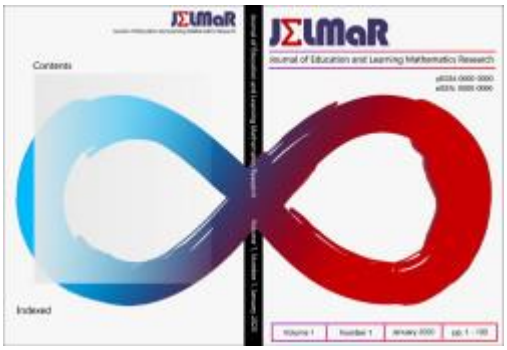

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Description of Difficulty of Semester VII Students of Mathematics Education Study Program in Complex Analysis Course

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Abstract: *The purpose of this research is to find out how the students' mastery and difficulty lies in direct objects and indirect objects in complex variables courses. Two mathematical indicators are direct object and indirect object. The direct object is related to understanding Facts (definitions), Concepts (ideas, thought patterns), Skills (general and specific skills), and Principles (Formulas, theorems and postulates). While indirect objects are media and tools. In 2014/2015 students in the Complex Variables course received UTS, there were 13% good scores and 77% less good. Another fact is that in 2019/2020, 30 students took complex variables, there were 50% less good and 15 others were of sufficient value, good and very good. Of the 50% who were not good, took remedial and only 10 people graduated, the remaining 5 people did not pass and had to repeat the next semester. The research method used is descriptive qualitative. Techniques to get data from observation, interviews and documentation. The analysis technique is to present, reduce and draw conclusions. The results of the analysis, observation, interviews and documentation intersect and show the location of the dominant difficulty in the direct object, 100% of sources think that the mastery of facts is weak (Definitions), 85.71% of concepts and skills, and 57.14% of principles. Difficulty connecting old material with new material is due to weak mastery of facts. In observation, a new problem arises when writing symbols on the media used. The ability of students to write symbols for complex variables makes the atmosphere of the discussion group percentage process unstructured. In conclusion, 100% believe that they do not master the facts, and this becomes another difficulty in mastering complex variables. New findings, in complex variable courses cannot use the online learning process.*

Keywords: Difficulty Description, Complex Variable Difficulty

INTRODUCTION

Education is something that must be taken, because education is a necessity and the spirit of the life of the community, nation and state. In this case, education needs a conscious human effort to develop personality, character and abilities in accordance with the values that develop in the community (Setiawan, 2016). Until now, there are still many higher education institutions that emphasize the transformation of knowledge as much as possible to students rather than transforming the skills and concepts of facts that students need in learning (Binsen Samuel Sidjabat, 2019). Mathematics is the most important science in education. The success of learning mathematics can be measured by the extent to which students can understand, explain, give examples and participate in these activities. Learning success can also be seen from the level of understanding and mastery of student material in learning (Anderha & Maskar, 2021). However, in reality students must be aware that there are 2 indicators of mastery in mathematics where students are not maximal, namely direct objects and indirect objects (Astuti, 2020). Complex variable analysis is a branch of mathematics that deals with the set of real numbers, functions in real numbers and imaginary numbers. Complex variable analysis can be called the deepest branch of mathematics, because in the material it discusses more deeply about direct and indirect

objects. In studying complex variables there are courses that are prerequisites, namely basic mathematics, basic calculus, advanced calculus, linear algebra, structural algebra, real analysis,

In the mathematics education study program at the Faculty of Teacher Training and Education at the Indonesian Christian University, the complex variable analysis course is a compulsory subject for all students in semester VII. Studying the complex variable analysis course requires a strong understanding of the previous courses, high concentration, good learning readiness, high reasoning power and logical thinking. Therefore, many students think that AnalysisVariables are difficult subjects (Mandasari, Rahmadhani, & Wahyuni, 2020). Things like this can have an impact on the achievement of student learning outcomes that are less than optimal. One of the materials in complex variable analysis is the real number system. According to (Karimah & Setiyani, 2019) the real number system is an algebraic system for addition operations (+) and multiplication operations (x) having the following properties: (R, +) Commutative group, (R-{0}, commutative group, (R, +,) distributive. The real number system discusses algebraic properties, order properties and absolute values, and completeness properties. In research (Widodo, Santia, & Jatmiko, 2019) the percentage of student learning outcomes of Mathematics Education Study Program in the 2015/2016 Academic Year in the Real Analysis course, only 32.4% of students got sufficient marks and the rest were less. These results are used as the basis as a benchmark for the extent to which students understand direct objects and indirect objects in the material and what difficulties are experienced in obtaining learning outcomes. Analysis of complex variables. In 2020, the end-of-semester exams in complex variable subjects experienced problems with student learning outcomes. There are half of the number of students who take courses, must be remedial and some do not pass. This is also found in the Mathematics Education Study Program, Faculty of Teacher Training and Educational Sciences at other universities. It was found data from the results of the mid-semester exam (UTS) that there were 63 people who had not achieved the criteria for good grades or B. Other data the researchers saw in the Mathematics Education Study Program FKIP-UKI, in 2014/2015 there were 13% of students who got good grades and 77% not good. In fact, this complex variable course is the core course of all compulsory subjects in the university. Another fact, in the Mathematics Education Study Program of FKIP-UKI semester VII 2019/2020 which amounted to 30 people, there were 15 people or 50% in the less category and 15 people or 50% in the sufficient, good and very good categories. Of the 50% of students whose learning outcomes are not good, take remedial and 10 of them pass, while 5 more have to repeat. Graduation criteria have been determined in each study program and must be more than a score of 65 out of a scale of 100.

According to (Anugrahana, 2021) the difficulty experienced when learning mathematics is a weakness in understanding and proving direct objects. Difficulty in mastering facts creates new problems in understanding skills, concepts and principles. People who study mathematics material must be able to master the four interrelated onesSame in direct object (Yayuk & Husamah, 2020). Similar to the complex variable analysis course, students must be able to understand facts and provide examples of real facts in everyday life which are called definitions. Errors in understanding facts, lack of concepts, insufficient skills in proving and correcting questions are very dominant things faced by students and teachers themselves. In a study (Lumbantoruan & Male, 2020), 62% of teachers acknowledged weaknesses in professional competence and pedagogic competence. Whereas in professional competence, a teacher must master and be able to show examples of facts, skills, concepts and principles that exist in direct objects and assistive devices in indirect objects. The difficulty in transferring knowledge in relating one material to another, making the concept of complex variables with reality is something that cannot be ignored (Csoli & Gallagher, 2012). The learning difficulties experienced by

students are very diverse, but the difficulties experienced in general in mathematics education courses are caused by two factors and can hinder the student learning process the factors that cause learning difficulties consist of 2 components, namely internal factors(Lumbantoruan & Male, 2022): 1) cognitive (Facts, Concepts and principles) and 2) psychomotor (Skills). While the external factors are: (1) the media used, friends, community and family and the environment. Basically, the learning difficulties experienced by students can be described in many ways, through errors when students explain the material, when writing, when proving theorems and when working on problems. Students who experience errors, it is certain that students have difficulty understanding the material. The influence of using technology in the process of online learning throughout Indonesia adds new impacts and difficulties in understanding mathematical material (Lumbantoruan & Uly, 2021). It takes special skills or mature skills to use the media in explaining and showing the direct objects that exist in each complex variable material. Yensy, (2020) in research on the description of difficulties in solving math problems. There are 4 types of difficulties in the mathematics learning process experienced by students, namely conceptual difficulties, fact difficulties, operating difficulties, and principle difficulties. Amalia & Hadi, (2020) in their research on the description of students' learning difficulties in mathematics in terms of cognitive style with the Think Pair Share (TPS) learning model. Students who have Field Dependent Cognitive Style have difficulty recognizing and understanding symbols and lessons. Field Independent Cognitive Style has difficulty with language and reading. In mathematics, there are various topics that are related to each other. Not only the relationship between topics and topics, but also between disciplines in everyday life (Arfinanti, 2020). Everyone who studies mathematics must be able to link facts, concepts, principles and skills. In general, every student who graduated from mathematics education must master 4 indicators, namely facts, skills, concepts or ideas and principles.

Research purposes

The researcher focuses on two points, namely, first, to find out how to master the direct object in the complex variable course and what difficulties are faced by students when studying complex variable material. The second part, the researcher wants to know how to master indirect objects online and what difficulties are encountered when using indirect objects. These two goals are necessary to know, because the success of students in achieving learning outcomes for mathematics education courses is measured by the two most important indicators, namely direct objects and indirect objects.

Lumbantoruan & Natalia, (2021) argue that difficulties during the learning process are conditions that should be conducive learning situations and have good initial abilities. Alyaa, Krisdianto hadiprasetyo, & Annisa Prima Exacta, (2020) argue that a situation where students experience obstacles from certain factors in understanding one material. Yasin & Netriwati, (2019) There are quite a number of learning difficulties that can hinder the learning process of mathematics, including: 1) not mastering basic concepts; 2) do not know the purpose of the material and questions; 3) difficult to form mathematical models; 4) difficult to complete mathematical sentences; 5) lack of accuracy; 6) mistakes in writing numbers. Suryani, Pendi, & B. Seto, (2020) have difficulty learning mathematics instudents, namely; 1) presence of spatial disturbances, 2) abnormalities of visual perception, 3) visual-motor associations, 4) perseveration, 5) difficulty understanding symbols, 6) impaired body appreciation, 7) difficulties in language and reading, 8) significantly higher Performance IQ scores lower than the Verbal IQ score. In mathematics, there are two things that must be mastered, namely direct objects and indirect objects. In this study, two indicators were used to detect the difficulties of the student learning process (Kim & Faith, 2020).

Direct Objects and Indirect Objects

A prospective teacher or even a teacher must know the object of mathematics. Mathematical objects are objects that are real or tangible that are easy to find in everyday

human environments and are silent among us. Land stakes, mapping of rice fields, fences, distance from door to window and so on. Mathematics develops into something abstract and imaginative and axiomatic called complex. There are two indicators that become a benchmark for mathematical difficulties inherent in the professional competence of prospective teachers or those who have become mathematics teachers, including direct objects and indirect objects. Direct object. Facts are agreements made by experts through agreements that have been agreed unanimously, whether in symbols or numbers "5" "five", "α" "alva", facts: "+" addition operation, Sine is a special function in trigonometry. 2+2 = 4, 5-4 = 1. Concepts are imaginative ideas and have directions and goals that can be actualized by examples and not examples. Like cubes, triangles, cubes, plane figures, space figures, sets, and radii are concepts in mathematics. The activity of the learning process in understanding one material is not just sitting in the classroom, but out of the real world, namely the natural surroundings, so as to be able to understand mathematical concepts through daily activities. In everyday life is able to make mathematics students get a variety of new information. So that students will see patterns, relationships between various knowledges inherent in mathematics. Daily activities are sufficient to foster an understanding of mathematical concepts. Such as defining a trapezoid, the definition of a cube, the definition of a tube, a triangle and so on (Andayani and Amir 2019). The principle is the most complete and complex object and has axioms, formulas and tools in explaining a problem. Principles can be translated as a collection of several concepts that have a definite purpose and direction. For example, two triangles are congruent if both sides and angles are the same. The formula that is often used by someone in explaining and solving mathematical problems is called a principle. Principles also include theorems that need to be proven true (Alvarez, Arnold, Burroughs, Fulton, & Kercher, 2021). Skill or Skill is someone who has advantages and speed in providing correct and precise answers with WHAT expected questions. For example, definite integrals, trigonometric substitution integrals and so on. A collection of several concepts that have a definite purpose and direction. For example, two triangles are congruent and congruent if the two sides and the enclosed angles are congruent (Snyder, 2019). Verlinde & Zurek, (2021) Principles also include theorems and postulates. Skill or Skill is someone who has advantages and speed in providing correct and precise answers with WHAT expected questions. For example, definite integrals, trigonometric substitution integrals and so on.

Indirect object. Derivatives of good behavior and character as well as discipline such as attitude, ability to design ways towards a goal (positive), build communication with ways to achieve a goal (positive), good mentality, being honest in the sense of admitting weaknesses, preparing materials with the essence of the value of good learning outcomes (positive). Evianti, Jafar, & Masi, (2019) which says that the teacher takes the role of a facilitator and as an obligatory person in terms of fostering students in a better direction, his main task and first of all an educator is to teach, educate, guide, train and assess and the last one is evaluating. Kartini & Kristiawan, (2019) the three main tasks of teachers are professional, social and humane duties. The teaching profession is forced and required to be professional in developing knowledge in a sustainable manner in stages. Teachers are also required to be able to develop their knowledge and incorporate it into technology that can be used as a medium in delivering teaching materials (Afshari, Bakar, Luan, Samah, & Fooi, 2009). Teachers are also required to have general skills and special skills in choosing methods and detecting difficulties faced by students, factors from the educators themselves and from outside (Akala, 2021). Every educator or student has experienced difficulties in certain cases, this is a factor from himself or from outside. Internal factors are lack of motivation for the profession and obligations as educators. Factors come from outside. As a professional educator, you must be supported by the surrounding environment (Verlinde & Zurek, 2021).

Media Selection and How to use

Media comes from the Latin word which is the plural form of medius which means introduction. Ridha Yoni Astika, Bambang Sri Anggoro, & Siska Andriani, (2020) said introductory media or bridges in conveying messages from a material to be conveyed, the process of transformation, transfer of knowledge from one to another through assistive devices. Muthy & Pujiastuti, (2020) say that something that can be delivered by the media is a human message, material, or event that builds conditions that make students able to develop or acquire something new, skill, or attitude. (Muthy & Pujiastuti, 2020) said that the media is something that cannot be separated from the learning process of teachers/lecturers with students/students. A person's learning outcomes are obtained from direct experience, facts that exist in the environment around life, then develop into more abstract media. The benefits of the media are (a) the learning process is more interesting and motivated, (b) the material presented is more interesting and varied (c) the learning process method is more; (d) students are more active in discussions (Damayanti & Qohar, 2019). Argue that in choosing media a) has the aim of demonstrating interesting teaching materials, b) has mastered the media, c) media can provide a more concrete picture, d) media can attract students' interest (Charitas, Prahmana, Hartanto, Kusumaningtyas, & Ali, 2021). Febrian, Astuti, & Antika, (2019) every student who wants to solve a problem, must go through the process of making a decision, seeking information and trying to understand deeply the intent and purpose of the problem. In the process of seeking this information, the thought process develops and of course there will be many questions that arise. Ridha Yoni Astika et al., (2020) said that campus is a place to teach students to think about all mental activities in an effort to solve problems, make decisions, interpret things, and search for answers in getting a meaning. Complex Variables courses are courses that have the accuracy of proving formulas and theorems, in the online learning process, the learning process for complex variable courses has encountered many difficulties. This is evident in 2020 many difficulties explaining mathematics and proving formulas in the media. The same is true for complex variables. The difficulty in writing symbols and proving formulas that require the right concept and flow, makes the media used must be selected and adjusted according to the user's abilities (Akala, 2021).

METHOD

The type of research approach used is descriptive qualitative research (Zaluchu, 2020). Research wants to describe and describe actual events. The researcher recorded the whole series of learning processes and described the field findings in the form of sentences. This research was conducted in the subject of Complex Variable Analysis in Semester VII, Faculty of Teacher Training and Education, Mathematics Education Study Program, UKI-Jakarta. There were 12 resource persons with an average age of 20 years. Primary data collection techniques (Darmalaksana, 2020). Observation, Researchers compiled observation sheets by referring to research indicators, namely direct objects (Facts, Concepts, Skills and Principles) and indirect objects. The observation sheet is used as the basis for seeing the location of students' difficulties in understanding mathematics courses. The researcher observed the students based on the observation sheet and checked the qualification section. The next stage, interviews were conducted by direct communication to each individual using the online method. Then, Documentation. Documentation data on the results of notes and student work during the learning process takes place, documentation data is synchronized with student answers during interviews and during observations through observations made by researchers (Subbotin & Aref, 2021). The results that intersect between observations, interviews and documentation are strong evidence in determining the right conclusions and in finding solutions in overcoming problems of power and difficulties faced by students. Researchers recorded, viewed, and structured in a structured way the results of observations, interviews, and documentation

obtained. Researchers categorize difficulties and classify the location of student difficulties, whether in facts, concepts, skills, principle or in the indirect object. Researchers carry out the process of compiling data, sorting, and processing it into written sentences and supported by simple numbers and complete documentation from the beginning to the end of the study (Moshood et al., 2022). Researchers also describe, describe and describe in the form of sentences. In analyzing the researchers followed the following steps: Data presentation, the researcher collected information obtained from each individual individual and group of students. Then, the presentation of the data is aligned with other data so that the reduced data is patterned, structured and organized. Data reduction, the data reduction in question is that the researcher categorizes or groups the data into several parts and then the researcher reduces the data which is the basis for drawing final conclusions (Hong, Yokoya, Chanussot, Xu, & Xiang, 2019). Conclusion and Verification. In the initial conclusion, it will be drawn and will confirm the strong documentary evidence that has been obtained. This is considered very necessary to support the conclusions of the research whether the conclusions are valid or not.

RESULT AND DISCUSSION

Results

Table.1. Coding of Research Observation Results

Code	Difficulty Keyword		Interpretation of Observation Results
	Direct Object	Fact	Many do not understand and have very little mastery of definitions, do not understand the relevance of the material, do not understand writing symbols, and cannot provide relevant examples.
		Concept	Difficulty determining results correctly, weakness in completion, wrong results and difficulty showing friends the truth.
		Skills	Difficulty determining using the method, difficulty operating the media
		Principle	Difficulty explaining a truth, difficulty explaining the relationship, difficulty in method and difficulty determining formula
	Indirect Object		Students look for answers from the internet without going through the thought process and logic, are instant, help friends in answering questions without any effort, and help do assignments without any effort, have difficulty writing symbols and mathematical concepts in the media.

The table above is the result of the initial conclusions from the analysis process from the observations of researchers, where the data that has been presented is reduced and then interpreted. It can be seen in the coding table, that students have more dominant difficulties in direct objects. Difficulty in understanding and giving examples of facts, difficulty in providing real concepts, lack of mastery or skills in using media, plus difficulty in writing symbols that match the material and the last difficulty in direct objects are principles that are not mastered, causing difficulties in producing correct and accurate answers. . While the indirect object is the main key for students in answering and solving complex variable problems without a structured process. If this continues, Of course, it will cause new problems in the future in studying complex variable courses. The low mastery of facts causes difficulties in describing concepts and skills to be minimal.

Table 2. Coding of Interview Results

Code	Keywords	Total 8	In Percent	Interpretation of interview results

			Peop le		
	Direct Object	Fact	8	100%	Mastery in understanding the definition of complex variables is minimal, difficulty in connecting one material with other material that has been studied in previous courses
		Concept	7	85.71%	Difficulty solving problems, difficulty giving examples and difficulty connecting material relationships
		Skills	7	85.71%	It is difficult to operate the media used, and difficult to provide relevant examples.
		Principl e	6	57.14%	Difficulty proving the formula and its use, difficulty solving problems and explaining to group friends
	Indirect object		3	28.57%	Difficulty in mathematical communication methods, difficulties in using media in writing mathematical operations, and difficulties in sharing mathematical concepts in the form of percentages

From table 2, it can be seen that only 8 students were successfully interviewed. There are 12 people who have been scheduled to be interviewed, but in fact 4 people are constrained to be interviewed. Of the 8 students, most of them said difficulties in direct objects. The results of student interviews were of the opinion that all sources believed that mastery of facts was the most difficult thing in the complex variable course. This lack of mastery creates new difficulties in understanding concepts, principles, as a result students' skills become unstructured and lead to inappropriate and incorrect conclusions in solving problems.

Table 3. Coding Documentation/Verification

No	Indicator		Interpretation of Evidence/Documentation
	Direct Object	Fact	Documentation shows difficulties in understanding the definition of complex variables
		Concept	Understanding the relevance of the material dan memecahkan masalah variabel kompleks dan memberikan contoh pertanyaan terkait materi.
		Skills	Weaknesses and difficulties in presenting and writing symbols related to the material
		Principle	Errors in writing formulas that match the discussion material
	Indirect Object		Difficulty using media in explaining the material when the percentage is to friends who ask questions, errors in writing formulas and the work process is not structured.

From table 3, the evidence of documentation can be seen that the results of observations and interviews coincide with documentation. Students do not master the definition, have difficulty connecting one material to another. Difficulty in explaining examples of questions and questions to classmates and students' difficulties when writing in the media used.

Discussion

1) Direct Object Mastery of complex variables.

From the results presented above, it is clear that the data obtained from observations, interviews and documentation about students' lack of mastery and difficulties in mastering complex variable subjects are clearly visible. This can be seen and experienced by students, starting from the lack of understanding of facts or definitions, difficulties in connecting the material in previous courses with material in complex variables, difficulties in providing concepts, concepts explaining questions to classmates that are

too abstract and tend to be wrong draft. The discussion method made by educators becomes ineffective because students' mastery of facts and difficulties in concepts slows down the online learning process. Transferring knowledge of mastery of facts and providing ideas is not suitable online for complex variable courses. Students experience limitations and difficulties in operating the menus in the media used, the internet used is not good, writing symbols in complex variables is not mastered. In fact, educators have given examples of how to write symbols. In the interview session, the source argued, there was a 100% minimum mastery of facts (definitions), because this course was too abstract to be defined. Students argue that they need additional time to re-learn courses related to complex variable courses, such as courses in differential equations, calculus, Structure Algebra, Linear Algebra and real analysis. The low mastery of students in complex variable subjects indicates that there are problems of understanding and lack of mastery in the previous courses. Mastery of real and imaginary numbers. Students have difficulty determining definitions and concepts of imaginary numbers. The theory says that a lack of understanding creates new difficulties. The following is an example of a student not mastering the facts and concepts of imaginary numbers, where the lecturer must explain how to understand and solve simple problems like the picture below. At the second meeting in the number structure material, it was seen that students had difficulty understanding imaginary numbers. The material for imaginary numbers has been studied in calculus and algebra courses, however, in reality there are still many students who have not mastered the definition,

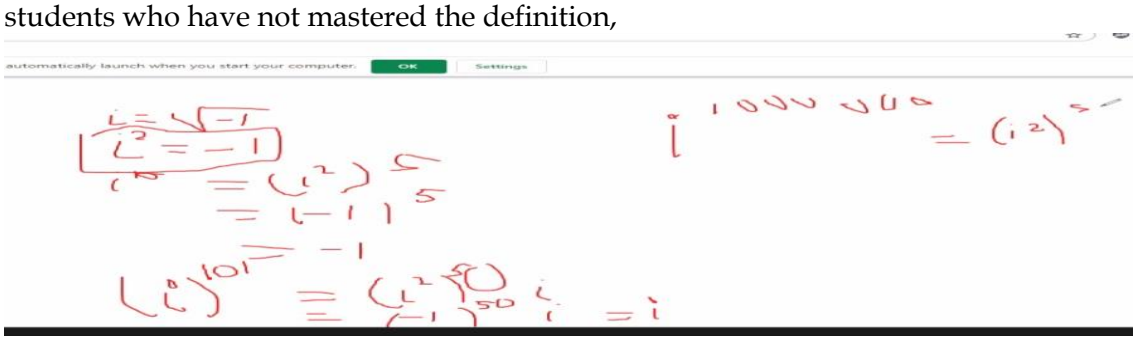

Figure 1. Difficulty of Facts and Concepts of Imaginary Numbers

In the picture above, educators must re-explain the definition and concept of imaginary numbers. In fact, the material and questions asked are still in the easy category for students. The previous courses had enough time to discuss imaginary material. Problems like Figure 2, many researchers find the inability of students to solve simple problems that should not be experienced in complex variables courses. Lack of mastery of the material that has been taught previously, becomes a new problem and for mastery of the next material. Educators also need a lot of time to re-explain simple material before going into material that is the focus of complex variables. This problem makes the lesson plans that have been designed not run as expected. The theory says that with unpreparedness the direct object will encounter many difficulties. The difficulties experienced in complex variable courses are in line with the theory (Fromm, Radianti, Wehking, Stieglitz, & Majchrzak, 2021)

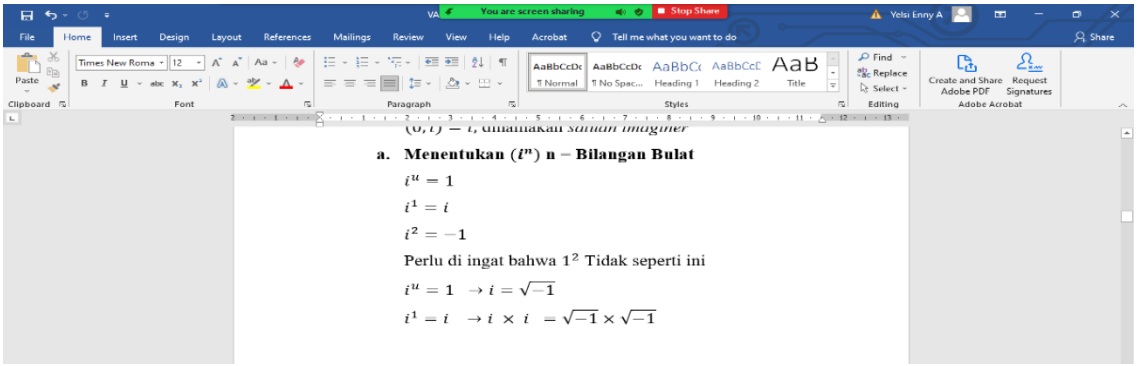

Figure 2. Lack of mastery of concepts and principles of complex variable material

The concept of the picture above is the difficulty of explaining the principle of complex numbers. Difficulty mastering facts 100%, resulting in conceptual difficulties85.71%and the 57.14% principle of solving the problem becomes incorrect. In this material it takes a lot of time to re-explain the basic concepts of complex numbers and other materials. In mastery of concepts and skills, they are very weak, when working on questions. Educators make discussion methods to discuss questions, but the expected results remain the same and are not understood. In fact, in this material, examples and books have been provided, this material has been discussed in algebra and students have passed. But the facts say otherwise, there are still quite a lot of students who don't understand. In overcoming the problem of lack of mastery of facts and concepts, the first step for educators is to arrange material that is not mastered, definitions that are not understood, compose 3 examples. The material that has been prepared is given to students who do not understand. It must be admitted that the learning process for complex variable courses is a bit disturbed, because they have to repeat and rearrange the material that has been learned in the previous courses. The second step is to overcome weaknesses in mastery at the next meeting. The teacher gives 5 questions for students to complete and is allowed to open the books in the previous course. Methods such as the first and second steps proved to be effective in helping students who did not master the direct object. The teacher gives 5 questions for students to complete and is allowed to open the books in the previous course. Methods such as the first and second steps proved to be effective in helping students who did not master the direct object. The teacher gives 5 questions for students to complete and is allowed to open the books in the previous course. Methods such as the first and second steps proved to be effective in helping students who did not master the direct object (Jowsey, Foster, Cooper-ioelu, & Jacobs, 2020).

2) Indirect object mastery and difficulty

In the direct object, students master the media used to communicate orally in discussions. However, students do not master when writing symbols and presenting concepts and principles of solving questions asked by other students. The process of writing formulas and symbols in the media takes a lot of time. For one to five questions, students need 1 hour.

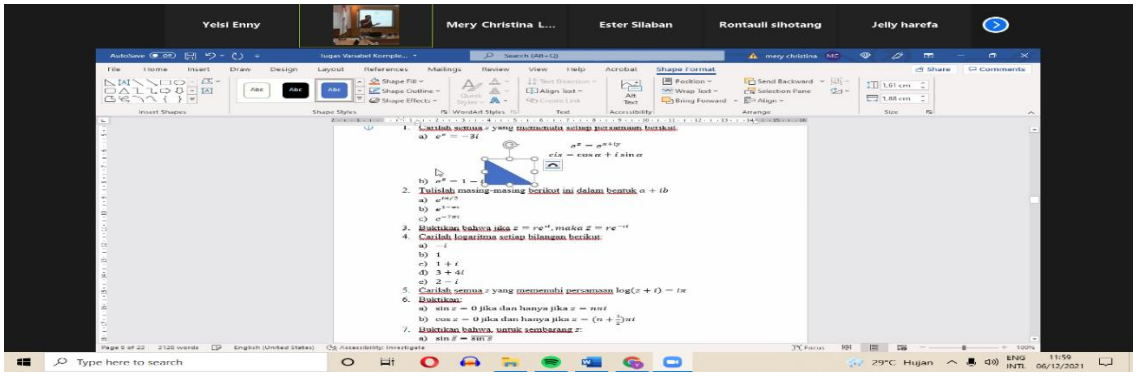

Figure 3. Difficulty of Concepts When Drawing in Media

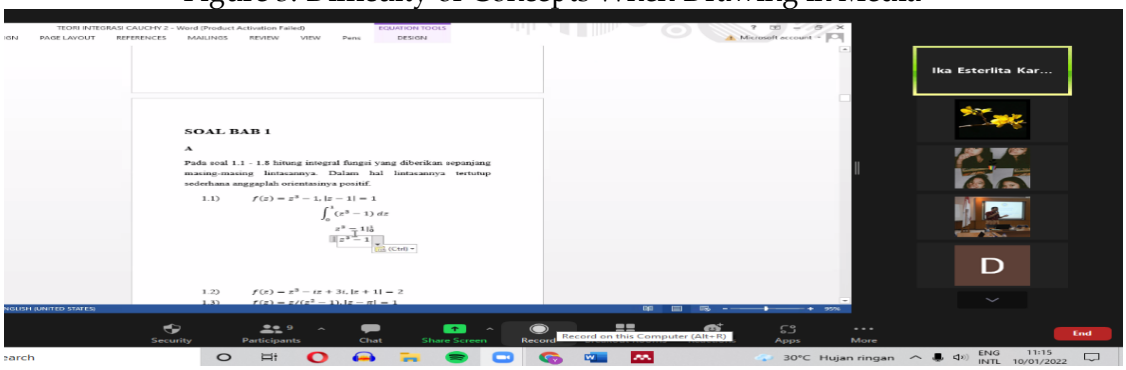

Figure 4. Lack of media control at the time of percentage

The results of observations and interviews are interconnected and confirmed documentary evidence overlaps about the difficulties of using media as a percentage. Difficulties and lack of mastery in writing symbols lead to different understandings between students who are percentages and students who listen, at this point the educator tries to straighten out the writing method that students use when percentages. It also takes quite a lot of time to train students how to write symbols, arithmetic operations and find sources related to the questions to be discussed. In solving this problem, the researcher gave assignments to students to write in mathematical form the material that had been presented. This method helps and trains students in mastering writing mathematical symbols.

CONCLUSION

From the results of the research and discussion, it is concluded: The location of the weaknesses and the location of the students' difficulties in facts or understanding the definition of complex variable material, from observations and from the number of students interviewed, 100% believed that the difficulties were in fact. While the concept is 85.71%. Both of these indicators are inside the direct object. The researcher is of the opinion that the two indicators in the direct object are the main causes of student learning outcomes in the low complex variable subject. The facts and concepts in the complex variable course are very abstract. Another factor is that the students' mastery in the previous courses was very low, even though the students had graduated and got good grades. However, the good grades that have been obtained by students are due to indirect object support. Student success in previous courses was driven by indirect object factors and not direct objects, by giving additional assignments, looking for answers from the internet, help from friends, media assistance in solving problems and assistance from the environment around students. This acknowledgment can be proven from the results of this study, where observations and acknowledgments by students did not understand the previous material. Difficulties are also seen when students are unable to relate one material from the previous course to material in complex variables. It can be proven by this research that indirect objects are a great help for students to pass in complex variables courses. In this study, new

difficulties were found during online implementation, students had difficulty with percentages, writing symbols in complex variables and difficulties in operating the media used.

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