Correspondence Editor and Author

Analysis of Students' Scientific Literacy Ability in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PhET Simulation

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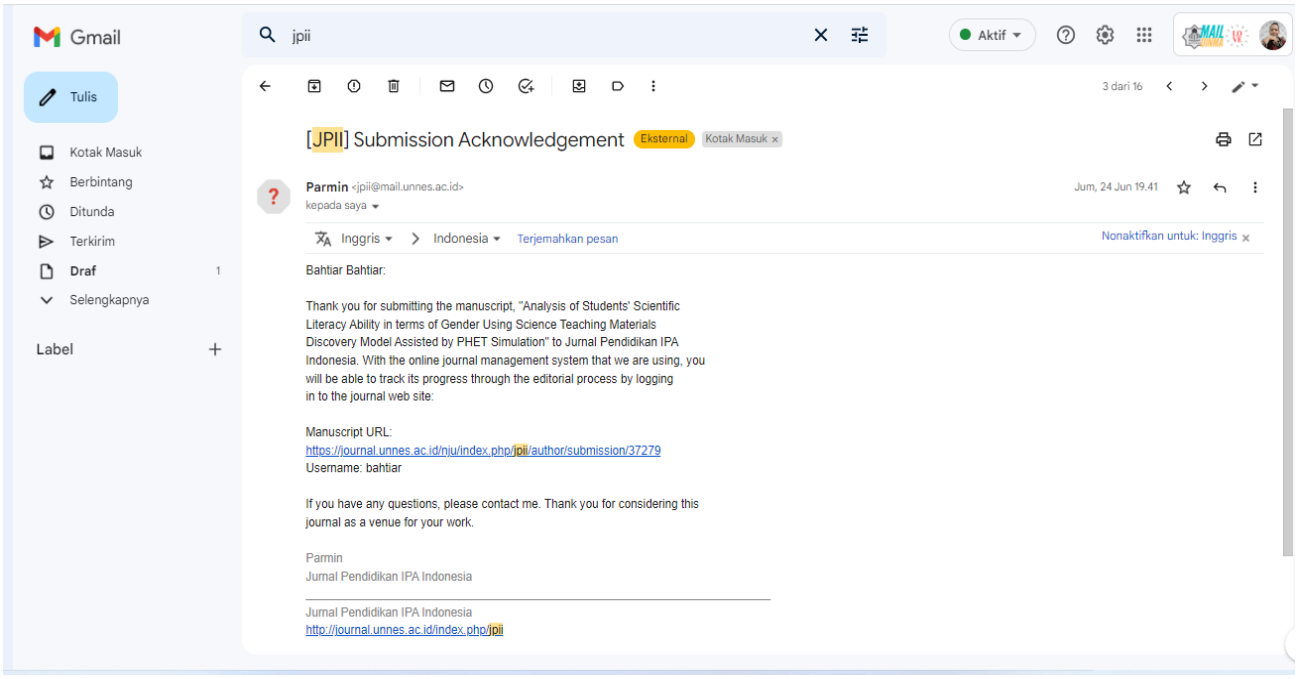

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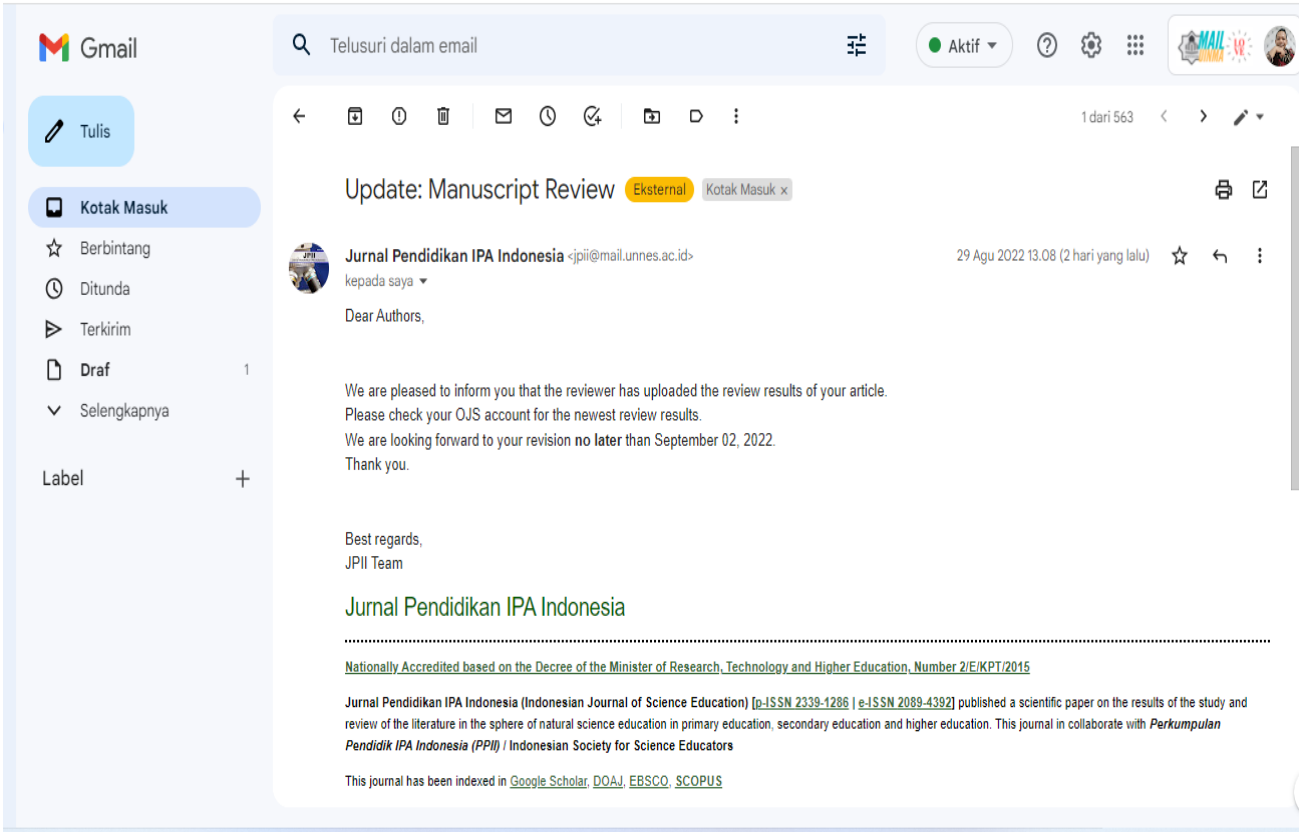

INTRODUCTION

21st Century Skills are a very important topic to be discusse
(Chalkiadaki, 2018) because it is closely related to the developme
(Handajani et al., 2018). 21st Century Learners are digital learners a
main objective of these 21st Century skills is to prepare student
related to competitive and technology-intensive daily life (Anagün, 2
Van Laar et al., (2019) stated that 21st Century skills are in line wi
that are more focused on creative and critical approaches to p
making. 21st-century teaching is expected to produce human resou
forms of 21st-century skills, one of which is mastering scientific l
Rios et al., 2022).

Scientific literacy was first introduced in 1958 by De Paul Hard Hu
Brothers Pund (Khaeroningtyas et al., 2016). In 1958, Paul De Ha
literacy as a goal of science education (Naganuma, 2017; Valladare
the ability of students to use their scientific knowledge in ic
conclusions, and making decisions based on the results that have b
are facing (Effendi et al., 2021; (Mm et al., 2020) (Widiyanti et al
related to students' creative thinking skills (Bahtiar & Ibrahim, 2022)
literacy skills are students who can understand the concepts, pr
the basis of scientific thinking (Ke et al., 2021; OECD, 2019). T
in learning aims to develop students' competence in constructi
scientific method (Liu et al., 2022).

Based on the comes by the Program for International Student A
Indonesia ranked 396. This shows that the results obtained by I
the OECD average and experienced a significant decline, from 403
results of the PISA report are presented in the following image.

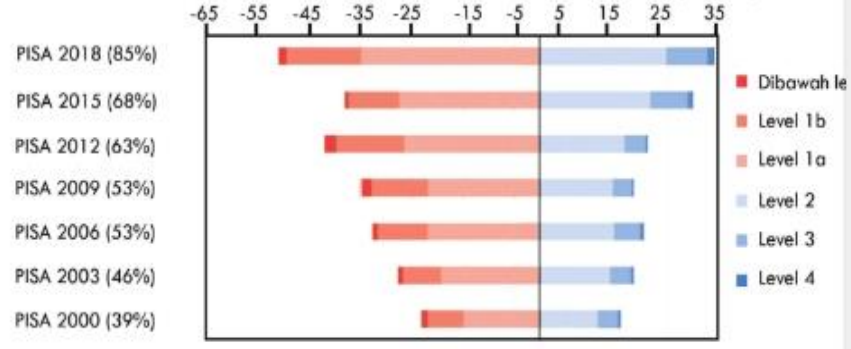

Figure 1. Indonesian Students' Scientific Literacy Results

User
INTRODUCTION should:
• contain urgency (importance) to research
• contain a carrying capacity in the form of supporting data and facts
• contain a preliminary study as a basis for the importance of the research conducted
• contain a GAP ANALYSIS
Departing from the preliminary study, analysis of published articles formulated in the Gap analysis
GAP ANALYSIS refers to articles published in various internationally reputable

METHODS

Research Design

This research is quantitative descriptive. Quasi-experimental resear
that can be applied to only one group which is the experimental
group or control group (Arikunto, 2011). The research design used
pre-test post-test design. This research design is presented in the fo

Table 1. Desain One Group Pretest-Postest

Pretest	Treatment	Post-test
O_1	X	O_2

Participants

User
METHODS should
• contain detailed research stages
• Each stage is explained and analyzed by what method

The population used in this study were all students of class VIII M
population will be used as a research sample. The research sample
sampling technique used was purposive sampling. This means tha
of certain considerations. The consideration in question is that t

No.	Stages	Activity
1.	Research Preparation Stages	Research design
		Study of literature
		Observing the school e
		Developing science
		Discovery Learning mo
		Preparing the Phet Sim
		Making scientific literacy q
2.	Stages of Research Implementation	Validating the instrument f
		Carry out pretest
		Carry out learning using with discovery learning
		Simulation
		Melaksanakan postest
3.	Final Stages of Research	Perform data processing an
		Make a discussion of the re
		Making research conclusio

sample has not studied static electricity material, while the other cla
material. So that the research sample is 30 students in class IX-A.

Research Procedures

This research was conducted from April to May 2022 at MTs Hidaya
this research is right in the even semester of the 2021/2022 acac
conducted in stages as presented in the following table.

User
Research time is too short.

Table 2. Research procedure

Instruments

The research instrument is a tool used to measure the observed r
From this understanding, it can be understood that an instrument is
using data collection methods systematically and more easily. The
used in this study was a multiple-choice scientific literacy test with
a grid of scientific literacy questions.

Table 3. Grid of Science Literacy Questions

No.	Sub Material	Scientific Literacy Indicator
1.	Static electricity	Explaining phenomena scientifically
		Evaluating and designing scientific st
		Interpret data and evidence scientifica
2.	Atom	Explaining phenomena scientifically
		Evaluating and designing scientific st
		Interpret data and evidence scientifica
3.	Electrical charge	Explaining phenomena scientifically
		Evaluating and designing scientific st

consisted of instrument analysis, and analysis of scientific literacy s
this study using the Rash model. Rash modeling is used to analyze
students' scientific literacy skills, with the following equation.

$$P_{ni}\left(x_{ni}=\frac{1}{\beta_n},\delta_i\right) = \frac{e^{(\beta_n-\delta_i)}}{1+e^{(\beta_n-\delta_i)}}$$

Where $P_{ni}\left(x_{ni}=\frac{1}{\beta_n},\delta_i\right)$ is the probability of respondent item produce a c
respondent's ability, β_n, and the difficulty level of the item δ_i.

RESULTS AND DISCUSSION

This study aims to analyze students' scientific literacy skills after using sc
the PheT simulation-assisted discovery learning model. This research v
matter of static electricity. The results of the research and discussion are de

Analysis of Question Instruments

Analysis of scientific literacy questions was carried out before the impleme
learning was carried out. The instrument analysis was carried out to determ
questions, the level of reliability of the questions, and the level of difficulty
the instrument analysis for the level of suitability of the items are presented

Table 4. Output Item Fit

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
12	17	30	.15	.43	1.32	1.56	1.20	.75	A .33	.51	53.3	73.4	Q12
9	14	30	.69	.43	1.29	1.47	1.31	1.10	B .33	.51	60.0	72.7	Q9
4	11	30	1.25	.44	1.21	1.04	1.21	.69	C .37	.50	66.7	73.8	Q4
14	18	30	-.04	.43	1.12	.66	1.04	.23	D .44	.51	70.0	74.1	Q14
7	21	30	-.63	.46	1.06	.34	1.07	.29	E .43	.48	80.0	76.5	Q7
13	8	30	1.86	.47	1.01	.12	.85	-.18	F .46	.46	83.3	78.0	Q13
5	18	30	-.04	.43	.86	-.65	.99	.07	G .57	.51	83.3	74.1	Q5
8	25	30	-1.58	.54	.98	.03	.56	-.49	H .45	.39	76.7	83.7	Q8
3	17	30	.15	.43	.96	-.16	.90	-.24	g .55	.51	73.3	73.4	Q3
10	16	30	.33	.43	.95	-.18	.92	-.19	f .55	.52	70.0	73.1	Q10
15	7	30	2.09	.49	.94	-.17	.65	-.56	e .51	.44	80.0	79.5	Q15
1	19	30	-.23	.44	.92	-.34	.76	-.67	d .57	.50	73.3	74.7	Q1
6	24	30	-1.31	.51	.83	-.58	.53	-.72	c .55	.42	86.7	81.2	Q6
11	20	30	-.42	.45	.83	-.79	.80	-.43	b .59	.49	83.3	75.5	Q11
2	27	30	-2.27	.65	.74	-.55	.33	-.53	a .50	.31	90.0	89.9	Q2
MEAN	17.5	30.0	.00	.47	1.00	.1	.87	-.1			75.3	76.9	
P.SD	5.6	.0	1.15	.06	.17	.7	.27	.5			9.8	4.7	

According to Boone et al., (2013) and Bond et al., (2015), the value o
standard, and point measure correlation are the criteria used to see the le
items in the three criteria are not met, it is certain that the items are not g
improved. In the output table above, it can be seen that the questions Q2, Q
one criterion, so there are no items that need to be changed or replace
analysis are presented in the following table form.

Table 5a. Output Reliability

SUMMARY OF 30 MEASURED Person

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	8.7	15.0	.51	.67	1.01	.11	.87	-.04
SEM	.6	.0	.24	.02	.04	.15	.06	.11
P.SD	3.3	.0	1.30	.11	.24	.82	.30	.58
S.SD	3.3	.0	1.32	.11	.24	.84	.30	.59
MAX.	14.0	15.0	3.16	1.07	1.53	1.98	1.55	1.34
MIN.	3.0	15.0	-1.72	.58	.63	-1.45	.25	-1.15

REAL RMSE	.71	TRUE SD	1.09	SEPARATION	1.53	Person RELIABILITY	.70
MODEL RMSE	.68	TRUE SD	1.11	SEPARATION	1.64	Person RELIABILITY	.73
S.E. OF Person MEAN = .24							

Person RAW SCORE-TO-MEASURE CORRELATION = .99
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .76 SEM = 1.61

User
RESULTS AND DISCUSSION
Tables or graphs (one selected) must represent different results
The results of data analysis must be strong in answering the analysis gap
Display of results other than those narrated in table-graph-image-modeling
The research novelty has not been clear enough
It is recommended not to repeat the references in the introduction, using previous research findings. References used should be taken from reputable journals.

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Authors	Bahtiar Bahtiar, Ibrahim Ibrahim, Maimun Maimun
Title	Analysis of Students' Scientific Literacy Ability in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PHET Simulation
Section	Articles
Editor	Stephani Pamelasari

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Round 1

Review Version	37279-95079-1-RV.docx 2022-06-24
Initiated	2022-08-15
Last modified	2022-09-06
Uploaded file	Reviewer A 37279-98405-1-RV.docx 2022-08-29 Reviewer B 37279-98718-2-RV.docx 2022-09-06

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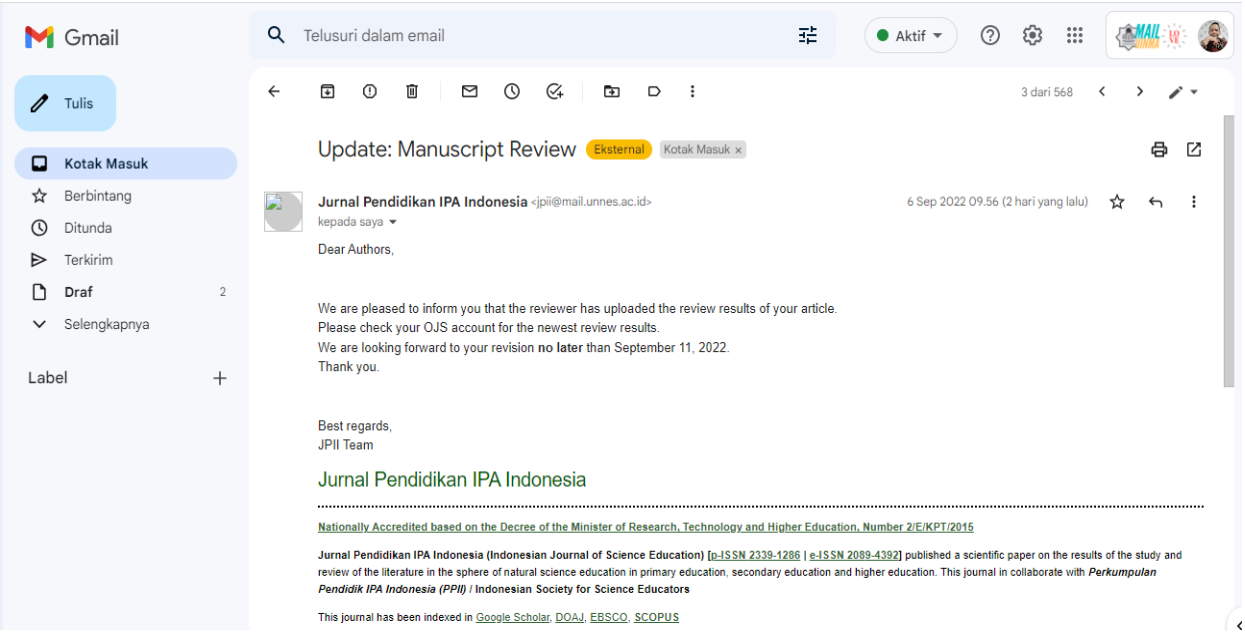

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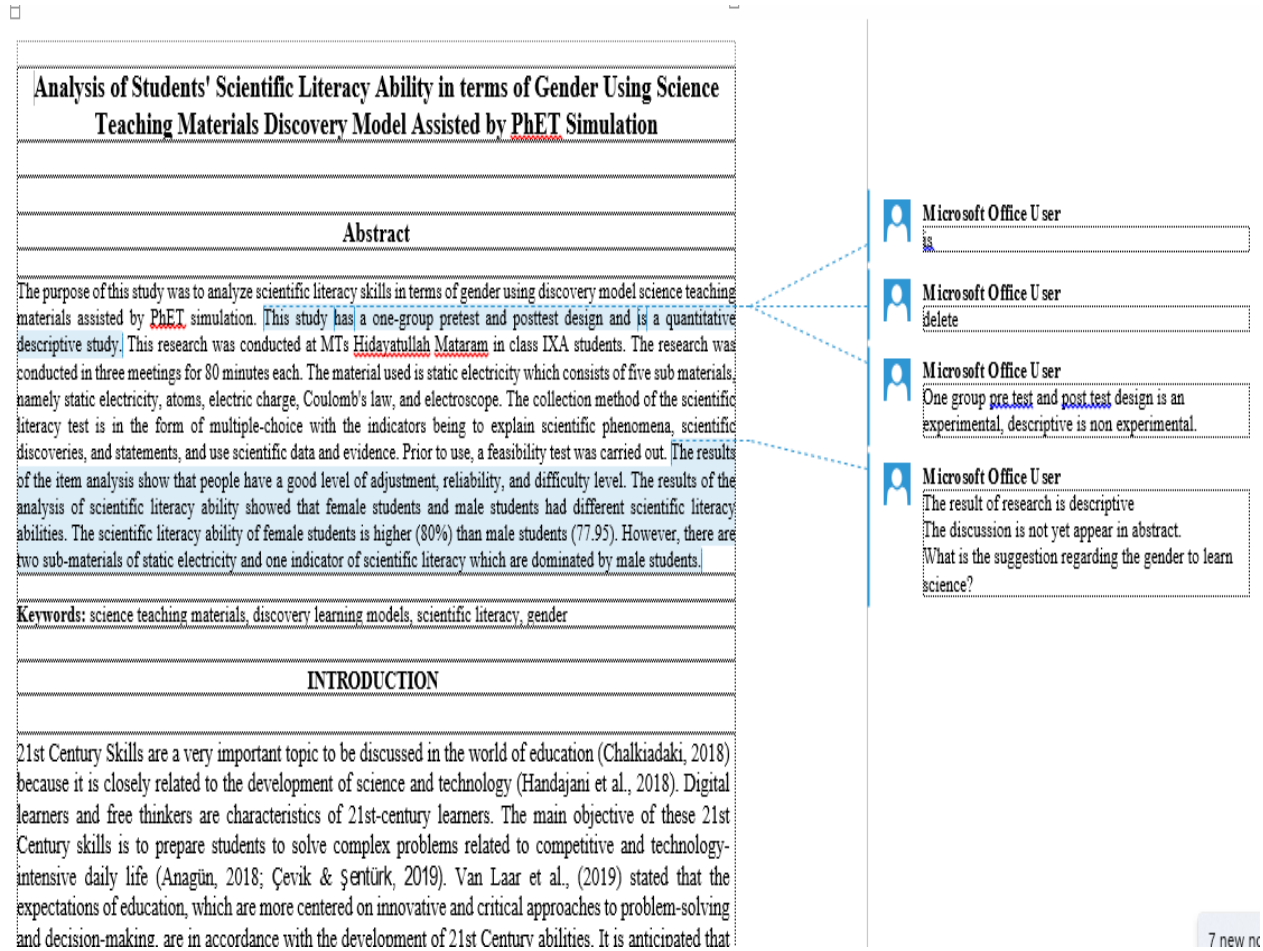

Analysis of Students' Scientific Literacy Ability in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PhET Simulation

Abstract

The purpose of this study was to analyze scientific literacy skills in terms of gender using discovery model science teaching materials assisted by PhET simulation. This study has a one-group pretest and posttest design and is a quantitative descriptive study. This research was conducted at MTs Hidayatullah Mataram in class IXA students. The research was conducted in three meetings for 80 minutes each. The material used is static electricity which consists of five sub materials, namely static electricity, atoms, electric charge, Coulomb's law, and electroscope. The collection method of the scientific literacy test is in the form of multiple-choice with the indicators being to explain scientific phenomena, scientific discoveries, and statements, and use scientific data and evidence. Prior to use, a feasibility test was carried out. The results of the item analysis show that people have a good level of adjustment, reliability, and difficulty level. The results of the analysis of scientific literacy ability showed that female students and male students had different scientific literacy abilities. The scientific literacy ability of female students is higher (80%) than male students (77.95). However, there are two sub-materials of static electricity and one indicator of scientific literacy which are dominated by male students.

Keywords: science teaching materials, discovery learning models, scientific literacy, gender

INTRODUCTION

21st Century Skills are a very important topic to be discussed in the world of education (Chalkiadaki, 2018) because it is closely related to the development of science and technology (Handajani et al., 2018). Digital learners and free thinkers are characteristics of 21st-century learners. The main objective of these 21st Century skills is to prepare students to solve complex problems related to competitive and technology-intensive daily life (Anagün, 2018; Çevik & Şentürk, 2019). Van Laar et al., (2019) stated that the expectations of education, which are more centered on innovative and critical approaches to problem-solving and decision-making, are in accordance with the development of 21st Century abilities. It is anticipated that

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One group pre test and post test design is an experimental, descriptive is non experimental.

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The result of research is descriptive
The discussion is not yet appear in abstract.
What is the suggestion regarding the gender to learn science?

7 new no

et al., 2022); students understand science as a theory so that it is still difficult to apply scientific concepts and scientific facts (Lestari et al., 2019; Rahayu et al., 2022); The low level of students' understanding of the nature of science (NoS) (Wei & Lin, 2022).

The results of the 2022 Indonesian Madrasah Competency Assessment (AKMI) as a measuring tool for diagnosing students' strengths and weaknesses in scientific literacy which consists of five stages show that the results are as follows: (1) need intervention (66%), (2) basic (25%), (3) competent (1%), and (4) skilled and (5) need to be creative, each of which has not reached 1% (Zainiyati & Suyitno, 2022; Widhiarso & Ridho, 2022). Meanwhile, there are 19 provinces whose scientific literacy index is still below the national average, one of which is madrasah students in the province of West Nusa Tenggara. The low value of scientific literacy obtained by Indonesia at PISA 2018 and AKMI 2022 was also due to problems in teaching science in Indonesia (Putri et al., 2021). To raise the standard of Indonesian education, scientific literacy needs to get significant consideration and be addressed as soon as possible (Jeong et al., 2021).

Using appropriate teaching materials when teaching science to students is one strategy that can help develop students scientific literacy. Science learning is learning that provides opportunities for students to gain hands-on experience so that it can increase students' strength to accept, store, and apply the concepts they have learned. In essence, scientific processes, attitudes, and products serve as the foundation for science (Yaşar, 2017; Ozdem-Yilmaz & Bilican, 2020). Student involvement in science learning is shown in several science activities, such as the process of observing, analyzing data, discussing, and presenting the results of observations (Margunayasa et al., 2019; Hussein et al., 2019). These conditions must be followed by learning that can meet the demands of the times (Inkinen et al., 2020). One of the learning models that are in accordance with the demands of the times is the discovery learning model (Bahtiar et al., 2022).

The discovery learning model is one of the learning models that can facilitate students in the concept discovery process (Gunawan et al., 2021; Ilahi et al., 2022). The discovery learning model emphasizes the discovery of concepts and or principles that are not yet owned by students (Ritonga, 2021). Through the discovery learning model, students are familiar with the scientific method and have the ability to think critically and analytically (Serevina & Luthfi, 2021). The main goal of the discovery learning model is to increase students' understanding of knowledge construction through scaffolding, symbolic representation, and discovery (Ozdem-Yilmaz & Bilican, 2020). Research on the application of the discovery learning

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Revise sentence
Research on the application of the discovery learning model conducted by Purwaningsih et al. (2020); Widoretno & Dwiastuti, (2019); and Ristanto et al. (2022) showed that the model can improve students' problem solving and critical thinking skills.

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Learning media that facilitate students in the learning process is also very important to apply (Muhammad, 2020; Winarni et al., 2020). One of the learning media that can be used is PhET simulation. The College of Colorado Boulder's simulation experts developed the website-based simulation known as PhET Simulation to help students learn through simulated learning (Najib et al., 2022; Ben Ouahi et al., 2022). This PhET simulation was created in Java or Flash to enable direct website use with a typical web browser (Eichler, 2022; Qu et al., 2022). The use of PhET Simulation in learning provides interesting things to students so that students can observe directly what is observed and simulated (Rahmawati et al., 2022; Watson et al., 2020; Herrington et al., 2022).

Research conducted by (Habibi et al., 2020; Eveline et al., 2019; Oktaviana et al., 2020; and Kamila & Rahmawati, 2021) on the application of PhET Simulation media in science learning has a positive impact on improving the ability of students to critical thinking skills, mastery of concepts, problem solving, and representation skills.

Therefore, this research is important to do to analyze the scientific literacy skills of students in terms of gender after using discovery learning model teaching materials assisted by PhET simulation. There were three main reasons in mind when conducting this study. First, when it comes to analyzing data presented in tables, diagrams, graphs, and other formats, pupils struggle. Second, the combination of variables in this study, especially in science learning has never been done. Third, research on students' scientific literacy skills in terms of gender only presents research data descriptively. Thus, this research specifically answers: "Do male and female students have good scientific literacy skills about static electricity after using PhET simulation-assisted discovery learning model teaching materials?

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Revise sentence
Research on the application of the discovery learning model conducted by Purwaningsih et al. (2020); Widoretno & Dwiastuti, (2019); and Ristanto et al. (2022) showed that the model can improve students' problem solving and critical thinking skills.

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interest students to make do the direct observation

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representation skills.

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METHODS

Research Design

This research is quantitative descriptive. Quasi-experimental research is an experimental research that can be applied to only one group which is the experimental class without any comparison group or control group (Arikunto, 2011). This study used a one-group pre-test post-test design as its method of investigation. This research design is presented in the form of the following Table 1.

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there is no discussion about why should be research on gender?

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Descriptive is non experimental. The method use descriptive but the design is experimental research

Table 1. Desain One Group Pretest-Postest

Pretest	Treatment	Post-test
O_1	X	O_2

Participants

The population used in this study were all students of class IXA MTs Hidayatullah Mataram. This population will be used as a research sample. The research sample is part of the population. The sampling technique used was purposive sampling. This means that the sample is taken because of certain considerations. The consideration in question is that the class that is the research sample has not studied static electricity material, while the other classes have started to study the material. So that the research sample is 30 students in class IX-A.

Research Procedures

This research was conducted from Oktober 2021 to April 2022 at MTs Hidayatullah Mataram. The timing of this research is right in the even semester of the 2021/2022 academic year. This research was conducted in three stages. The first stage is the research preparation stage. At this stage, several things were carried out such as preparing research designs, studying literature, observing the school environment where the research was carried out, namely at MTs Hidayatullah Mataram, developing discovery-based learning tools assisted by PhET simulations, preparing PhET simulations, and making instrument grids and answers to instrument questions. student scientific literacy.

The second stage is the implementation stage. At this stage, several things were done, namely validating the instrument for scientific literacy questions to students who have studied static electricity, conducting a pretest to the selected class as the research sample, and conducting learning using discovery learning tools assisted by PhET simulation which has been developed for five meetings. , then do a posttest.

The third stage is the final stage of the research. At this stage, there are several things to do, including analyzing research data obtained during the study, presenting research results and discussing research results, and making conclusions. This research was conducted in stages as presented in the following Table 2.

Microsoft Office User
Wrong sentence

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Wrong consideration of the choosing of purposive sample

to more easily master certain parts of the concept. On the other hand, some parts of the concept are easier for boys to understand. This is in line with research conducted by Rosyadah Mukti et al., (2019) and Pramuda et al., (2019) who concluded that the scientific literacy ability of female students was higher than that of male students.

The high scientific literacy ability of both female and male students is due to the use of discovery model teaching materials. Discovery teaching materials are one of the teaching materials that can create a student-centered learning atmosphere (Rosen et al., 2021; Rizki et al., 2021). The development of discovery model science teaching materials aims for students to be able to find out for themselves what is being researched based on the worksheets that have been provided (Munthe et al., 2019; Ellizar et al., 2018). Apart from the discovery model, Satria & Herumurti (2021) stated that the media also plays an important role in the learning process. Learning media that can be used such as PhET simulation can replace experimental activities directly. With the PhET simulation, it is easier for students to understand the concepts being studied (Price et al., 2019; Salame & Makki, 2021). This PhET simulation media was developed to help students understand science concepts visually using dynamic graphics (Mahtari et al., 2020).

CONCLUSION

Based on the description above, it can be concluded that the scientific literacy skills of students before and after using discovery model science teaching materials assisted by PhET simulation in the process of learning static electricity material in class IXA students of MTs Hidayatullah Mataram are different. The average posttest score is higher than the pretest. The average scientific literacy ability of female students at the time of the posttest was 80 higher than male students who obtained an average of 77.95. However, in some sub-materials of static electricity, the literacy ability of male students is higher than that of female students. In terms of scientific literacy indicators, the two scientific literacy indicators for female students are higher than for male students.

The impact of this research in the world of education is to provide new knowledge, insight, and information about learning models and learning media, especially PhET simulations that can be used in science learning. With the results of this study, it can also be a reference and information for teachers in paying attention to diversity in the division of male and female groups. Some of the limitations associated with this research are that this research only analyzes the data on instrument questions and students' scientific literacy skills. Further analysis related to the increase and the effect of discovery model science teaching materials assisted by PhET simulation is very possible. In addition, researchers also still use a small sample, so it is possible to increase the number of samples in further research.

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Which concept? Explain why?

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There is no supporting theory that explain why female students achieve better scientific literacy than male.

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what is the suggestion regarding the gender to learn science?

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Title	Analysis of Students' Scientific Literacy Ability in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PHET Simulation
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Last modified	2022-09-06
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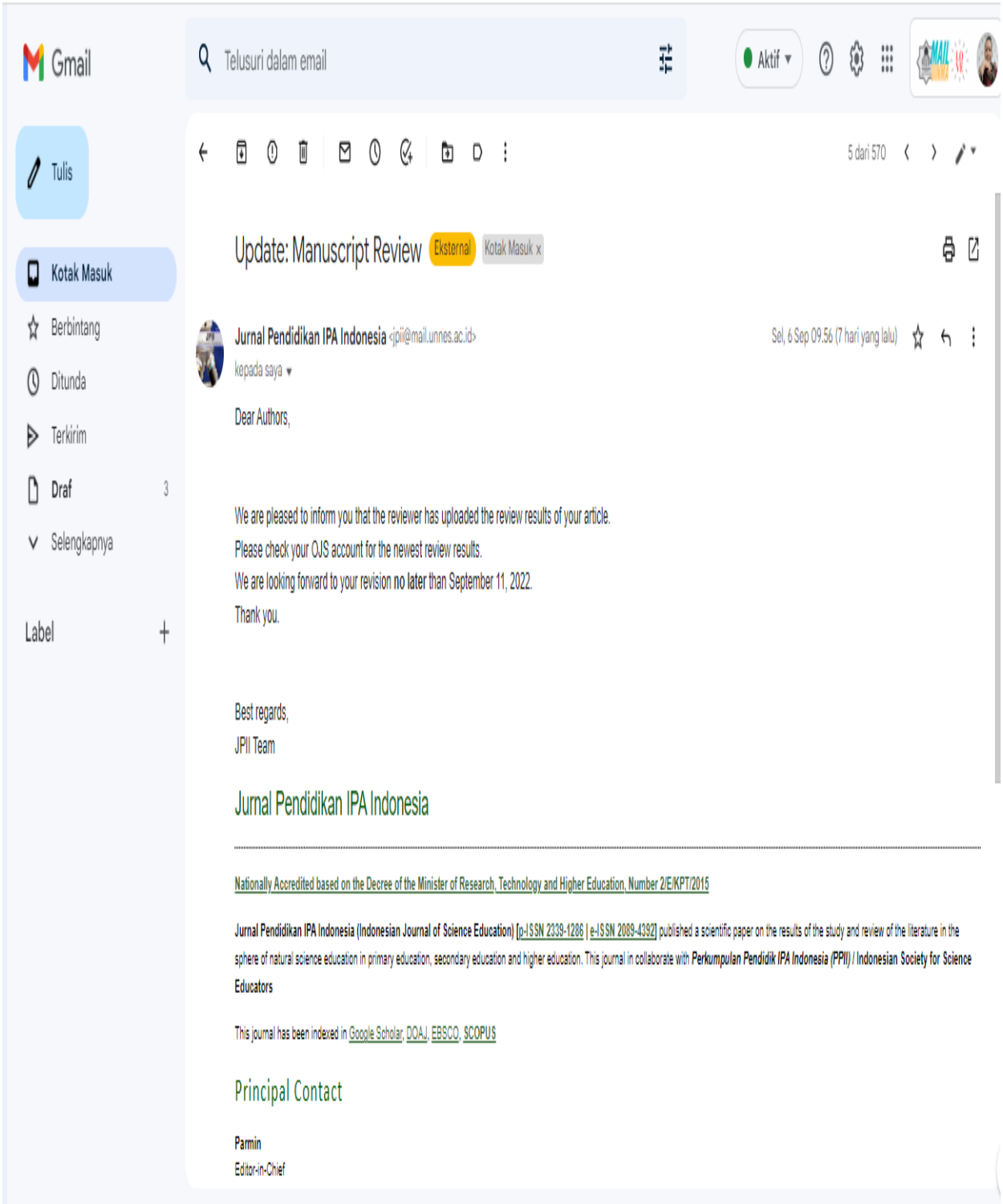

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Editor-in-Chief

Analysis of Students' Scientific Literacy Ability in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PhET Simulation

Abstract

The purpose of this study was to analyze scientific literacy skills in terms of gender using discovery model science teaching materials assisted by PhET simulation. This study is a one-group pretest and posttest design and an experimental. This research was conducted at MTs Hidayatullah Mataram in class IXA students. The research was conducted in three meetings for 80 minutes each. The material used is static electricity which consists of five sub materials, namely static electricity, atoms, electric charge, Coulomb's law, and electroscope. The collection method of the scientific literacy test is in the form of multiple-choice with the indicators being to explain scientific phenomena, scientific discoveries, and statements, and use scientific data and evidence. Prior to use, a feasibility test was carried out. The results of the item analysis show that people have a good level of adjustment, reliability, and difficulty level. The research found that: (1) female students and male students had different scientific literacy abilities, where the scientific literacy ability of female students was higher (80) than male students (77.95); (2) there were three sub-materials dominated by female students, namely the sub-materials of electrical charge, Coulomb's Law, and electroscope; (3) there are two sub-materials of static electricity which are dominated by male students, namely the sub-materials of static electricity and atoms; (4) the average percentage of the indicators explaining phenomena scientifically, and interpret data ad evidence scientifically female students are higher than male students; and (5) the average percentage of evaluating and designing scientific statements is higher for male students than female students. Suggestions for teachers are to pay attention to the roles between female and male students in the learning process, so that the abilities of female and male students are not much different.

Keywords: *science teaching materials, discovery learning models, scientific literacy, gender*

INTRODUCTION

21st Century Skills are a very important topic to be discussed in the world of education (Chalkiadaki, 2018) because it is closely related to the development of science and technology (Handajani et al., 2018). Digital learners and free thinkers are characteristics of 21st-century learners. The main objective of these 21st Century skills is to prepare students to solve complex problems related to competitive and technology-intensive daily life (Anagün, 2018; Çevik & Şentürk, 2019). Van Laar et al., (2019) stated that the expectations of education, which are more centered on innovative and critical approaches to problem-solving and decision-making, are in accordance with the development of 21st Century abilities. It is anticipated that 21st-century education will develop human resources who possess various 21st-century competencies, including scientific literacy (Menggo et al., 2019; Rios et al., 2022).

In 1958, De Paul Hard Hurd, McCurry, and the Rockefeller Brothers Pund presented scientific literacy (Khaeroningtyas et al., 2016). Paul De Hard Hurd first proposed scientific literacy as an objective for science education (Naganuma, 2017; Valladares, 2021). Scientific literacy is the capacity for students to utilize their knowledge of science to formulate hypotheses, draw inferences, and come to judgments about their problems in light of the data that has been gathered (Effendi et al., 2021; Mm et al., 2020; Widiyanti et al., 2015). Scientific literacy is related to students' creative thinking skills (Bahtiar & Ibrahim, 2022). Students who have scientific literacy skills are students who can understand the concepts, principles, and theories that form the basis of scientific thinking (Ke et al., 2021; économiques, 2019). The emphasis on scientific literacy in learning aims to develop students' competence in constructing scientific knowledge using the scientific method (Liu et al., 2022).

Based on the comes by the Program for International Student Assessment (PISA) report, in 2018 Indonesia ranked 396. This shows that the results obtained by Indonesian students are far below the OECD average and experienced a significant decline, from 403 to 396 (Schleicher, 2018). The results of the PISA report are presented in the form of Figure 1 below.

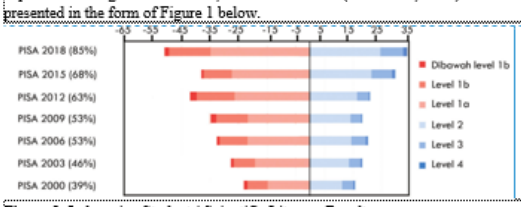

Figure 1. Indonesian Students' Scientific Literacy Results

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Research conducted by (Habibi et al., 2020; Eveline et al., 2019; Oktaviana et al., 2020; and Kamila & Rahmawati, 2021) on the application of PhET Simulation media in science learning has a positive impact on improving the ability of students to critical thinking skills, mastery of concepts, problem solving, and representation skills.

Therefore, this research is important to do to analyze the scientific literacy skills of students in terms of gender after using discovery learning model teaching materials assisted by PhET simulation. There were four main reasons in conducting this study. First, when it comes to analyzing data presented in tables, diagrams, graphs, and other formats, pupils struggle. Second, the combination of variables in this study, especially in science learning has never been done. Third, research on students' scientific literacy skills in terms of gender only presents research data descriptively. Fourth, gender research needs to be done so that teachers understand the different roles between men and women. Through gender recognition, teachers can teach students according to their respective roles. Thus, this research specifically answers: "Do male and female students have good scientific literacy skills about static electricity after using PhET simulation-assisted discovery learning model teaching materials?

User
The introduction contains the purpose of article/research that is formulated

METHODS

Research Design

This research is experimental. Quasi-experimental research is an experimental research that can be applied to only one group which is the experimental class without any comparison group or control group (Sugiyono, 2020). This study used a one-group pre-test post-test design as its method of investigation. This research design is presented in the form of the following Table 1.

Table 1. Desain One Group Pretest-Postest

Pretest	Treatment	Post-test
O_1	X	O_2

in PhET simulations than female students who were more focused on what was instructed on student worksheets only. Balloons and Static Electricity is one of the simulations that contain a lot of static electricity content related to positive and negative charges (Ajredini et al., 2014). The Balloons and Static Electricity simulation permits students to adaptably investigate static electricity (Lewis, 2018). Concepts such as exchange of charge, acceptance, fascination, repugnance, and establishing. The illustration of the PhET simulation used in static electricity and atomic sub-materials is as follows.

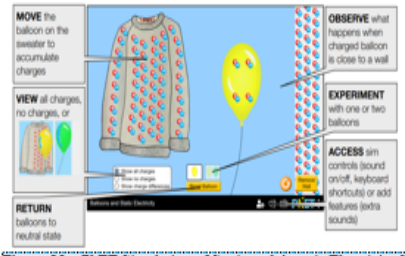

Figure 12a. PhET Simulation of Static and Atomic Electricity Sub-Material

Figure 12b. PhET Simulation of Static and Atomic Electricity Sub-Material

In the sub-material of electric charge, Coulomb's Law, and electroscope, the average percentage of female students was shown to be higher than that of male students. This is because female students are able to operate with the maximum PhET simulation given. In Charges and Fields, students explore electrostatics as they arrange positive and negative charge space and observe the resulting electric field, voltage, and equipotential lines.

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1. Each picture/table is preceded by an introduction to the description, and after the picture/table is given a description of the results shown.
2. The pictures/tables must not be consecutive.

Figure 14. Comparison of Students' Science Literacy Ability Based on Indicators

Based on Figure 14, it is known that female students have a greater level of scientific literacy than male students have in terms of indicators of scientifically understanding phenomena and scientifically evaluating facts and evidence. This shows that female students understand better in applying scientific knowledge in situations given in the form of questions. Female students are also better at describing or interpreting phenomena scientifically. In addition, female students are also better at identifying the assumptions, evidence, and reasons behind the conclusions drawn.

However, on the indicators of evaluating and designing scientific statements, the ability of male students is higher than that of female students. This indicates that male students understand better about describing and evaluating the methods used in solving problems, and are able to propose a method of investigation. The findings of this study are consistent with studies done by (Susongko et al., 2021) which suggested that in science learning, female students need to be given further training in the ability to evaluate and design scientific statements, while male students need further training in explaining phenomena scientifically and interpret data and evidence scientifically. In general, students' scientific literacy skills after using discovery model teaching materials assisted by PhET simulation are presented in the following figure.

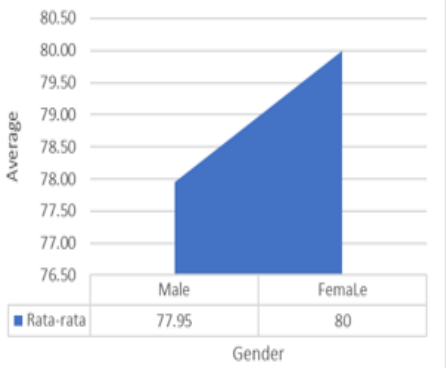

Figure 15. Comparison of Students' Literacy Ability Based on Gender

In general, Figure 15 demonstrates that female students have a better level of scientific literacy than male students do. Where female students score on average at 80.00% and male students score at 77.95% for scientific literacy. Based on the findings that have been stated, the authors recommend adding student-centered collaborative learning activities. Students can be grouped heterogeneously with the aim that male students can be helped by female students who tend

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to more easily master certain parts of the concept. On the other hand, some parts of the concept are easier for male to understand. Concepts that are easily understood by male students are static electricity sub-material and atomic sub-material. The high average percentage obtained by male students is due to the fact that male students are more active in trying new things in this sub-material PhET simulation. This is in line with research conducted by Rosyadah Mukti et al., (2019) and Pramuda et al., (2019) who concluded that the scientific literacy ability of female students was higher than that of male students. The high scientific literacy ability of female students is because female students are easier to work with and involve themselves in activities in the classroom (Queiruga-Dios et al., 2020). Female students also have a greater interest in learning than boys (Stoet & Geary, 2018). Another study also found that female students were less likely to be bullied than boys, which made female students more enthusiastic about learning (Haegele et al., 2018).

The high scientific literacy ability of both female and male students is due to the use of discovery model teaching materials. Discovery teaching materials are one of the teaching materials that can create a student-centered learning atmosphere (Rosen et al., 2021; Rizki et al., 2021). The development of discovery model science teaching materials aims for students to be able to find out for themselves what is being researched based on the worksheets that have been provided (Munthe et al., 2019; Ellizar et al., 2018). Apart from the discovery model, Satria & Herumurti (2021) stated that the media also plays an important role in the learning process. Learning media that can be used such as PhET simulation can replace experimental activities directly. With the PhET simulation, it is easier for students to understand the concepts being studied (Price et al., 2019; Salame & Makki, 2021). This PhET simulation media was developed to help students understand science concepts visually using dynamic graphics (Mahtari et al., 2020).

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The discussion part should contain the benefit of the research result

User
Comparisons to the findings of previous studies must be included

CONCLUSION

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The conclusion of the research is conceptual. The research impact must be stated.

Based on the description above, it can be concluded that the scientific literacy skills of students before and after using discovery model science teaching materials assisted by PhET simulation in the process of learning static electricity material in class IXA students of MTs Hidayatullah Mataram are different. The average posttest score is higher than the pretest. The average scientific literacy ability of female students at the time of the posttest was 80 higher than male students who obtained an average of 77.95. However, in some sub-materials of static electricity, the literacy ability of male students is higher than that of female students. In terms of scientific literacy indicators, the two scientific literacy indicators of female students are higher than male students.

The impact of this research in the world of education is to provide new knowledge, insight, and information about learning models and learning media, especially PhET simulations that can be used in science learning. With the results of this study, it can also be a reference and information for teachers in paying attention to diversity in the division of male and female groups. Some of the limitations associated with this research are that this research only analyzes the data on instrument questions and students' scientific literacy skills. Further analysis related to the increase and the effect of discovery model science teaching materials assisted by PhET simulation is very possible. In addition, researchers also still use a small sample, so it is possible to increase the number of samples in further research. In addition, suggestions for teachers are to pay attention to the roles between female and male students in the learning process, so that the abilities of female and male students are not much different.

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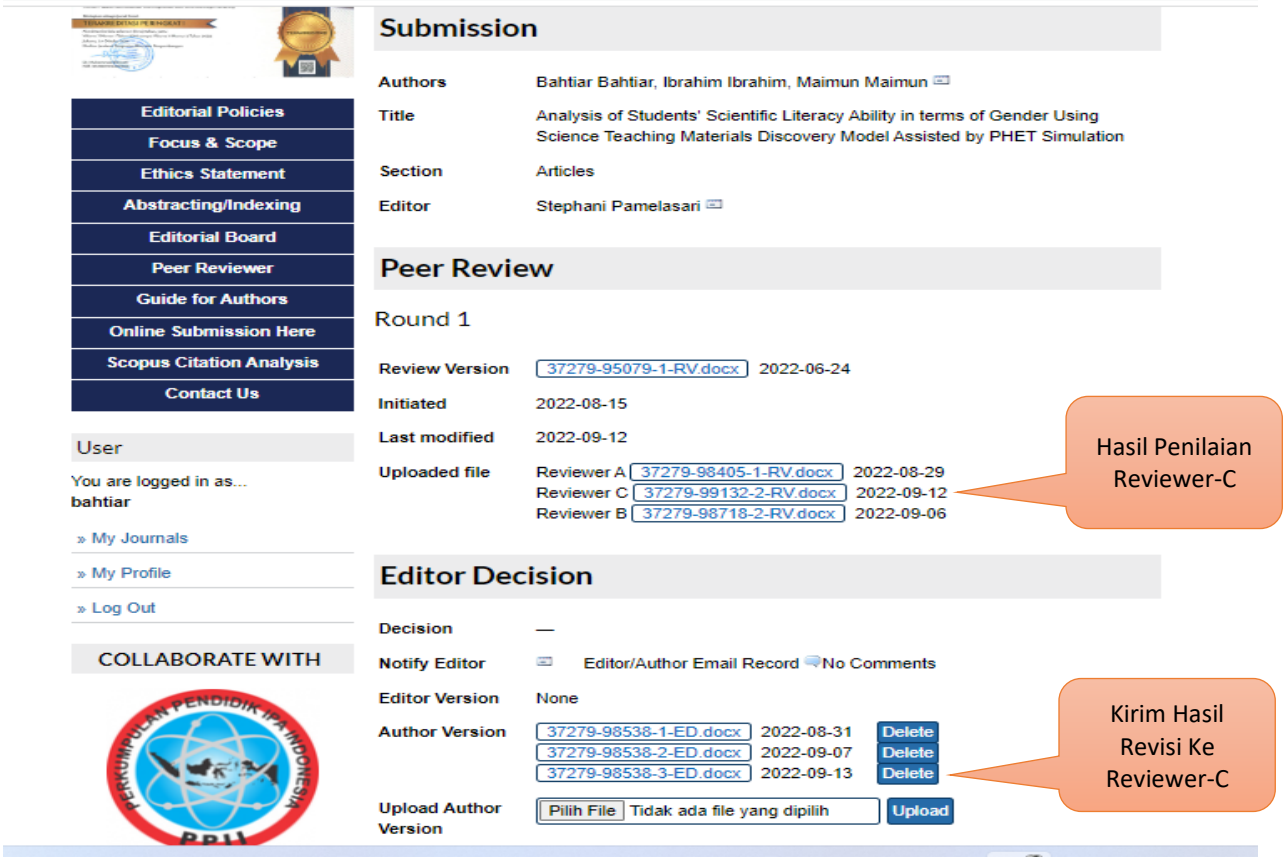
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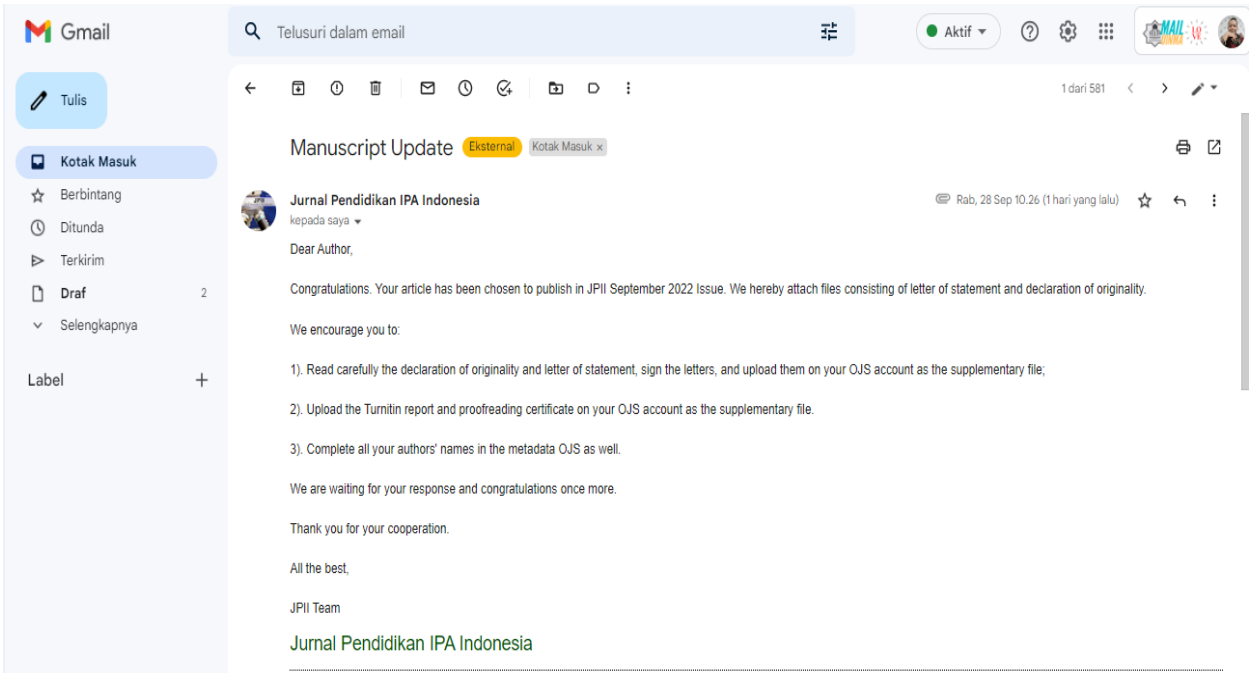
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We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

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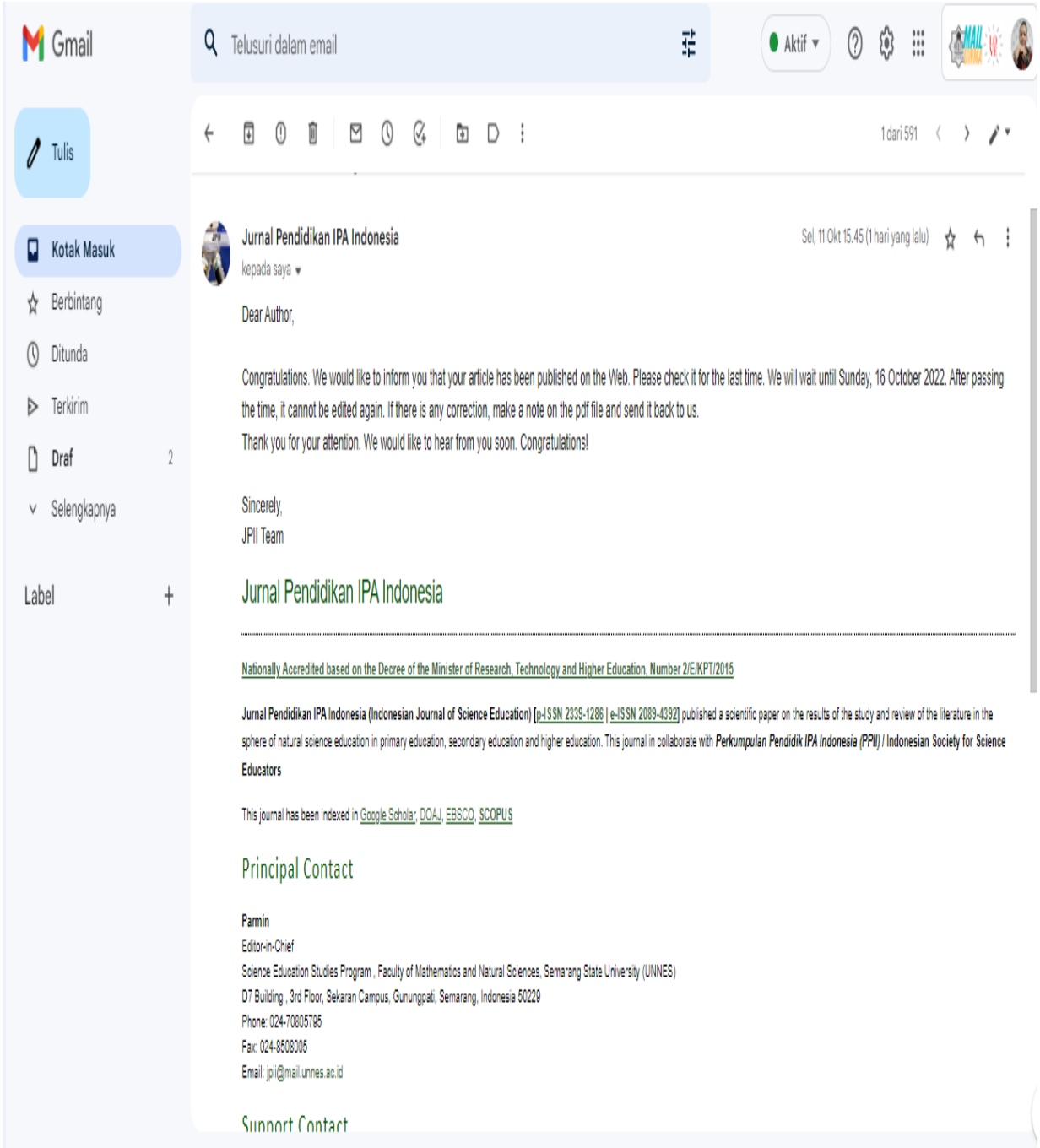
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Analysis of Students' Scientific Literacy Skill in terms of Gender Using Science Teaching Materials Discovery Model Assisted by PhET Simulation

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Abstract

This study aimed to analyze scientific literacy skills in terms of gender using discovery model science teaching materials assisted by PhET simulation. This study is a one-group pretest and posttest design and an experimental. This research was conducted at MTs Hidayatullah Mataram in class IXA students in three meetings for 80 minutes each. The material used is static electricity which consists of five sub materials, namely static electricity, atoms, electric charge, Coulomb's law, and electroscope. The collection method of the scientific literacy test is in the form of multiple-choice with the indicators of being to explain scientific phenomena, scientific discoveries, and statements, and use scientific data and evidence. Prior to use, a feasibility test was carried out. The results of the item analysis show that people have a good level of adjustment, reliability, and difficulty level. The research found that: (1) female and male students had different scientific literacy skills, where the scientific literacy skill of female students was higher (80) than male students (77.95); (2) there were three sub-materials dominated by female students, namely the sub-materials