The Implementation of Project-based Learning using ICT in Mathematical Proficiency Improvement of High School Students in the Region of North Maluku at 3T

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Abstract: The purpose of this study is to produce ICT-based project materials and project-based instruments to improve the mathematical proficiency of high school students in 3T areas in mathematics learning. This experimental research applies ICT-assisted PBP to improve students 'mathematical skills, beginning with the development of quality teaching materials and instruments to measure the improvement of students' mathematical skills through ICT-assisted project-based learning (ICT-assisted PBP). This research develops ICT-assisted based project-based mathematics teaching materials, test instruments for students' mathematical skills, observation sheets of teacher and student activities, to be applied in order to improve the quality of mathematics learning and the quality of regional education 3T. Data analysis techniques use qualitative and quantitative analysis to express the quality of teaching materials, instruments of students 'mathematical skills tests, and observation sheets of teacher and student activities to measure the improvement of students' mathematical skills abilities. The results of advance validation, content validation and empirical validation are limited, that the instructional materials for PBP-based statistical materials with ICT, students' mathematical proficiency test instruments, and guidelines for observing the activities of teachers and students are suitable to be used as tools and research instruments to improve the mathematical proficiency of high school students.

1 INTRODUCTION

The advancement of technology and information which is increasingly globalized today, encourages all Indonesian people to try to get information in abundance, quickly and easily from various sources and various parts of the world. Likewise for the community in the 3T area (leading, outermost and disadvantaged) in preparing themselves to anticipate the advances in technology, communication and information (ICT). Anticipating the progress of ICT, people in the 3T area are required to have the ability to obtain, select, manage, and follow up on the progress of ICT to be used in a dynamic, challenging, and full of competition, especially for the sake of improving the quality of education and the quality of the learning process.

The development of the quality of education in the 3T area in North Maluku requires special attention from the government, in order to increase human resources (HR) in anticipating the emergence of ICT. This fact is in accordance with Luthfiyah Nurlaela's experience in the book' Berbagi di Ujung Negeri [Sharing in the Nation Corner] (2013), that the problems related to human resources in the 3T area are a lack of educators (teachers), teacher distribution is not balanced, mismatch between the qualifications of educators and the field being taught. This condition leads to the quality of education in the 3T area is still below the standard when compared with other regions nationally.

The creation of reliable human resources for the 3T area, it is necessary to increase the skills of students as future generations through the development of quality education in the learning process in every field of science. Mathematics as a scientific discipline has important access to the formation of quality human resources and the formation of students' mindset skills and can be

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measured from mathematical skills (Mathematical Profession).

Mathematical skills which include: understanding concepts, smooth procedures, strategic competencies, adaptive reasoning, and productive character are abilities that are intertwined with one another. The five mathematical skills are integrated with each other and are synergistically balanced in the intellectual development of students. The process of constructing it, the teacher must not only emphasize on one or several skills, but must pay attention to all aspects of mathematical skills. According to Kilpatrick (2001) mathematical skills have components that cannot be separated, namely: (1) conceptual understanding; (2) procedural smoothness; (3) strategic competence; (4) adaptive reasoning; and (5) productive disposition. These five components of mathematical skills are not separate things, but intertwine into one skill that represents different aspects of something complex.

Mathematical skills as described above can be developed through mathematics learning activities. Mathematics learning in schools according to the Ministry of National Education (2014) aims to: (1) train students 'ways of thinking and reasoning in drawing conclusions, (2) developing students' creative activities that involve imagination, intuition, and discovery by developing divergent, original, curious thoughts. make predictions and predictions, and experiment, (3) develop problem-solving skills, and (4) develop the ability to convey information and communicate ideas. The creation of these abilities, students must have mathematical skills in conducting mathematics learning activities.

Improving mathematical skills in learning mathematics, it is necessary to use innovative learning models that involve collaborative student activity in solving real problems, completing meaningful tasks, constructing knowledge, in connection with certain material to be studied. One of the learning that creates this situation is ICT-assisted project-based learning (ICT-assisted PBP).

According to La Nani (2015), ICT-assisted PBP can be used as an alternative in learning introductory statistics. PBP-assisted ICT implementation provides opportunities for students to learn statistical concepts from various sources, understand the implementation of statistics in real life, increase interaction activities between students, encourage the creation of a dynamic and conducive learning atmosphere, and improve mathematical skills. The application of ICT-assisted PBP is expected to provide opportunities for students to learn statistical material from various sources, understand the implementation of statistics in real life, increase interaction activities between students, encourage the creation of a dynamic and conducive learning atmosphere, and improve students' mathematical skills.

Based on the above background, the main problem of this research is, "how is the implementation of ICT-assisted project-based learning (PBP Assisted by ICT) to improve the mathematical skills of students in the 3T area of North Maluku?" In detail the research problems are described in the following questions: (1) What is the achievement and improvement of the mathematical skills of high school students in 3T areas in North Maluku through the implementation of ICT-assisted PBP? (2) How is the effectiveness of PBP implementation assisted by ICT in improving the mathematical skills of high school students in 3T areas in North Maluku? (3) Does the implementation of PBP Assisted by ICT improve the mathematical skills of high school students in 3T areas in North Maluku?

Based on its content, school mathematics learning is expected to form students' mathematical skills. The low quality of learning and mathematical skills of students in learning mathematics, especially students in South Halmahera district, Morotai island district and Taliabu district as 3T areas in North Maluku. South Halmahera Regency, Morotai Islands and Taliabu as 3T areas in North Maluku have geo-political and geo-economic potential that can be developed as catalysts for development and as a gateway to Pacific axis competition, it is necessary to prepare human resources through improving mathematical skills so that the creation of quality human resources, education and learning, as well as the quality of mathematics learning.

2 THEORY STUDY

2.1 Mathematical Proficiency

Mathematical skills are the ability to understand concepts, proficiency in using procedures, mathematical problem solving, logical thinking capacity, consisting of five strands with one another must be established synergistically. Therefore the mathematical skills themselves are not easily observed. The formulation of mathematical skills is as follows: (1) Conceptual Understanding, namely the ability that includes concepts, operations and relationships or connections in mathematics. Understanding a concept in mathematics correctly

will result in the use of mathematical operations in various ways it can be done, or students will later have the ability to use the concept associated with various circumstances when they encounter problems related to the concept in different circumstances. (2) Procedural Fluency, namely the students' skill in using procedures in a flexible, accurate, efficient and appropriate manner. (3) Strategic Competence, namely the student's ability or ability to formulate, present, and solve mathematical problems. (4) Adaptive Reasoning (Adaptive Reasoning) is the ability of students to think logically about the relationship between concepts and situations, estimate, reflect, explain and conclude with validity / validity and ultimately can justify what they do. (5) Productive Disposition is a habit that tends to see mathematics as something that is reasonable, useful, and valuable along with the belief in perseverance and its success in mathematics.

The five mathematical skills must be intertwined with each other and run in a balanced manner, as teachers cannot only emphasize on one or several skills. The five mathematical skills are interrelated so that they are not easily observed in a simple way. A student who has mastered these five abilities must be seen as a whole, for example a high school student who studies trigonometry. Knowing whether these five mathematical skills are already present in the student, cannot be easily observed at that time, because it must be seen when the student uses trigonometric concepts to solve problems in other fields, using algorithms, strategies, trigonometric concept procedures on different problems and different times too, so that in the end it was able to use the concept to justify the results of the work which would lead to a sense of trust in mathematics.

2.2 Regional Education Concern 3T

The Presidential Regulation states that disadvantaged regions are regencies whose regions and communities are less developed than other regions on a national scale. An area is designated as a Disadvantaged Region based on the criteria of the community's economy, human resources, facilities and infrastructure, regional financial capacity, accessibility and regional characteristics. The criteria for underdevelopment as intended are measured based on indicators and sub-indicators. Provisions concerning indicators and sub-indicators as referred to are regulated by a Ministerial Regulation which organizes governmental affairs in the development of underdeveloped regions, "read Article 2 Paragraph (2.3) of the Presidential Regulation.

According to the Presidential Regulation (Perpres), the Government determines Regions Left behind every 5 years nationally based on criteria, indicators, and sub-indicators of regional underdevelopment. Determination of Disadvantaged Areas as intended is based on the Minister's proposal by involving relevant ministries / institutions and local governments. The establishment, expansion and merger of regencies; or efforts to overcome extraordinary circumstances, conditions of conflict, or natural disasters, according to this Presidential Regulation, the President can establish a new Disadvantaged Region. This regulation also affirms, that the Minister who carries out government affairs in the field of underdeveloped regional development by involving other relevant ministries / institutions to evaluate the Disadvantaged Regions every 1 year.

Evaluation as referred to in paragraph (1) is carried out using the calculation method: a. composite index; b. interval value; c. interval; and / or d. the percentage of underdeveloped villages in the district. This Presidential Regulation comes into force on the date of promulgation, "reads Article 8 of the Presidential Regulation Number 131 of 2015 which was promulgated by the Minister of Law and Human Rights Yasonna H. Laoly on November 9, 2015.

North Maluku Province is an archipelago which results in differences in culture, customs and quality of education in each region. In addition to the lack of education in North Maluku, especially in remote areas, there is no quality learning that is relevant to environmental conditions, student needs and subject matter. Education services in North Maluku Province have not yet been felt evenly, resulting in low quality of education from years of exposure, especially in the 3T (frontier, outermost, and disadvantaged) regions. This inequality of education has become a complex problem as if it is difficult to solve, if it is not immediately resolved by the provincial government of North Maluku and share stakeholders in each district of the city.

Addressing the problem of education in the province of North Maluku, especially in the 3T area requires the care of the government, both local government and central government in conducting scientific studies and research, especially the implementation of effective and efficient learning to be able to prepare quality generations so that they can compete nationally. That is, it is necessary to carry out learning that is relevant to environmental conditions (local wisdom), student needs, and

efficient learning media to encourage student learning motivation is expected to improve the quality of mathematics learning. The process of learning mathematics that is adjusted to environmental conditions, readiness of students, and the use of relevant learning media is expected to motivate students in improving the quality of learning.

Its relevance to environmental conditions, the readiness of students in learning and their suitability with the subject matter of mathematics need to be applied ICT-assisted project-based learning (PBP assisted by ICT). PBP-assisted ICT activities that are student-centered are expected to be able to deliver students' abilities in learning mathematics. According to La Nani, K (2015), the application of ICT-assisted PBP by using an authentic structured problem type project provides an opportunity for students to learn the concept of statistics from various sources, understand the implementation of statistics in real life or other fields of science, increase the interaction activity between students, the interaction of students with relevant experts or sources, encourages the creation of a dynamic and conducive learning atmosphere, and enhances students' reasoning and communication skills.

2.3 Learning Based on ICT- Assisted Projects

Operationally, the implementation of ICT-assisted PBP encourages the growth of creativity, independence, responsibility, confidence, critical thinking and analytical competence. PBP's Focus on ICT Assistance lies in mathematical objects, including: facts, concepts, principles, and skills, involving students in investigating problem solving and meaningful task activities, providing opportunities for students to work autonomously constructing their knowledge, and culminating in producing real products (Thomas, 2000)

PBP Assisted by ICT is a learning model that uses contextual learning, where students play an active role in solving problems, making decisions, presenting, and making report documents. ICT Assisted PBP designed to be used in complex problems in carrying out investigations has the potential to be very large to make learning experiences more interesting and meaningful for students. Through PBP Assisted with ICT, students become active in learning, and the instructor functions as a facilitator to provide facilities and evaluate projects on statistical problems related to daily life.

Santyasa (2006) presents four characteristics of PBP, namely: content, conditions, activities, and results. Content characteristics are: (1) complex problems, (2) students find relationships between ideas proposed, (3) students face ill-defined problems, and (4) raise questions that tend to question real-world problems. The characteristics of the condition are prioritizing student autonomy. Activity characteristics are conducting collaborative group investigations. Garfield and Change (Ying Cui, et al, 2010) that project learning, authentic assignments, and criticism are alternative approaches that can help instructors to gain better student understanding of mathematical skills.

Therefore, developing ICT-assisted project-based teaching materials that are authentic and contextual are expected to guide students in conducting direct investigations in order to obtain data, then further processing, presenting, analyzing, interpreting, drawing conclusions, and presentations. As a result, students can utilize concepts, procedures, and processes based on mathematical rules to improve mathematical skills. The development of project-based teaching materials to support school mathematics teaching using ICT-assisted PBP in this study seeks to: (1) involve students in complex problems, real-world problems that are meaningful, and required to use investigations, research planning skills, critical thinking and the ability to solve problems when completing a project; (2) students can learn, apply the skills and knowledge they have in a variety of contexts when working on mathematical problem projects with the help of ICT, to then be revealed when collaborating, or when discussing.

ICT-assisted project-based learning in this study is intended to improve the mathematical proficiency of high school students in 3T areas in North Maluku. The steps for implementing Learning Based on ICT Assisted Projects (La Nani, 2015) are as listed in Table 2 below.

Table 1: Scenario for the Implementation of ICT-Assisted PBP Activities.

Stage	Student Activity	Student Activity
1. Planning	Formulate learning objectives; determine the topics to be discussed; prepare the problem project and the instructions for the investigation; design and compile LKS and learning resource needs; grouping students in 5-6 people with heterogeneous ability levels; determine the allocation of investigation time; prepare guidelines and practices for the use of ICT; and designate monitoring and evaluation designs	Identify and choose context as a project assignment; prepare everything that will be needed in the investigation and investigation of the problem project; and data collection according to the problem project provided.
2. Implementation	Monitor investigation and data collection activities; Direct the outline of the subject matter; Guiding and facilitating students in collaborating; Providing assistance to students or groups seeking assistance as needed; monitoring student learning and collaboration activities; facilitate group presentation activities and discuss; together with students draw conclusions about the material being studied.	Investigate or think with their abilities based on experience; utilizing SPSS software; collaborate with group friends; compile reports; and present and discuss about the results of their activities (in groups).
3. Evaluation	Evaluate the work of each group; make conclusions whether these activities need to be improved or not, which parts need improvement, and which parts can be developed.	Revise reports based on class discussion results; Submit reports on the results of project activities (in groups and individuals).

3 RESEARCH METHODS

This study uses a modified development research method from the development model of Sukmadinata, et al (2006), consisting of four stages, namely: (1) preliminary study, (2) product development model teaching materials and instruments and assessment rubric, (3) test products, and (4) the application of ICT-assisted project-based learning. Activities in the preliminary study are: literature study, field survey, drafting of teaching materials, drafting instruments and assessment rubrics, and testing of research instruments. The literature study was partially carried out until the completion of this proposal, but in principle it will always be re-analyzed and continued to meet the research needs. Library search through journals, textbooks, and research relevant to the problems developed. Field survey activities, carried out through documentation studies, direct observation, and interviews. Data collected in the form of student learning outcomes and teacher perceptions of the learning process that has been practiced. Preparation of draft teaching materials, draft instruments and assessment rubrics, as well as instrument testing as the last activity in the preliminary study.

The development of draft teaching materials and research instruments through several stages: (1) analyzing competency standards, basic competencies and indicators of high school mathematics lessons according to the applicable curriculum (2013 curriculum); (2) compile a concept map based on SK and KD; (3) compile a matrix of test grid design and classify it based on indicators that will be developed as items; (4) write down the item and its settlement; and (5) determining the scoring rubric or guidelines.

The draft of ICT-assisted project-based mathematics teaching materials and the mathematical skills instruments developed before being tested are validated to the expert team. The team of experts as validators of teaching materials and instruments are people who are experts in their fields (mathematics, mathematics education, research and education evaluation, etc.). Expert validation aims to get corrections as input regarding improvements to draft teaching materials and instruments and the results of their validation. Validation tests include content and face validation, which is intended to examine: readability, linguistic structure and conformity of concepts to competency standards (SK), basic competencies (KD), material indicators, and students' mathematical skills indicators developed.

The draft of ICT-assisted project-based mathematics teaching materials and revised mathematical skills instruments from the results of expert validation, followed by a limited trial of students in several high schools in Ternate City and South Halmahera Regency. The results of expert validation analysis and limited trials are then analyzed to be refined. Indicators of achievement of ICT-based mathematics teaching projects, instruments of mathematical skills, and measurable validation and testing results include: (1) Content and face validation results, obtained quality readability of sentences or sentence meanings, linguistic structure, conformity of concepts in teaching materials and instruments against competency standards, basic competencies, and mathematical material indicators, as well as valid and reliable student mathematical skills indicators. Besides the validity and reliability, also obtained the significance of similarity of validity and reliability by several expert validators known through Q-Cochran test statistics. (2) The results of empirical validation through limited and widespread trials, obtained the quality of the items that meet the requirements: validity, reliability, level of difficulty, and differentiation in good qualifications. (3) The compilation of ICT-assisted project-based mathematics teaching materials and students' mathematical skills instruments that qualify as a measuring tool to be applied in mathematics learning and measure the mathematical skills of high school students.

4 RESULTS AND DISCUSSION

Analysis of Advance Validation Results and Content of Research Instruments. Before being used, the project-based teaching materials that are prepared are reviewed or assessed by 5 (five) validators to determine their suitability with the learning objectives and indicators of the mathematical proficiency of the students studied. Validators who are trusted to examine the validity of the instructional material in question are 2 (two) lecturers of mathematics education, and 3 (three) high school mathematics teachers who teach in the 3T area in North Maluku who hold an undergraduate degree. Suitability of teaching materials includes aspects: (1) clarity in terms of language or editorial; (2) the language used is standard; and (3) authenticity of interesting topic topics to be discussed; (4) suitability of the material with the topic of the problem given; (5) compliance with indicators of achievement of learning outcomes; (6) suitability in fostering students' mathematical proficiency as measured; and (7) the level of difficulty for high school students.

Data from the validation of teaching materials by the validators were analyzed descriptively and inferentially using Q-Cochran test statistics to determine the validity uniformity by the validators on the suitability of teaching materials. Project-based statistical introductory teaching materials are prepared for 6 (six) face-to-face meetings. The results of the conformity analysis of ICT-assisted project-based instruments are described below. Advance Validation Results of Mathematical Proficiency Instrument for Students with Statistical Material. The frequency of valid and invalid administration of the five validators is shown in Table 2 below.

Table 2: Frequency of Valid and Invalid Giving Instruments by Validator.

Validator	Frequency of Validity	
	Valid (%)	Invalid (%)
I	8 (80)	2 (20)
II	8(80)	2(20)
III	9(90)	1(10)
IV	8(80)	2(20)
V	10(100)	0
Total	86.00	14.00

Based on table 2 above, there is one validator stating that teaching materials (LKPD) meet the requirements of face validity, three validators say 8 items of questions fulfil the validity requirements and 2 items of questions are invalid, and one validator states 9 items of valid items and 3 items of questions not valid, and one validator states 9 valid items and 1 invalid item. Overall, six validators who examined the face validity of 10 items about students' mathematical proficiency instruments can be said that 86.00% were declared valid and 14.00% were invalid. Question items that are declared invalid will be revised according to the validator's advice and adjusted to the student's mathematical proficiency indicators.

Knowing the face validity of mathematical proficiency instruments students used Q-Cochran test statistics. The null hypothesis (H0) tested is that the validators give the same or uniform assessment. Test criteria: accept H0 if the value is Asymp. Sig Q-Cochran is more than the significance level α = 5%. The results of the Q-Cochran test of the validity of the face of the instrument of statistical reasoning ability as described in Table 3.

Table 3: Advance Validity Test Instrument Statistic Reasoning Ability.

N	10
Cochran's Q	5.789[a]
df	5
Asymp. Sig.	.327

a. 1 is treated as a success.

Output data in the Test Statistics table obtained Cochran's value Q = 3.467 with Asymp. Sig 0.327 is greater than the significance level α = 5%. This shows that 10 students' mathematical proficiency instruments were rated uniformly by the validators. This shows that students' mathematical proficiency instruments are declared to meet the requirements of face validity with minor improvements.

Validation Results of Students' Content of Mathematical Proficiency Instrument Statistical Material. In the validity, the contents of all validators do not provide corrections to students' mathematical proficiency instruments. This shows that the instrument has fulfilled aspects related to the material, indicators of achievement, and the mathematical proficiency of the students to be achieved. Quantitatively, the frequency of instrument validity by five validators can be shown in Table 4 below.

Table 4: Frequency of Validity of Instrument Content by Validator.

Validator	Frequency of Validity	
	Valid (%)	Invalid(%)
I	8 (80)	2 (20)
II	8(80)	2(20)
III	10(100)	0
IV	9(90)	1(10)
V	10(100)	0
Total	90, 00	10, 00

Based on table 4 above, there are two validators stating that 10 items of questions fulfill the requirements of content validity, two validators say 8 items of questions fulfill the requirements of validity (valid) and 2 items of questions are invalid, and one validator states 9 items of valid items and 1 item of question invalid. Overall, of the five validators who examined the content validity of the 10 items about students' mathematical proficiency instruments that 90.00% were declared valid and 10.00% were invalid.

Knowing that the mathematical proficiency instrument of students fulfilled the requirements for content validity, the Q-Cochran test statistics were used. The null hypothesis (H0) tested is that the validators give the same rating. Test criteria: accept H0 if the value is Asymp. Sig Q-Cochran is more than the significance level α = 5%. The results of the Q-Cochran test validity of the content of students' mathematical proficiency instruments as described in Table 5.

Table 5: Validity Test Results of Students' Mathematical Proficiency Instruments.

N	10
Cochran's Q	9.815[a]
df	5
Asymp. Sig.	.081

a. 1 is treated as a success.

Output data in Test Statistics table obtained Cochran's-Q value = 9.815 with Asymp. Sig = 0.081 is greater than the significance level α = 5%. This shows that 10 students' mathematical proficiency instruments were rated uniformly by the validators. Furthermore, the comment of one of the validators that the aspect of indicators and indicators of the measured questions contained synchronization and operational verbs had indicated the validity of an instrument. Thus the instrument of statistical reasoning ability can be stated to fulfill the requirements of content validity.

4.1 Analysis of Research Instrument Test Results

After the instrument meets the face validity and content validation by expert validators, the research instrument of students' mathematical proficiency tests is conducted a trial (try out) before being applied to the research subjects to determine reliability, validity, level of difficulty (TK) and differentiation (DP) of the instrument. The trial of this research instrument was applied to high school students in Ternate City (not sample classes) who had studied and experienced the learning process of statistical material. Data from the results of the research instrument trial (attached), the description below.

4.2 Validity and Reliability of Student Mathematical Proficiency Tests

The process of calculating item validity and reliability of students' mathematical proficiency test questions using SPSS for Windows version 20

software. Test the validity of the items using the rough number product moment correlation formula that correlates the score of each item with the total score. While the reliability test questions using the Cronbach-Alpha formula. The null hypothesis (H0) tested is that there is no significant positive correlation between item item scores and total score. Test criteria, accept H0 if r count <r table. At the significant level α = 5% and n = 26 obtained r table = 0.317. (Usman H., and Akbar S.P., 2011). Calculation of item validity and reliability of students' mathematical proficiency tests are presented in Table 6 below.

Table 6: Validity and Reliability of Students' Mathematical Proficiency Tests for 15 High School Students.

Question Number	Question Item Validity			Problem Reliability	
	r_{Count}	Interpretation	Criteria	r_{11}	Interpretation
1a	0.784	High	Valid	0.695	High
1b	0.414	Mediun	Valid		
2a	0.583	Mediun	Valid		
2b	0.699	High	Valid		
3a	0.455	Mediun	Valid		
3b	0.595	Mediun	Valid		
4	0.497	Mediun	Valid		
5	0.404	Mediun	Valid		

Description of table 6 shows that the reliability coefficient is large r_{11} = 0.695. According to Guilford (Suherman, 2003), an instrument with a reliability coefficient of 0.60 ≤ r_11 <0.80 is a classification in the high category. Furthermore, the validity of item questions in Table 4.5 based on Guilford (Suherman, 2003) classification shows that: there are two items of questions (1a, & 2b) in high interpretation and six items of questions (1b, 2a, 3a, 3b, 4, and 5) in the interpretation of moderate validity. These results provide an illustration that students' mathematical proficiency instruments compiled by the research team are declared valid and reliable, so that they can be used to measure the mathematical proficiency of high school students in the 3T Region in North Maluku. Level of Difficulty and Distinction of Students' Mathematical Proficiency Test Calculation of the level of difficulty and distinguishing power is done manually using Microsoft Excel, the calculation results are described in the following table 7.

Table 7: Levels of Difficulties and Differences in Students' Mathematical Proficiency Tests Trial Results to 15 Students.

Question Item	Difficulty		Differential Power	
	Index	Interpretation	Index	Interpretation
1a	0.43	Medium	0.25	Enough
1b	0.44	Medium	0.31	Enough
2a	0.39	Medium	0.32	Enough
2b	0.38	Medium	0.25	Enough
3a	0.42	Medium	0.33	Enough
3b	0.32	Medium	0.25	Enough
4	0.51	Medium	0.44	Good,
5	0.34	Medium	0.27	Enough

The results of the calculation of TK and DP tests of statistical reasoning ability in Table 7 after adjusting to the classification (Suherman, 2003) indicate that: eight items in the interpretation as a problem with moderate difficulty; (2) there is one item (number 4) in a good interpretation of power (DP), and seven other items in the interpretation of DP are sufficient. This shows that the students' mathematical proficiency test items are considered to have fulfilled the characteristics that are sufficient enough to be used in the study.

5 CONCLUSION

Based on the description of the results and discussion described above, the development of ICT-assisted project-based statistical material teaching materials and research instruments to measure the improvement of students' mathematical skills can be concluded as follows:

1. Teaching materials (LKPD) ICT-assisted project-based statistical materials that are expected to motivate student learning, create collaboration of individual students in cooperative groups, shape ICT utilization skills (SPSS software) as learning aids, and enhance students' mathematical skills. On teaching material materials, statistical materials prepared based on the project by the weighers provide the same or uniform assessment of the seven aspects of the assessment of the teaching material. Thus it can be said that the instructional material of statistical material compiled based on ICT-assisted projects is fulfilling the requirements of face validity and content so that it is considered

feasible to be applied in the learning of statistical material.

2. Developing a quality statistical test instrument to be able to measure the improvement of students' mathematical skills in learning statistical material that meets the requirements of validity, meets reliability, has a good level of difficulty, and has a strong distinguishing power. The results of expert validation and the results of the trial showed that the instrument of statistical reasoning ability after going through several trials and revisions was stated to have fulfilled the requirements of validity, reliability in high categories, good level of difficulty, and strong differentiation so that it could be used as a research instrument. The results of expert validation and the results of the trial showed that the instrument of statistical communication ability after going through the trial and revision showed that there were 8 (eight items that met the validity requirements.

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