

# [IJERE] Article Review Request



**From** Dr. Lina Handayani <ijere@iaesjournal.com>  
**To** Furtasan Ali Yusuf <fay@binabangsa.ac.id>  
**Reply-To** Dr. Lina Handayani <linafkm@gmail.com>  
**Date** 2022-11-30 15:47

The following message is being delivered on behalf of International Journal of Evaluation and Research in Education (IJERE).

---

Furtasan Ali Yusuf:

I believe that you would serve as an excellent reviewer of the manuscript, "The Effect of Information Technology-Based Learning on the Learning Outcomes of Indonesian Students: A Meta-Analysis Study," which has been submitted to International Journal of Evaluation and Research in Education (IJERE). The submission's abstract is inserted below, and I hope that you will consider undertaking this important task for us.

Please log into the journal web site by 2022-12-07 to indicate whether you will undertake the review or not, as well as to access the submission and to record your review and recommendation. The web site is

<https://ijere.iaescore.com/index.php/IJERE>

The review itself is due 2022-12-28.

If you do not have your username and password for the journal's web site, you can use this link to reset your password (which will then be emailed to you along with your username).

<https://ijere.iaescore.com/index.php/IJERE/login/resetPassword/fay?confirm=c1e3d6c9e2650d52836184ff6a9af59ca085faab7a7dcbd8f8793599fa0a68ce%3A1669805276>

Submission URL:

<https://ijere.iaescore.com/index.php/IJERE/reviewer/submission/47729>

Thank you for considering this request.

Dr. Lina Handayani  
Universitas Ahmad Dahlan  
Phone +62274379418  
Fax +62274381523  
[linafkm@gmail.com](mailto:linafkm@gmail.com)

"The Effect of Information Technology-Based Learning on the Learning Outcomes of Indonesian Students: A Meta-Analysis Study"

## Abstract

The utilization of information technology in the field of education provides opportunities for learners to access various learning resources that are not limited. This utilization is expected to increase the success of the learning process and the achievement of educational goals. This study aims to reveal the effect of information technology-based learning on the learning achievement of Indonesian students. This research is a meta-analysis study. The studies under analysis were taken from the Google Scholar and Scopus databases through a selection process based on predetermined criteria. The protocol used is based on the PRISMA protocol. A total of 51 studies were included in this study, which consisted of 44 scientific journals and seven proceedings. The analysis technique used is a meta-analysis of the random effect size model. The research findings show that the effect sizes of the analyzed studies vary, ranging from -0.80 to 5.85, and indicate that there is heterogeneity in the analyzed studies. Based on these findings, the effect size model used in this meta-analysis is a random effect size model. The results of the study indicate that information technology-based learning affects the learning achievement of Indonesian students. The effect given by information technology-based learning on learning achievement is in the large category with the summary effect value showing the number 1.285 with a p-value <0.001 and a confidence interval of 1.012 for the lower limit and 1.559 for the upper limit. The results of the sub-group analysis show that there is a significant difference in the average effect size at the level of education among elementary, secondary, and tertiary education. The results also show that there is no publication bias problem in this meta-analysis study

---

International Journal of Evaluation and Research in Education (IJERE)

<http://ijere.iaescore.com>

## The Effect of Information Technology-Based Learning on the Learning Outcomes of Indonesian Students: A Meta-Analysis Study

Iqbal Faza Ahmad<sup>1</sup>, Farida Agus Setiawati<sup>1</sup>, Rani Putri Prihatin<sup>2</sup>

<sup>1</sup> Department of Educational Research and Evaluation, Graduate School, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

<sup>2</sup> Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia

### Article Info

#### Article history:

Received mm dd, yyyy

Revised mm dd, yyyy

Accepted mm dd, yyyy

#### Keywords:

Learning Outcomes

Learning Effect

Information Technology

### ABSTRACT

The utilization of information technology in the field of education provides opportunities for learners to access various learning resources that are not limited. This utilization is expected to increase the success of the learning process and the achievement of educational goals. This study aims to reveal the effect of information technology-based learning on the learning achievement of Indonesian students. This research is a meta-analysis study. The studies under analysis were taken from the Google Scholar and Scopus databases through a selection process based on predetermined criteria. The protocol used is based on the PRISMA protocol. A total of 51 studies were included in this study, which consisted of 44 scientific journals and seven proceedings. The analysis technique used is a meta-analysis of the random effect size model. The research findings show that the effect sizes of the analyzed studies vary, ranging from -0.80 to 5.85, and indicate that there is heterogeneity in the analyzed studies. Based on these findings, the effect size model used in this meta-analysis is a random effect size model. The results of the study indicate that information technology-based learning affects the learning achievement of Indonesian students. The effect given by information technology-based learning on learning achievement is in the large category with the summary effect value showing the number 1.285 with a p-value <0.001 and a confidence interval of 1.012 for the lower limit and 1.559 for the upper limit. The results of the sub-group analysis show that there is a significant difference in the average effect size at the level of education among elementary, secondary, and tertiary education. The results also show that there is no publication bias problem in this meta-analysis study.

This is an open access article under the [CC BY-SA](#) license.



### Corresponding Author:

Iqbal Faza Ahmad

Department of Educational Research and Evaluation, Graduate School, Universitas Negeri Yogyakarta, Indonesia

Kampus Karangmalang, Yogyakarta 55281

Email: iqbalfaza.2020@student.uny.ac.id

## 1. INTRODUCTION

Transformations in numerous sectors of life need that individuals constantly adapt to change. Because these quick changes are impacted by humans' adaptive power and their environment, the ability to adapt and change is required in the building of an evolved society [1]. The government, society, and educational institutions have long prioritized efforts to increase quantity, quality, effectiveness, and efficiency in the sphere

Commented [A2]: Why isn't "meta analysis" used as a keyword?

Commented [A1]: The Abstract should be 100 to 200 words in length.

of education. These initiatives include using information technology to become a trend center to improve the effectiveness and efficiency of education, particularly in the learning process.

The growth of information technology is so rapid that the flow of information is so rapid. Following the first and second wave revolutions in agriculture and industry, Alvin Toffler dubbed the third wave revolution the rise of information technology [2]. The ramifications of information technology development in the field of education include access to limitless sources of information via the internet network, which recognizes no bounds of space and time, both locally, nationally, and worldwide, allowing for remote learning [3], [4].

In contrast to traditional learning, which is centered in the classroom and requires physical face-to-face interaction between teachers and students, distance learning is designed with a learning system that is carried out outside of the classroom and does not require physical face-to-face interaction between teachers and students [5]. Distance learning is now possible because of advancements in information technology [6]. Interaction between teachers and students can take place in real-time or indirect time (asynchronous).

The use of information technology in the field of education, such as gadgets and internet networks, allows students to get access to a variety of learning resources and limitless learning materials. It is predicted that by utilizing this technology, it will be possible to boost the success of the learning process, minimize class absence and dropout rates, and provide an equal distribution of possibilities to get an education that reaches diverse levels of society from various locations [5].

The utilization of information technology is one of the keys to improving the quality and quality of education in Indonesia [7]. Stakeholders in the field of education must be fast and responsive in responding to these technological developments. The impetus to apply information technology in education is not just to follow global trends but is a strategic step in improving access and quality of education.

In the recent decade, the use of information technology in education has piqued the interest of educational experts and practitioners in Indonesia. Especially in the first half of 2020, when the Covid-19 pandemic affected the school industry, necessitating online learning. Many scholars and practitioners are investigating the effectiveness of learning that makes use of information technology. Several prior research has demonstrated the favorable impact of information technology on the learning process [8]–[14].

The use of digital learning media influences the interests and learning outcomes of students. Digital-based learning media provides advantages because it is easy to use, practical, effective, and in the implementation of the learning process [15]. The use of information technology also affects learning as stated by Jasmi & Tamuri [16].

However, some studies suggest otherwise. Research conducted by Prestiadi et al. by using the meta-analysis method concluded that the effectiveness of online learning is still less effective when compared to conventional or face-to-face learning. This is influenced by several factors, including teacher competence in utilizing digital technology, instruments used in online learning such as gadgets and internet network support, and student behavior in carrying out online learning [17].

The problem that arises in Indonesia is that the use of information technology or e-learning in the learning process is not yet optimal, especially in eastern Indonesia. This can be seen from the ineffective management of e-learning sites in several educational institutions such as schools and universities. The e-learning facilities provided have very limited access, both in terms of resources and in managing the website. The use of e-learning must be supported by various resources including the readiness of educators and students to carry out learning that utilizes digital technology [8].

The researcher discovered that with diverse research findings connected to the effectiveness of the use of information technology in the learning process in Indonesia, it is necessary to perform a study that analyses the research findings in a meta-analysis framework. It is assumed that a meta-analysis study will be able to explain the reality that no research is free of faults or mistakes. Such meta-analytical research should also take into account publication bias. As a result of this publication bias, the published literature may not be representative of all research undertaken on a topic, resulting in published studies reporting larger overall effect sizes.

In the last two decades, research related to the effectiveness of the use of information technology in education has been widely carried out. Krisanna (2020) conducted a study using a meta-analysis procedure to examine the experimental research literature on the use of telecourses in adult learning and higher education. The study included experiments using both one-way and two-way video and audio. The purpose of this study was to review the evidence regarding the effectiveness of information technology-based telecourses. Variables that affect student achievement are the type of interaction, the type of course, and the type of remote site. Two-way interaction was found to be the best method of interaction between the learner and the instructor.

Furthermore, a meta-analysis of the literature comparing distance education (DE) between 1985 and 2002 was conducted by Bernard et al. [18]. In total, the study included 232 studies containing 688 respondents regarding independent achievement, attitude, and retention outcomes which were then analyzed. The overall

**Commented [A3]:**  
Researchers cannot describe the novelty of their research. According to him, this research is more specific than other studies because this research examines the effectiveness of information technology in learning in Indonesia.

**Commented [A4]:**  
Citation error. It should be in the form of a number, for example [15]

**Commented [A5]:**  
Citation error. It should be in the form of a number, for example [15]

**Commented [A6]:**  
See, researchers describe research on the same theme in the same country. This means that there is no difference or privilege in this meta-analysis.

**Commented [A7]:**  
The researcher also explained that there had been previous research which even had a much wider research sample and far more diverse topics than this research. Then why did the researcher conduct this research?

results show a zero-effect size on all three measures and wide variability. This shows that many students who use distance education platforms are doing well and many are performing worse. Bernard et al. divide the achievements into synchronous and asynchronous DE forms and produces somewhat different impressions. In general, the average achievement effect size for synchronous applications favors classroom learning, while the effect size for asynchronous applications favors DE. However, significant heterogeneity remained in each subset [18].

Ozdemir et al. conducted another study that aims to determine the effect of Augmented Reality (AR) applications in the learning process. To determine the effect of AR in the learning process, an experimental study conducted in 2007-2017 on the use of AR in education was analyzed using the Meta-Analysis Method. The articles analyzed were selected among publications in journals indexed in the Social Sciences Citation Index (SSCI). In this context, 16 studies were examined to identify the influence of AR applications in the learning process. The results showed that the AR application improved students' academic achievement in the learning process compared to traditional methods. The study explained that the use of AR did not show a significant difference in academic success in the learning process [19].

According to the preceding explanation, the researcher discovered a gap in prior studies, where there were inconsistencies in the conclusions on the effectiveness of information technology-based learning, particularly in Indonesia. As a result, using a meta-analysis methodology, it is critical to investigate the impact of information technology-based learning on the accomplishment of student learning outcomes in Indonesia. It is predicted that a meta-analysis study will be able to completely describe the findings of linked earlier investigations. This study was carried out in an attempt to offer a theoretical contribution to the future advancement of Indonesian education.

## 2. METHOD

This research is a type of meta-analysis research [20]. Meta-analysis is a quantitative statistical method for compiling and analyzing descriptive data from various relevant published and unpublished research results that explore and test the same research problems and hypotheses [21]. According to Borenstein et al., the stages of meta-analysis consist of (1) formulating problems, (2) searching the literature, (3) collecting information and findings from individual studies, (4) evaluating the quality of studies, (5) analyzing and interpreting study results, and (6) interpret the results or evidence [22]. In this meta-analysis, the data used are secondary data obtained from published research related to the effectiveness of information technology-based learning on the achievement of student learning outcomes in Indonesia. Through a meta-analysis study, it is expected to be able to comprehensively summarize the findings of previous related studies.

The literature reviewed in this study is journal articles and proceedings, in Indonesian or English and the research subjects are students. The year of publication of articles is limited to 2017 to 2021. Article searches are carried out by entering keywords in the Google Scholar and Scopus databases.

## 3. RESULTS AND DISCUSSION

A total of 51 research articles were included in the meta-analysis. The 51 research articles consist of 7 articles which are proceedings, and 44 articles are journals. These studies are extracted into a table containing information for each article. The table contains the name of the researcher and year of publication, topic, research design, sample group, number of samples, mean, and standard deviation.

Based on the year of publication, the number of studies published in 2017 was 3, in 2018 there were 6, in 2019 there were 8, in 2020 there were 12, and in 2021 there were 22. There were a total of 51 studies published between 2017 and 2021. While the number of studies based on the elementary school education level is four, the junior high school level is thirteen, the high school level is twenty-seven, and the college level is seven.

Table 1. Literature database

No.	Author	Method	Education level	Control Sample	Exp Sample	Control Mean	Control SD	Exp Mean	Exp SD
1	Basuki et.al. [23]	Research and Development	College	34	35	86,97	4,26	91,14	4,16
2	Budiman et.al. [24]	Quasi-experimental	College	30	30	75,5	11,8	81,03	11,6
3	Derlina et.al. [25]	Pretest- posttest control group design	Senior High School	35	35	71,8	13,8	84,19	7,38
4	Dewi, [26]	Research & development	Primary school	78	77	52,95	13,2	82,08	11
5	Ering et.al. [27]	Experiment	Senior High	25	26	64,8	11,4	71,04	11,7

*Paper's should be the fewest possible that accurately describe ... (First Author)*

### Commented [A8]:

Researchers are not focused. At the beginning of the introduction, the researcher never mentioned the type of information technology that would be studied in this study, but suddenly the researcher explained randomly about AR.

If the researcher wants to describe the meta-analysis in this study, the researcher can describe it in the research method section.

### Commented [A9]:

Please divide this section into  
Research Design  
Eligibility Criteria  
Data Encoding  
Data Analysis

Furthermore, the researcher explained in the abstract of this study that he used the PRISMA approach. However, not one bit of the researcher mentions this part of the research methodology.

### Commented [A10]:

Citation error. It should be in the form of a number, for example [15]

No.	Author	Method	Education level	Control Sample	Exp Sample	Control Mean	Control SD	Exp Mean	Exp SD
			School						
6	Farida & Rahayu, [28]	Randomized pretest-posttest control group design	Primary school	39	39	53,33	32,5	65,89	18,9
7	Fatmawati et.al. [29]	Nonequivalent control group design	Junior High School	25	25	72,93	5,03	79,87	2,97
8	Gemilang et.al. [30]	Experiment	Senior High School	39	39	54,05	16,9	68	18,3
9	Gunawan, [31]	Nonequivalent control group design	Primary school	22	22	71,59	7,75	79,54	8,43
10	Guntur & Setyaningrum, [32]	Quasi experiment	Senior High School	35	35	79,05	6,36	85,97	9,08
11	Guntur & Setyaningrum, [32]	Quasi experiment	Senior High School	35	35	75,6	13,7	84,62	10
12	Harahap & Siregar, [33]	Quasi experiment	Senior High School	64	64	77,46	4,6	78,15	4,09
13	Herawati et.al. [34]	Experiment	College	20	31	77,55	6,67	86,58	5,89
14	Husnaini & Chen, [35]	Quasi experiment	Senior High School	34	34	6,76	5,89	11,47	10,2
15	Ihsan, [36]	Nonequivalent control group design	Senior High School	35	35	48,31	12,7	80,37	11,2
16	Jamil et.al. [37]	Posttest-only, non-equivalent control group design	Senior High School	20	20	75,2	8,02	81,2	9,98
17	Jusmiana et.al. [38]	Pre-test and Post-test control Desig	Junior High School	25	28	65,6	15,3	75,71	16,2
18	Kardipah & Wibawa, [39]	Quasi experiment	College	24	24	19,46	9,42	29,4	10,5
19	Khamidah et.al. [40]	Quasi experiment	Junior High School	24	25	59,4	11,7	72,8	5,6
20	Mokoginta et.al. [41]	Posttest-only control design	Senior High School	10	10	73,2	8,23	86,4	9,83
21	Mulyati et.al. [42]	Pretest posttest control group design	Senior High School	20	20	74,15	4,12	80,25	2,44
22	Muniroh, [43]	Experiment with using pretest and posttest	Junior High School	36	36	78,47	4,1	89,03	6,19
23	Noverdika, [44]	Quasy experiment	Junior High School	31	31	76	9,68	84	7,8
24	Nugraha et.al. [45]	Quasi experiment	Primary school	12	12	64,17	9	80,83	7,93
25	Nurkanti et.al. [46]	Pre-experimental	Senior High School	35	35	42,7	8,69	82,46	6,42
26	Nurparida & Srirahayu, [47]	quasi experiment	Junior High School	18	18	26,67	7,29	40,28	8,13
27	Nuryadin & Tamam, [48]	True experimental	Junior High School	30	30	19,13	3,69	24,69	3,28
28	Nuryaningsih, [49]	Pretest- posttest control group design	Junior High School	32	32	74	4	81	3
29	Pelealu et.al. [50]	Nonequivalent control group design	Senior High School	20	20	61,75	8,62	86,75	6,54
30	Permana, [51]	Pretest- posttest control group design	Senior High School	31	32	70,65	8,73	84,53	6,52
31	Poluakan et.al.	Quasi experiment	Junior High	25	25	68,9	10,3	88,5	6,21

No.	Author	Method	Education level	Control Sample	Exp Sample	Control Mean	Control SD	Exp Mean	Exp SD
	[52]		School						
32	Ramadhani et.al. [53]	Quasi experiment	Senior High School	29	33	76,44	4,64	77	5,32
33	Saman et.al. [54]	Non-Equivalent Control Group Design	Senior High School	28	28	71,25	6,32	80,54	6,13
34	Sanca et.al. [55]	Quasi experiment	Senior High School	30	30	77,8	4,72	85,9	5,61
35	Santi et.al. [56]	Research and Development	College	25	25	81,92	8,5	85,12	8,45
36	Sari et.al. [57]	Experiment	Junior High School	28	28	67,25	7,87	72,14	8,43
37	Setyobudi & Harimurti, [58]	Experiment	Senior High School	34	34	73,2	14,9	80,6	15,4
38	Sidabutar, [59]	Experimental non-equivalent control group design	Senior High School	25	25	84,5	6,65	90,1	6,12
39	Sigar et.al. [60]	Experiment	Senior High School	20	20	67,5	12,1	80,5	8,87
40	Sirait & Apriyani, [61]	Experiment	Junior High School	36	36	75,4	5,29	78,94	9,67
41	Soimah, [62]	Quasi experiment	Junior High School	29	28	17,52	3,03	23,43	2,64
42	Sulaiman & Wibawa, [63]	Development	Senior High School	25	25	56,2	14,9	64	12,8
43	Sumoked et.al. [64]	Pre-test-posttest control group design	Senior High School	20	20	75,2	7,29	90	5,86
44	Syafira et.al. [65]	Quasi experiment	Senior High School	20	20	68,15	7,03	75,51	3,91
45	Syahril et.al. [66]	Posttest-only, nonequivalent control group design	Senior High School	32	32	75,16	16,7	77,66	18,6
46	Taufiqurrohman & Sumbawati, [67]	Quasi experimental design	Senior High School	30	30	83,1	4,95	85,54	3,76
47	Wahyu et.al. [68]	Quasi experiment	College	88	87	22,04	3,51	25,9	3,55
48	Wahyuni & Hidayati, [69]	Quasi experiment	College	20	20	63,2	4,96	91,95	4,67
49	Wardani & Harwanto, [70]	Posttest only control group design	Senior High School	45	45	61,51	6,89	75,11	5,96
50	Wismawan, et.al. [71]	Posttest-only control design	Junior High School	36	35	47,83	17,3	66,07	18,8
51	Zulhelmi, [72]	Experiment	Senior High School	8	12	73,38	8,85	65	10,7

### 3.1. Heterogeneity Test

This heterogeneity test is needed to determine whether the combined effect size to be used is a fixed effect or a random effect. The fixed effect is used if the heterogeneity test shows that there is no heterogeneity between study effect sizes so that the data is homogeneous. Conversely, if the heterogeneity test shows a heterogeneous value of the effect size of each study, the calculation of the combined effect size value uses the random effect method.

The heterogeneity test in this study used the help of JASP software. The heterogeneity analysis used several test models commonly used in meta-analysis. In this study, Cochran's Q test was used to determine whether there was heterogeneity in the meta-analysis. Table 1 is the result of the Heterogeneity Test:

Table 2. Heterogeneity Test

	Q	df	p
Omnibus test of Model Coefficients	84,777	1	< .001

*Paper's should be the fewest possible that accurately describe ... (First Author)*

Test of Residual Heterogeneity	412.858	50	< .001
--------------------------------	---------	----	--------

Note. p-values are approximate.

Note. The model was estimated using Restricted ML method.

The results of the analysis showed that the 51 effect sizes of the analyzed studies were heterogeneous with a Q value = 412.858 and a p-value < 0.001. Thus, the Random Effect model is more suitable for estimating the mean effect size of the 51 analyzed studies. These results also indicate that there is potential to investigate the moderating variables that influence the independent and dependent variables [73].

### 3.2. Summary Effect Size

The Random Effect size model is the effect size model used to estimate the Summary Effect. Estimation is performed using JASP software by providing the research's name, the effect size of each study, and the standard error of the effect size of each study. Table 2 shows the Summary Effect:

Table 3. Summary Effect

Coefficients				95% Confidence Interval		
Estimate	S.Error	z	p	Lower	Upper	
intercept	1.285	0.140	9.207	<.001	1.012	1.559

Note. Wald test.

The results of the analysis show that the value of the random effect size shows the number 1.285 with a p-value < 0.001 and a confidence interval for the lower limit of 1.012 and the upper limit of 1.559. the p-value of 0.001 is smaller than the value of (0.05) so H<sub>0</sub> is rejected. So it can be concluded that there is a significant effect of information technology-based learning on student achievement in Indonesia. An effect size of 0.20-0.49 suggests a minor effect, an effect size of 0.50-0.79 shows a moderate influence, and an effect size of 0.80 or higher indicates a big effect, according to the Cohen value interval [24, p. 25–27]. The calculation results show a cumulative effect size value of 1.285, indicating that it has a big effect. Thus, the impact of information technology-based learning on student achievement in Indonesia is significant.

The results of the analysis also contain a forest plot. The forest plot is a representation of the effect size of each study and its contribution to the combined effect size (weight). In the forest plot, the effect size representation is visualized as a line in the center of the plot. This visualization shows the estimated study points on the x-axis. This point estimate is complemented by a line, which represents the range of confidence intervals calculated for the observed effect size. The point estimate is surrounded by a square. The size of the square is determined by the weight of the effect size. Studies with larger weights form larger squares, while studies with lower weights have smaller squares.

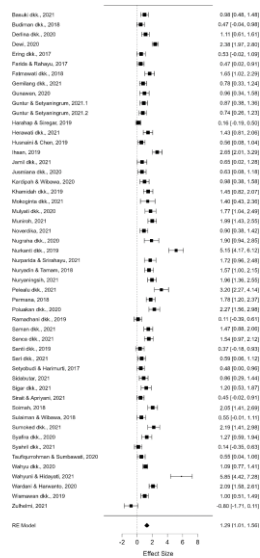


Figure 1. Forest plot

### 3.3. Subgroup Analysis

The study of heterogeneity in the meta-analysis is an important aspect in addition to identifying the appropriate combined effect size model as well as determining whether the variance aspect affects the combined effect size results. From the previous explanation, it has been explained that the results of the heterogeneity test of the meta-analysis of the observed studies show a high/substantial heterogeneity value. For this reason, it is important to do a post-hoc test based on the high heterogeneity test results. The post-hoc test in meta-analysis is to perform sub-group analysis or commonly called moderator variables. In this subgroup analysis, a different approach is used to identify why certain patterns of heterogeneity can be found in the observed study data. The subgroup analysis assumes that the heterogeneity of the study effect size is not a disturbance but an interesting variation that can be explained through scientific hypotheses. In this study, education level is a moderating variable that causes heterogeneity in the effect size of the observed studies.

The subgroup test was carried out with the help of JASP software by entering effect size data and standard errors for each study that had been grouped by education level. The level of education is divided into four groups, namely: 1) Elementary School (SD); 2) Junior High School (SMP/MTS); 3) High School (SMA/SMK/MA); and 4) Higher Education (PT). The data needed to test the hypothesis are summary effect data, overall Q value, the effect size for each group, and Q value for each group. The following table summarizes the data:

Group	Effect size	Q
Overall	1,285	412,858
SD	1,414	41,523
SMP	1,515	46,313
SMA	1,261	263,709
PT	1,673	51,744

After acquiring the aforementioned data, the statistical value of Q is examined by computing  $Q_{within}$  and  $Q_{between}$  with  $df = k-1$  to determine the p-value.

$$\begin{aligned}
 Q_{within} &= Q1 + Q2 + Qi \\
 Q_{within} &= 41,523 + 46,313 + 263,709 + 51,744 \\
 Q_{within} &= 403,289
 \end{aligned}
 \tag{1}$$



$$\begin{aligned}
 Q_{between} &= Q_{overall} - Q_{within} \\
 Q_{between} &= 412,858 - 403,289 \\
 Q_{between} &= 9,569
 \end{aligned}
 \tag{2}$$

Table 5. Subgroup Test Summary

$Q_{within}$	403,289
$Q_{between}$	9,569
df	3
p-value	0,0226085

The p-value obtained is smaller than 0.05, so it can be concluded that there is a significant difference in the average effect size at the level of education between SD, SMP, SMA, and PT. These differences can also be observed from the forest plots of each group.

**3.4. Publication Bias**

Publication bias arises when the likelihood of a study being published is affected by the results, for this reason, a publication bias test is needed to determine whether the data from the observed study are publication bias. The publication bias test in this meta-analysis study used two publication bias tests. The two publication bias tests are the funnel plot test and the file drawer analysis test or Rosenthal's fail-safe N model [22]. The results of the two publication bias test methods are described below.

**3.4.1 Funnel Plot**

In this type of experimental research, the research sample size and standard error are closely related. A standard error that is larger than the effect size results in a wider confidence interval and increases the likelihood that the effect is not statistically significant. Therefore, it is reasonable to assume that the effect of the small study will largely affect the study with a larger standard of error. The funnel plot is the most commonly used analysis of publication bias. With the help of JASP software, the following funnel plots are obtained:

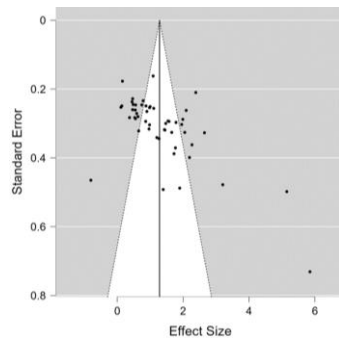


Figure 1. Funnel Plot

The funnel plot shows a symmetrical distribution, so it can be said that there is no publication bias in this meta-analysis study.

**3.4.1 File Drawer Analysis**

File drawer analysis in this meta-analysis uses the Rosenthal model. The value of the save file N obtained is 15917, with a target significance of 0.05 and  $p < 0.001$ .

Table 6. File Drawer Analysis

	Fail-safe N	Target Significance	Observed Significance
Rosenthal	15917.000	0.050	< .001

According to Mullen's formula, assuming  $N/(5K + 10)$  is greater than 1, the publication bias is certainly low [75], [76]. While the value of  $5K + 10$  with  $K = 51$  obtained a value of 265. The result of  $15917 / 265 = 62.1$  is greater than 1, so it has a relatively low meta-analysis publication bias. So it can be concluded that there is no publication bias problem in this meta-analysis study.

XXX

#### 4. CONCLUSION

The research findings show that the effect size of the analyzed studies varies between -0.80 to 5.85. The research findings indicate that there is heterogeneity. Based on these findings, the effect size model used in this meta-analysis study is a random effect size model. The findings show that information technology-based learning is significantly successful in improving student learning outcomes in Indonesia. The influence of information technology-based learning on the achievement of learning outcomes is included in the large category, namely 1.29. The findings show a substantial difference in the average effect size at the school level between SD, SMP, SMA, and PT, so it can be concluded that there are differences in the effectiveness of the use of information technology in learning on the achievement of student learning outcomes based on education level. This meta-analysis found no evidence of publication bias.

This research has implications for the development of studies on information technology-based learning that utilizes technology to improve the quality of education. The findings of this study further emphasize the importance of using information technology in education, especially in Indonesia. This research strengthens the findings of previous individual studies in the study of the effectiveness of information technology-based learning. This research encourages the development and utilization of information technology in education. Research with this meta-analysis method has several limitations. These limitations include that the studies found through searching the Scopus database are limited to open access studies that can be accessed free of charge, while closed access studies cannot be included. This meta-analysis research also has limitations in the article selection process, which is ideally carried out by more than one person, but only by one researcher.

#### REFERENCES

- [1] H. Darmadi, *Pengantar Pendidikan Era Globalisasi: Konsep Dasar, Teori, Strategi dan Implementasi dalam Pendidikan Globalisasi*. Jakarta: AnImage, 2019.
- [2] A. Toffler, *The Third Wave*, vol. 484. Bantam books New York, 1980.
- [3] E. Duval, M. Sharples, dan R. Sutherland, *Technology Enhanced Learning*. Springer, 2017.
- [4] R. Huang dan N. S. Chen, *The New Development of Technology Enhanced Learning: Concept, Research and Best Practices*. Springer Berlin Heidelberg, 2014.
- [5] Munir, *Pembelajaran Jarak Jauh Berbasis Teknologi Informasi dan Komunikasi*. Bandung: Alfabeta, 2012.
- [6] L. Kolb, *Learning first, technology second: The educator's guide to designing authentic lessons*. International Society for Technology in Education, 2017.
- [7] A. Koesnandar, "Pengembangan Model Pendayagunaan Teknologi Informasi dan Komunikasi (TIK) Untuk Pendidikan di Daerah Terpencil, Tertinggal, dan Terdepan," *Kwangsan J. Teknol. Pendidik.*, vol. 1, no. 2, hal. 122–142, 2013.
- [8] I. Yusuf, S. W. Widyaningsih, Z. K. Prasetyo, dan E. Istiyono, "Blended learning: Its effect towards Higher Order Thinking Skills (HOTS)," *J. Phys. Conf. Ser.*, vol. 1832, no. 1, hal. 0–10, 2021, doi: 10.1088/1742-6596/1832/1/012039.
- [9] M. A. H. Patwary dan H. D. Surjono, "The implementation of e-learning with team builder at vocational high schools," *Res. Eval. Educ.*, vol. 1, no. 1, hal. 25, 2015, doi: 10.21831/reid.v1i1.4896.
- [10] H. Effendi, S. Soenarto, dan H. Sofyan, "The effectiveness of web-based interactive blended learning model in electrical engineering courses," *Res. Eval. Educ.*, vol. 1, no. 2, hal. 175, 2015, doi: 10.21831/reid.v1i2.7140.
- [11] D. Widjanarko, H. Sofyan, dan H. D. Surjono, "Improving students' mastery on automotive electrical system using automotive electrical multimedia," *Res. Eval. Educ.*, vol. 2, no. 1, hal. 71, 2016, doi: 10.21831/reid.v2i1.8219.
- [12] W. Hidayat, M. M. bin A. Ali, N. A. Lawahid, dan M. Mujahidah, "Developing the flipped learning instrument in an ESL context: The experts' perspective," *J. Penelit. dan Eval. Pendidik.*, vol. 25, no. 1, hal. 35–48, 2021, doi: 10.21831/pep.v25i1.38060.
- [13] M. Dewi, L. Rosalina, F. Ferdian, dan F. S. Andres, "An evaluation of e-learning of entrepreneurship course : Learning alternative during Covid-19 pandemic for university students," *J. Penelit. dan Eval. Pendidik.*, vol. 26, no. 1, hal. 47–58, 2022.
- [14] Y. Ayryza et al., "The effectiveness of quartet card game in increasing career knowledge in lower grade elementary school students," *Curr. Psychol.*, hal. 1–12, 2021.
- [15] N. Hafzah, K. P. Amalia, E. Lestari, N. Annisa, U. Adiatmi, dan M. F. Saifuddin, "Meta-Analysis Efektivitas Penggunaan Media Pembelajaran Digital Dalam Peningkatan Hasil dan Minat Belajar Biologi Peserta Didik di Era Revolusi Industri 4.0," *BIODIK*, vol. 6, no. 4, hal. 541–549, 2020.
- [16] K. A. Jasmi dan A. H. Tamuri, *Pendidikan Islam: Kaedah Pengajaran & Pembelajaran*. Penerbit UTM Press, 2011.
- [17] D. Prestiadi, I. Arifin, dan A. N. Bhayangkara, "Meta-Analysis of Online Learning Implementation in Learning Effectiveness," in *2020 6th International Conference on Education and Technology (ICET)*, 2020, hal. 109–114.
- [18] R. M. Bernard et al., "How Does Distance Education Compare With Classroom Instruction? A Meta-Analysis of the Empirical Literature," *Rev. Educ. Res.*, vol. 74, no. 3, hal. 379–439, Sep 2004, doi: 10.3102/00346543074003379.
- [19] M. Ozdemir, C. Sahin, S. Arcagok, dan M. K. Demir, "The effect of augmented reality applications in the learning process: A meta-analysis study," *Eurasian J. Educ. Res.*, vol. 18, no. 74, hal. 165–186, 2018.
- [20] H. Retnawati, E. Apino, K. Kartianom, H. Djidu, dan R. D. Anazifa, "Pengantar Analisis Meta (Edisi 1)." Parama Publishing, Yogyakarta, 2018.
- [21] G. V Glass, "Primary, secondary, and meta-analysis of research," *Educ. Res.*, vol. 5, no. 10, hal. 3–8, 1976.
- [22] M. Borenstein, L. V Hedges, J. P. T. Higgins, dan H. R. Rothstein, *Introduction to Meta-analysis*. West Sussex, England: Wiley & Sons Ltd, 2009.
- [23] A. Basuki, M. Wulansari, M. Churiyah, dan M. Arief, "Improve Learning Outcomes In-Office Technology Lessons by Using Appypie," in *Proceedings of the Sixth Padang International Conference On Economics Education, Economics, Business and*

#### Commented [A11]:

There needs to be a discussion paragraph starting from the effect size obtained, what is effect size, the use of effect size, why is this research looking for effect size?

The results of this study are supported by which theory or research?

Why are there no forest plots?

Why is there no in-depth discussion regarding funnel plots?

What is publication bias? How important is publication bias in meta-analytic research?

This article would not be feasible if this part of the discussion was not improved.

#### Commented [A12]:












Please cite at least 3 articles from IJERE

- Management, Accounting and Entrepreneurship (PICEEBA 2020)*, 2021, vol. 179, no. Piceeba 2020, hal. 278–282, doi: 10.2991/aebmr.k.210616.041.
- [24] E. Budiman, S. N. Alam, dan M. A. Akbar, "Mobile Learning: Utilization of Media to Increase Student Learning Outcomes," in *Proceeding of the Electrical Engineering Computer Science and Informatics*, 2018, hal. 16–18, doi: 10.11591/eecsi.v5i5.1723.
- [25] Derlina, Aisyah, N. Bukit, Sahyar, dan A. Hassan, "Blended Learning in English and English-medium Physics Classes Using Augmented Reality, Edmodo, and Tinkercad Media," *TESOL Int. J.*, vol. 15, no. 3, hal. 111–133, 2020.
- [26] R. K. Dewi, "Pemanfaatan Media 3 Dimensi Berbasis Virtual Reality Untuk Meningkatkan Minat Dan Hasil Belajar IPA Siswa Kelas V SD," *J. Pendidik.*, vol. 21, no. 1, hal. 28–37, 2020, doi: 10.33830/jp.v21i1.732.2020.
- [27] N. S. Ering, K. Mustapa, dan M. R. Jura, "Pengaruh Pembelajaran Self Direct Learning Berbasis Teknologi Informasi Terhadap Hasil Belajar Siswa Pada Materi Struktur Atom di Kelas X SMA Negeri 9 Palu," *J. Akad. Kim.*, vol. 6, no. 4, hal. 227, 2017, doi: 10.22487/j24775185.2017.v6.i4.9453.
- [28] N. Farida dan S. Rahayu, "Perbedaan Pembelajaran Melalui Multimedia Interaktif dan Melalui Buku Teks Terhadap Hasil Belajar Siswa Pada Materi Pecahan Kelas IV SDN Gadang 01 Malang," *J. Inspirasi Pendidik.*, vol. 7, no. 1, hal. 7–12, 2017, doi: 10.21067/jip.v7i1.1550.
- [29] E. Fatmawati, K. Karmin, dan R. S. Sulistiyawati, "Pengaruh Media Pembelajaran Berbasis Video Terhadap Hasil Belajar Siswa," *Cakrawala J. Pendidik.*, vol. 12, no. 1, hal. 24–31, 2018, doi: 10.24905/cakrawala.v12i1.959.
- [30] F. P. Gemilang, M. Fakhruddin, dan N. Ibrahim, "Pengaruh Penggunaan Media Meme Sejarah Terhadap Hasil Belajar Siswa Pada Pelajaran Sejarah di SMAN 51 Jakarta," *Hist. J. Indones. Hist. Educ.*, vol. 1, no. 3, hal. 332–342, 2021.
- [31] D. Gunawan, "Pengaruh Media Video Interaktif Terhadap Hasil Belajar Kognitif Kelas IV SD Negeri 2 Karangrejo Trenggalek," *EDUPROXIMA J. Ilm. Pendidik. IPA*, vol. 2, no. 1, hal. 1–9, 2020, doi: 10.29100/eduproxima.v2i1.1489.
- [32] M. I. S. Guntur dan W. Setyaningrum, "The Effectiveness of Augmented Reality in Learning Vector to Improve Students' Spatial and Problem-Solving Skills," *Int. J. Interact. Mob. Technol.*, vol. 15, no. 5, hal. 159–173, 2021, doi: 10.3991/ijim.v15i05.19037.
- [33] S. N. Harahap dan M. F. Siregar, "Pengaruh Model Pembelajaran Dengan Mengintegrasikan Strategi Pembelajaran Cooperative Learning Tipe STAD Dengan Media Chemscetch Terhadap Hasil Belajar Siswa," *Cybersp. J. Pendidik. Teknol. Inf.*, vol. 3, no. 1, hal. 1–7, 2019, doi: 10.22373/cj.v3i1.4000.
- [34] H. Herawati, A. Yusta, dan S. K. Sianturi, "Pengaruh Penggunaan Media Pembelajaran Berbasis Web Terhadap Motivasi dan Hasil Belajar Mahasiswa STTIKOM Insan Unggul," *JIP - J. Ilm. Ilmu Pendidik.*, vol. 4, no. 8, hal. 795–802, 2021, doi: 10.54371/jip.v4i8.346.
- [35] S. J. Husnaini dan S. Chen, "Effects of guided inquiry virtual and physical laboratories on conceptual understanding, inquiry performance, scientific inquiry self-efficacy, and enjoyment," *Phys. Rev. Phys. Educ. Res.*, vol. 15, no. 1, hal. 10119, 2019, doi: 10.1103/PhysRevPhysEducRes.15.010119.
- [36] M. Ihsan, "Pengaruh Penggunaan Media Teknologi Informasi Untuk Meningkatkan Hasil Belajar Siswa Kelas X MAN Asahan," in *Prosiding Seminar Nasional Riset Information Science (SENARIS)*, 2019, vol. 1, no. September, hal. 1182, doi: 10.30645/senaris.v1i0.134.
- [37] F. Jamil, A. C. Djamen, dan M. M. Mintjelungan, "Media Simulasi Untuk Pembelajaran Teknologi Jaringan di SMK," *iSmartEdu J. Pendidik. Teknol. Inf.*, vol. 02, no. 01, hal. 22–26, 2021.
- [38] A. Jusmiana, H. Herianto, dan R. Awalita, "Pengaruh Penggunaan Media Audio Visual Terhadap Hasil Belajar Matematika Siswa SMP di Era Pandemi Covid-19," *Pedagog. J. Pendidik. Mat.*, vol. 5, no. 2, hal. 1–11, 2020, doi: 10.30605/pedagog.v5i2.400.
- [39] S. Kardipah dan B. Wibawa, "A Flipped-Blended Learning Model with Augmented Problem Based Learning to Enhance Students' Computer Skills," *TechTrends*, vol. 64, no. 3, hal. 507–513, 2020, doi: 10.1007/s11528-020-00506-3.
- [40] N. Khamidah, W. Winarto, dan V. R. Mustikasari, "Discovery Learning: Penerapan dalam pembelajaran IPA berbantuan bahan ajar digital interaktif untuk meningkatkan prestasi belajar siswa," *JIPVA (Jurnal Pendidik. IPA Veteran)*, vol. 3, no. 1, hal. 87, 2019, doi: 10.31331/jipva.v3i1.770.
- [41] H. Mokoginta, L. Sojow, dan H. K. Manggopa, "Pengaruh Pembelajaran Menggunakan Video Tutorial Terhadap Hasil Belajar Mata Pelajaran Simulasi Dan Komunikasi Digital," *EduTIK J. Pendidik. Teknol. Informasidan Komun.*, vol. 1, no. 3, 2021, [Daring]. Tersedia pada: <https://ejurnal.unima.ac.id/index.php/edutik/article/view/3293>.
- [42] T. Mulyati, M. Nurkamillah, dan C. Riki, "Pengaruh Media Pembelajaran Edmodo Terhadap Hasil Belajar Peserta Didik Pada Mata Pelajaran Administrasi Sistem Jaringan di SMK Al-Falah," *Produktif J. Ilm. Pendidik. Teknol. Inf.*, vol. 4, no. 2, hal. 377–384, 2020, doi: 10.35568/produktif.v4i2.947.
- [43] Muniroh, "Efektivitas Pembelajaran Daring Pada Mata Pelajaran Teknologi Informasi dan Komunikasi Materi Microsoft Word," *Akad. J. Teknol. Pendidik.*, vol. 10, no. 2, hal. 383–392, 2021.
- [44] Y. Noverdika, "Pengaruh Penggunaan Multimedia Interaktif Model Tutorial dalam Pembelajaran Teknologi Informasi dan Komunikasi Terhadap Hasil Belajar Siswa Kelas VIII SMPN 17 Padang," *J. Literasiologi*, vol. 5, no. 1, hal. 105–122, 2021.
- [45] S. A. Nugraha, T. Sudiatmi, dan M. Suswandari, "Studi Pengaruh Daring Learning Terhadap Hasil Belajar Matematika Kelas IV," *J. Inov. Penelit.*, vol. 1, no. 3, hal. 265–276, 2020, doi: 10.47492/jip.v1i3.74.
- [46] M. Nurkanti, T. S. G. Utari, dan C. Devi, "Improve Student Learning Outcomes Through The Use of Interactive Visual Learning Media (MIVL)," in *International Conference On Education Development And Quality Assurance Table*, 2019, hal. 64–68, doi: 10.5220/0008679500640068.
- [47] Nurparida dan E. Sriharyu, "Efektivitas Media Audio Visual Dalam Meningkatkan Hasil Belajar Siswa Pada Pembelajaran IPS Terpadu Kelas VII MTS. Al Yusufiah," *J. Ilmu Sos. Dan Pendidik.*, vol. 5, no. 1, hal. 155–162, 2021.
- [48] E. Nuryadin dan M. Z. B. Tamam, "Pengaruh Media Prezi Terhadap Hasil Belajar Peserta Didik Pada Materi Sistem Pencernaan Pada Manusia (Studi Eksperimen di Kelas VIII SMP Negeri 20 Kota Tasikmalaya, Tahun Ajaran 2018/2019)," *Bio Educ.*, vol. 3, no. 1, hal. 82–89, 2018.
- [49] W. D. Nuryaningasih, "Penerapan Media Schoology untuk Meningkatkan Motivasi dan Hasil Belajar Siswa dalam Pembelajaran Bahasa Indonesia di SMP Negeri 3 Bojong Pekalongan," *J. Paedagogy*, vol. 8, no. 1, hal. 16–23, 2021, [Daring]. Tersedia pada: <https://jurnal.ikipmataram.ac.id/index.php/pedagogy/article/view/3161>.
- [50] A. Pelealu, T. Komansilan, dan A. Takaredase, "Pengaruh Media Pembelajaran Simulasi Terhadap Hasil Belajar Komputer Dan Jaringan Dasar Siswa SMK," *EduTIK J. Pendidik. Teknol. Informasidan Komun.*, vol. 1, no. 5, 2021, [Daring]. Tersedia pada: <https://ejurnal.unima.ac.id/index.php/edutik/article/view/3293>.
- [51] A. S. Permana, "Efektivitas Media Pembelajaran Berbasis Ict (Website) Berbantuan Software Lectora Inspiredalam Meningkatkan Hasil Belajar Ekonomi," in *Jurnal Prosiding Seminar Pendidikan Ekonomi dan Bisnis*, 2018, vol. 3, no. 1, hal.

- 3–5.
- [52] C. Poluakan, Y. V. Kapubau, N. W. Suryani, H. M. Sumampouw, dan J. Rungkat, "Use of the Science Technology and Society (STS) model with the help of Facebook in science learning for junior high school students," in *Journal of Physics: Conference Series*, 2020, vol. 1567, no. 4, doi: 10.1088/1742-6596/1567/4/042019.
- [53] R. Ramadhani, R. Umam, A. Abdurrahman, dan M. Syazali, "The effect of flipped-problem based learning model integrated with LMS-google classroom for senior high school students," *J. Educ. Gift. Young Sci.*, vol. 7, no. 2, hal. 137–158, 2019, doi: 10.17478/jegys.548350.
- [54] F. Saman, V. R. Palilingan, dan O. E. S. L. Liando, "Pengaruh Pemanfaatan Video Tutorial Terhadap Hasil Belajar Instalasi Sistem Operasi Dasar Siswa SMK," *EduTIK J. Pendidik. Teknol. Informasidan Komun.*, vol. 1, no. 5, 2021, [Daring]. Tersedia pada: <https://ejurnal.unima.ac.id/index.php/edutik/article/view/3293>.
- [55] P. A. Sanca, Ekohariadi, I. Asto Budijahjanto, dan T. Rijanto, "Pemanfaatan media lectora inspire dalam meningkatkan hasil belajar siswa pada mata pelajaran jaringan dasar di smk negeri 3 surabaya," *J. Ilm. Penelit. dan Pembelajaran Inform.*, vol. 06, no. 02, hal. 277–285, 2021.
- [56] N. Santi, Z. Muchtar, dan A. Sudrajat, "Developing Mobile Learning Media Integrated of Problem Based Learning In Chemical Equilibrium Materials at Unimed Chemical Education Study Program," in *Advances in Social Science, Education and Humanities Research*, 2019, vol. 384, no. Aisteel, hal. 518–521, doi: 10.2991/aisteel-19.2019.115.
- [57] N. S. A. Sari, H. Hamengkubuwono, dan M. I. L. Pratama, "Pengaruh Penggunaan Media Interaktif Lectora Inspire terhadap Hasil Belajar Siswa Pada Mata Pelajaran Pendidikan Agama Islam," *J. Ilm. Profesi Pendidik.*, vol. 6, no. 4, hal. 594–602, 2021, doi: 10.29303/jipp.v6i4.290.
- [58] R. K. Setyobudi dan R. Harimurti, "Pengaruh Penerapan Media Pembelajaran Moodle Terhadap Hasil Belajar Siswa Pada Bidang Kejuruan TKJ di SMKN 3 Buduran," *IT-Edu*, vol. 2, no. 01, hal. 198–202, 2017.
- [59] R. Sidabutar, "Efektivitas Penerapan Media Pembelajaran Interaktif Berbasis Google Classroom Dalam Menyongsong Era Revolusi Industri 4.0 Terhadap Hasil Belajar Matematika Siswa," *J. Ilm. Aquinas*, vol. 4, no. 2, hal. 344–352, 2021.
- [60] F. Sigar, F. Dungus, dan A. Komansilan, "Efektivitas Penggunaan E-Learning Berbasis Edmodo Terhadap Hasil Belajar Fisika Siswa SMA Negeri 2 Tondano Kelas Xi Pada Materi Suhu dan Kalor," *Charm Sains J. Pendidik. Fis.*, vol. 2, no. 2, hal. 126–130, 2021, doi: 10.53682/charmsains.v2i2.119.
- [61] E. D. Sirait dan D. D. Apriyani, "Pengaruh Media Pembelajaran Google Classroom Dan Minat Belajar Terhadap Hasil Belajar Matematika," in *Seminar Nasional Riset dan Inovasi Teknologi (SEMNAS RISTEK)*, 2021, hal. 827–831, [Daring]. Tersedia pada: <http://www.proceeding.unindra.ac.id/index.php/semnasristek/article/view/5072>.
- [62] I. Soimah, "Pengaruh Media Pembelajaran Berbasis Komputer Terhadap Hasil Belajar Ipa Ditinjau Dari Motivasi Belajar Siswa," *Nat. J. Ilm. Pendidik. IPA*, vol. 5, no. 1, hal. 38, 2018, doi: 10.30738/natural.v5i1.2559.
- [63] P. A. Sulaiman dan S. C. Wibawa, "Penerapan Media Pembelajaran Berbasis Schoology Mobile Untuk Meningkatkan Hasil Belajar Pada Mata Pelajaran Jaringan Dasar Kelas X TKJ di SMK Pahlawan Mojosari," *J. IT-EDU*, vol. 3, no. 01, hal. 75–84, 2018.
- [64] S. N. Sumoked, F. I. Sangkop, dan P. V. Togas, "Pengaruh Penggunaan Media Pembelajaran Online Terhadap Hasil Belajar Simulasi Dan Komunikasi Digital Siswa SMK," *EduTik J. Pendidik. Teknol. Inf. dan Komun.*, vol. 1, no. 4, hal. 332–334, 2021, doi: 10.53682/edutik.v1i4.2078.
- [65] D. A. Syafira, L. Yulastris, dan D. Atmanto, "Pengaruh Penggunaan Media Pembelajaran E-Learning Berbantuan Edmodo Terhadap Hasil Belajar Sanitasi Dan Higiene Kecantikan di SMK Negeri 27 Jakarta," *JTR-Jurnal Tata Rias*, vol. 10, no. 2, hal. 1–12, 2020, [Daring]. Tersedia pada: <http://repository.unj.ac.id/id/eprint/8725>.
- [66] M. Syahril, M. T. Parinsid, dan P. V. Togas, "Media Simulasi Untuk Meningkatkan Hasil Belajar Komputer dan Jaringan Dasar Siswa di SMK," *Ismart Edu*, vol. 02, no. 01, hal. 27–31, 2021.
- [67] Taufiqurrohman dan M. S. Sumbawati, "Penerapan Media Virtual Tour Dengan Google Expedition Dalam Pembelajaran Project Based Learning di SMK Negeri 10 Surabaya," *J. IT-EDU (Information Technol. Educ.)*, vol. 5, no. 1, hal. 247–253, 2020, [Daring]. Tersedia pada: <https://ejournal.unesa.ac.id/index.php/it-edu/article/view/37483>.
- [68] Y. Wahyu, I. W. Suastra, I. W. Sadiq, dan N. K. Suarni, "The effectiveness of mobile augmented reality assisted STEM-based learning on scientific literacy and students' achievement," *Int. J. Instr.*, vol. 13, no. 3, hal. 343–356, 2020, doi: 10.29333/iji.2020.13324a.
- [69] A. Wahyuni dan D. W. Hidayati, "Pengaruh Media Pembelajaran Moodle Berbasis Youtube Terhadap Hasil Belajar Mahasiswa," *J. Inf. J. Penelit. dan Pengabd. Masy.*, vol. 7, no. 2, 2021.
- [70] M. A. P. Wardani dan R. Harwanto, "Penerapan Strategi Pembelajaran Berbasis ICT terhadap Pencapaian Hasil Belajar Sistem Komputer Siswa," *Fakt. J. Ilm. Kependidikan*, vol. 7, no. 2, hal. 99–106, 2020.
- [71] K. H. Wismawan, N. Sugihartini, dan M. W. Antara Kesiman, "Pengaruh Model Pembelajaran Assure Menggunakan Media Rumah Belajar dalam Upaya Meningkatkan Hasil Belajar Teknologi Informasi dan Komunikasi," *Int. J. Nat. Sci. Eng.*, vol. 3, no. 3, hal. 130–138, 2019, doi: 10.23887/ijnse.v3i3.24148.
- [72] Z. Zulhelmi, "Pemanfaatan Kvisoft Flipbook Maker dalam Rangka Peningkatan Hasil Belajar Peserta Didik," *J. Imiah Pendidik. dan Pembelajaran*, vol. 5, no. 2, hal. 217, 2021, doi: 10.23887/jipp.v5i2.31209.
- [73] P. Sedgwick, "Meta-analyses: heterogeneity and subgroup analysis," *BMJ Br. Med. J. Publ. Gr.*, vol. 346, 2013.
- [74] J. Cohen, *Statistical power analysis for the behavioral sciences*, 2nd ed. United States of America: Lawrence Erlbaum Associates, 1988.
- [75] D. Juandi, Y. S. Kusumah, M. Tamur, K. S. Perbowo, dan T. T. Wijaya, "A meta-analysis of Geogebra software decade of assisted mathematics learning: what to learn and where to go?," *Heliyon*, vol. 7, no. 5, 2021.
- [76] S. Turgut dan I. Gülşen Turgut, "The effects of cooperative learning on mathematics achievement in turkey a meta-analysis study," *Int. J. Instr.*, vol. 11, no. 3, hal. 663–680, 2018, doi: <https://doi.org/10.12973/iji.2018.11345a>.

## BIOGRAPHIES OF AUTHORS

*Paper's should be the fewest possible that accurately describe ... (First Author)*

	<p><b>Iqbal Faza Ahmad</b>     is a researcher and activist in the field of Islamic Education, born in Pekalongan on November 3, 1995. An alumnus of the Gontor Islamic Boarding School and completed his undergraduate studies at the Islamic Religious Education Study Program, Faculty of Tarbiyah and Teacher Training, Sunan Kalijaga State Islamic University, Yogyakarta in 2019 and continue studying in postgraduate programs at Yogyakarta State University. Studying and researching the fields of Islamic Education, Educational Assessment, Educational Evaluation, Islamic Studies and being active in socio-religious activities. For those who want to communicate further, please contact via email: <a href="mailto:qobelahmed@gmail.com">qobelahmed@gmail.com</a>.</p>
	<p><b>Farida Agus Setiawati</b>     is lecturer in departement Pschology dan Educational Research and Evaluation, Universitas Negeri Yogyakarta. She was born in Pekalongan on August 13, 1972. She studied undergraduate students in the Department Psychology and Mastery Program in Psychometric Universitas Gadjah Mada and doctoral program in educational research and evaluation, Universitas Negeri Yogyakarta. For those who want to communicate further, please get in touch with Farida via email: <a href="mailto:farida_as@uny.ac.id">farida_as@uny.ac.id</a></p>
	<p><b>Rani Putri Prihatin S. Pd.</b> Educational Background SDN 2 Bulusan graduated in 2009, MTS Sunan Pandanaran Yogyakarta graduated in 2012, MA Sunan Pandanaran graduated in 2015, S1 Islamic Education Management Faculty of Tarbiyah and Teacher Training, Sunan Kalijaga State University, Yogyakarta graduated in 2019. He is Moderate pursuing a Masters Program in Islamic Religious Education, Faculty of Tarbiyah and Teacher Training, Sunan Kalijaga State University, Yogyakarta. For those who want to communicate further, please contact via email: <a href="mailto:rani.putri289@gmail.com">rani.putri289@gmail.com</a></p>

# CERTIFICATE

No: 25383/IJERE/R1/I/2023

International Journal of Evaluation and Research in Education

is hereby awarding this certificate to

**Furtasan Ali Yusuf**

in recognition of his/her contribution as **Reviewer** on paper ID:

25383

in this scientific journal

Yogyakarta, 30 January 2023



ISSN 2252-8822  
<http://ijere.iaescore.com>

   
**Lina Handayani**  
Managing Editor