difficulty explaining, writing symbols, providing mathematical concepts from the material. To overcome the problem of difficulty, students expect the material to be compiled into modules prepared by the teacher himself. The modules compiled include methods, learning strategies and adapt them to the basic abilities of the students being taught. Students gave an assessment of teacher competence, namely professional, 62% disagreed and 5% strongly disagreed and 33% agreed and strongly agreed. While the assessment of pedagogic competence, 45% disagree, 5% strongly disagree 50% agree and strongly agree. Students also gave the method of assessment of learning outcomes with 57, 14% disagree and 19, 04%

strongly disagree http and the rest fall into the category agree and strongly agree. Of all the assessments given by students only with penguin teachers who have difficulty in professional and pedagogic competence when learning online. There are 45% of students who do not agree with the implementation of the conventional 2013 curriculum when online and expect the new curriculum to be implemented online. The positive thing is the social competence of teachers, 55% of students strongly agree and 35% agree on the social competence of teachers.

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AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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