A Systematic Review and Meta-Analysis Group Contrasts: Learning Model Based on Local Cultural Wisdom and Student Learning Outcomes

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The integration of local cultural wisdom in the learning model is very important. Learning through culture will make students quickly understand the material presented. There have been many studies that have integrated local wisdom into learning models. The purpose of this study was to determine the effect size of the results of a systematic review and meta-analysis group's contrast from several research results on improving student learning outcomes that are taught with the integrated learning model of local cultural wisdom (MBTKBL) as an experimental group and not taught with a learning model integrated with local cultural wisdom (T-MBTKB) as a control group. The source of the data was obtained from searching in the online database of Google Scholar that met the specified criteria. Data analysis uses the systematic review and meta-analysis group contrasts approach. Random effects are used to determine summary effects and check publication bias. The analysis results obtained that the group of students taught using MBTKBL had high learning outcomes compared to the group of students who were taught T-MBTKB. The resulting summary effect of 1.37 (strong) is at intervals of 1.04 to 1.70. There is no indication of publication bias. Thus, local wisdom in Indonesia is very effectively integrated into each learning model because it can improve student learning outcomes.

Keywords: learning model, local cultural wisdom, learning outcomes, systematic review, meta-analysis group contrast

INTRODUCTION

Indonesia is a nation that has a diversity of tribes, languages, and cultures. Every region in Indonesia has unique local wisdom. The value of local wisdom as a source of innovation in the field of education that is educative, cognitive, and affective (Selasih & Sudarsana, 2018). Local wisdom in society is the material contained in education

(Marhayani, 2016). Local wisdom education is a means of providing knowledge, skills, and behavior to students so that they have insight into the state of the environment and support regional development and national development (Marhayani, 2016).

Local wisdom embedded in student life is a form of direct experience, so the use of local wisdom in learning can help students to understand concepts contextually and correctly (Kurniawati et al., 2017) and have an impact on student achievement (Kana'iaupuni et al., 2010). Integrating science with important local knowledge in learning is carried out to instill knowledge and pass down the existing local culture within the student's environment (Maretta, 2016). The inculcation of values of local wisdom in the learning process can be done through the inculcation of cultural values through methods of observation of residents in the student environment (Pornpimon et al., 2014). The results of these observations can then be integrated with the learning model in the classroom, so students can have the knowledge and be embedded in a good attitude from their environment.

The learning model is a plan used in preparing the curriculum, organizing teaching material, and giving instructions when learning in class using certain rules (Yinger, 1979). Learning models are conceptual and operational learning frameworks that have names, characteristics, logical sequences, settings, and cultures (Banks & Banks, 1997). In essence, the dimensions of the learning model explicitly and implicitly discuss the content standards and standards of lifetime learning based on educational standards (Marzano et al., 1993). The learning model is a learning activity in the classroom to solve all problems by considering the appropriate answers to these problems (Hennessy & Murphy, 1999). A learning model that is applied in the classroom must be able to improve student's critical thinking skills (Sutiani et al., 2021). Learning models are conceptual frameworks that describe systematic procedures for regulating learning experiences to achieve certain learning goals (Rost, 2013).

Learning will be effective if it is done by a professional teacher. Whereas professional teachers have personal qualities, have a positive disposition to knowledge, namely mastering basic knowledge about teaching and learning; mastering the strategies of implementing learning; have the ability and skills to help students to reflect and solve problems (Arends, 1997). Learning is said to be effective if students are actively involved in organizing and finding information (Eggen & Kauchak, 1979). The effectiveness of learning includes quality of instruction, appropriate levels of instruction, incentives, and time (Slavin, 1994). The ultimate goal of effective learning is to improve student learning outcomes.

Student learning outcomes can be improved through integrated learning models of local wisdom. In Indonesia, many studies integrate local wisdom into learning models and have a good effect on improving student learning outcomes. For example, the contextual teaching and learning model is based on local wisdom (Hermawan et al., 2013), guided inquiry based on local wisdom (Wijayanthi et al., 2014), and think talk writing based on *Tri Kaya Parisudha* (Wahyuni et al., 2017), think talk write based on *Tri Hita Karana* (Indrawan et al., 2017), the team assisted individualization based on *Tri Hita Karana* (Santhi et al., 2018), think pair share based on *Tri Kaya Parisudha* (Paryanata et al.,

2019), and group-based investigation *Tri Hita Karana* (Widiartini et al., 2019). The details are presented in Table (1). The number of studies that have succeeded in applying the integrated learning model of local cultural wisdom, so the authors are interested in conducting a systematic review and meta-analysis group contrasts study. The goal is to find a summary effect size of the whole integrated learning model of local cultural wisdom so that conclusions can be made in general.

Systemic reviews aim to reduce bias by using explicit methods to conduct a comprehensive literature search and critically assess individual studies. The quality of the included studies was formally assessed. The data are summarized, and, if the data are statistically combined (quantitative summary), the systematic review is referred to as a meta-analysis (Crowther et al., 2010). During the systematic review process, the quality of the studies was evaluated, and the statistical meta-analysis of the study results was based on quality. Meta-analysis is a valid, objective, and scientific method for analyzing and combining different results (Ahn., & Kang., 2018). Based on this description, a systematic review and meta-analysis of group contrast is a choice in research methodology to obtain information about the effect size of a study. The purpose of this study was to determine the effect size of the results of a systematic review and meta-analysis contrast groups from several research results on improving student learning outcomes that are taught with the integrated learning model of local cultural wisdom (MBTKBL) as an experimental group and not taught with a learning model integrated with local cultural wisdom (T-MBTKB) as a control group.

METHOD

Research Design

This research is a systematic review and quantitative meta-analysis study (Hunter & Schmidt, 2004). Conduct a systematic review and meta-analysis group contrasts of some of the results of research on student learning outcomes taught by the learning model integrated with local cultural wisdom (MBTKBL) as an experimental group and not taught with a learning model integrated with local cultural wisdom (T-MBTKB) as a control group. Thus the design used is meta-analysis group contrasts. Research findings in the form of groups contrast involve variables that are measured in two or more groups of respondents and then compared between groups. The descriptive statistics that usually characterize this situation are the mean, standard deviation, and sample size for each group on each variable. Differences between such groups are often checked with familiar statistical tests such as the t-test (Lipsey & Wilson, 2001: 46). A conceptual framework for the experimental design group contrasts:

Suppose you have obtained results for k studies/articles.
Each study consists of an experimental group (T) and a control group (C).
nT : number of subjects in the experimental group.
nC : the number of subjects in the control group.
xT : the mean of the sample from the treatment group, estimating the mean of the T experimental.

xC : the mean of the sample from the control group, estimating the mean of the C control

sT : standard deviation of the sample from the experimental group.

sC : standard deviation of the sample from the control group.

Data Collection and Eligibility Criteria

The research data used were sourced from various research publications published in journals and downloaded in the Google Scholar online database (Retrieved as many as 22 articles that meet the specified criteria). The criteria used in selecting articles refer to the research of Khadijah et al.(2021). The sentence or keywords used in the article search are:

1. Cooperative learning model based on local wisdom on learning outcomes.
2. The snowball throwing learning model based on local wisdom on social studies learning outcomes
3. The inside-outside circle learning model is oriented to local wisdom on the mathematics learning outcomes
4. The multicultural-based group investigation learning model with the nuances of local wisdom affects learning outcomes
5. The local wisdom-based TPS learning model on the social studies learning outcomes
6. The talking STICK learning model based on local wisdom on social science knowledge competence
7. The NHT-type cooperative learning model based on local wisdom on students learning outcomes
8. The 7E learning cycle model based on local wisdom on the science learning outcomes
9. The thematic model with the nuances of local wisdom affects the science learning outcomes
10. The effect of learning the contextual teaching and learning (CTL) approach based on local wisdom on social studies learning outcomes
11. The TTW-type cooperative learning model based on local wisdom on science learning outcomes
12. The think pair shares a learning model based on local wisdom on social studies learning outcomes
13. and others

The standard eligibility criteria used in screening or selecting research publications are as follows; (1) published in national or international journals; (2) the research was conducted in Indonesia; (3) can be accessed at the Google Scholar; (4) student learning outcomes are limited to elementary school (SD) level (5) publications of at least the last 10 years; articles that are used as artifacts in the meta-analysis are articles published in the last 10 years, so they have novelty value, and (6) each publication has an experimental and control group; (7) the experimental group uses a learning model that is integrated with local cultural wisdom (MBTKBL) and the control group does not use the integrated learning model of local cultural wisdom (T-MBTKB); (9) both groups

(experimental and control) have learning outcomes; and (10) include the number of samples, mean, standard deviation, and variance of the two groups. The duration of time in collecting articles is one month.

Coding and Data analysis

In this study, it is necessary to code (Harun et al., 2021). Coding in the data analysis includes publication year (t_i), the sample size for the experimental and control group (n_i), the average of the experimental and control group (x_i), the standard deviation of the experimental and control group (SD_i), and the variance of the experimental and control group (S^2). Stages of data analysis are (1) sample characteristics, (2) heterogeneity test, (3) checking publication bias, (4) estimation of effect size weight and estimation of summary effect size, (5) making forest plot, and (6) calculating p-value to test hypotheses (Grasman, 2017; Borenstein et al., 2009; and Hunter & Schmidt, 2004). JASP. 0.8. 4.0 is used to facilitate data analysis. Classification of effect size: 0 - 0.20 (Weak effect), 0.21 – 0.50 (Modest effect), 0.51-1.00 (Moderate effect), and > 1.00 (Strong effect) (Cohen et al., 2007).

FINDINGS

In Indonesia, there are many studies on the application of learning models that are integrated with local cultural wisdom (MBTKBL). The cooperative learning model, inquiry, and thematic are the models chosen by many researchers. Local wisdom in an area is integrated into each learning model to improve student learning outcomes. The characteristics of each research publication are presented in Table (1) and Table (2) below.

Table 1
Variable characteristics of each research publication

Author	Local wisdom integrated learning model	subject/field of study
Wahyuni et al., (2017)	Think Talk Write based on Tri Kaya Parisudha	Mastery of IPS competence
Paryanata et al., (2019)	Think Pair Share based on Tri Kaya Parisudha	Social studies learning outcomes
Santhi et al., (2018)	Team Assisted Individualization based on Tri Hita Karana	Mastery of civics competence
Widiartini, et al., (2019)	Group Investigation based on Tri Hita Karana	Mastery of science competence
Indrawan et al., (2017)	Think Talk Write based on Tri Hita Karana	Mastery of IPS knowledge
Somarasih et al., (2017)	Inside Outside Circlebased on Tri Kaya Parisudha	Science learning outcomes
Ariasih et al., (2018)	Inside Outside Circle based on local wisdom	Mathematical learning outcomes
Aristikawati et al., (2014)	Group Investigation nuances of local wisdom	Social studies learning outcomes
Adnyana et al., (2017)	Snowball Throwing Contains local wisdom	Social studies learning outcomes
Astini et al., (2017)	Talking Stick based on local wisdom	Mastery of IPS competence
Suartika et al., (2017)	Word Square based on local wisdom	Mastery of IPA competence
Kharismawati et al., (2013)	Think Talk Write based on local wisdom	Science learning outcomes
Yunita et al., (2018)	Team Game Turnamen based on local wisdom	Science learning outcomes
Astri et al., (2017)	Number Head Together based on local wisdom	Civics learning outcomes
Ati et al., (2013)	Learning Cycle 7E based on local wisdom	Science learning outcomes
Suputra et al., (2013)	Group Investigation oriented towards local wisdom	Critical thinking ability of science
Satriari et al., (2013)	IKRAR based on local wisdom	Mathematical problem solving ability
Indrayani et al., (2014)	Think Talk Write based on local wisdom	Science learning outcomes
Aryawan et al., (2013)	Think Pair Share based on local wisdom	Social studies learning outcomes
Hermawan et al., (2013)	Contextual Teaching and Learning based on local wisdom	Social studies learning outcomes
Wijayanthi et al., (2014)	Guided Inquiry based on local wisdom	Social studies learning outcomes
Dewi et al., (2014)	Thematic Ruling on local wisdom	Science learning outcomes

Table 2
The mean value, standard deviation, and number of samples in each research publication

Author	Experimental group (T)			Control group (C)		
	Mean	SD	n1	Mean	SD	n2
Wahyuni et al., (2017)	81.07	7.70	45	72.86	6.10	40
Paryanata et al., (2019)	15.90	3.82	26	16.50	4.26	22
Santhi et al., (2018)	76.32	11.39	37	50.86	13.97	37
Widiartini et al., (2019)	75.72	10.35	35	63.66	9.49	42
Indrawan et al., (2017)	74.89	7.41	38	66.79	9.17	49
Somarasih et al., (2017)	20.42	3.57	36	14.89	3.41	28
Ariasih et al., (2018)	24.05	2.52	20	12.23	2.67	22
Aristikawati et al., (2014)	82.37	3.71	40	77.50	5.40	41
Adnyana et al., (2017)	21.08	3.91	23	13.29	3.41	23
Astini et al., (2017)	78.99	13.32	43	68.93	12.67	41
Suartika et al., (2017)	73.70	12.74	40	63.07	15.07	42
Kharismawati et al., (2017)	21.96	4.56	29	16.81	4.91	27
Yunita et al., (2018)	22.04	3.31	28	18.75	3.27	24
Astri et al., (2017)	22.50	4.60	30	16.70	4.47	21
Ati et al., (2013)	85.70	6.74	23	69.90	0.24	24
Saputra et al.,(2013)	26.62	5.16	21	19.95	7.11	39
Satriari et al., (2013)	89.44	14.31	31	65.00	12.08	27
Indrayani et al., (2014)	18.00	3.45	24	13.68	3.54	22
Aryawan et al., (2013)	17.56	3.36	27	13.68	3.54	22
Hermawan et al., (2013)	20.39	4.31	31	15.13	3.87	31
Wijayanthi et al., (2014)	72.09	6.49	45	60.84	6.14	43
Dewi et al., (2014)	83.57	6.04	35	77.52	5.92	32

Each research publication sampled has an experimental group and a control group. The experimental group was taught with a learning model integrated with local cultural wisdom (MBTKBL) and the control group was not taught with an integrated learning model with local culture wisdom (T-MBTKB). The mean values, standard deviations, and many samples for each publication vary greatly. The publication which is used as the research sample is heterogeneous testing. The purpose of the test is to determine the analysis used in estimating summary effect sizes and publication bias. Heterogeneous test results of the research samples are presented in Table (3) below.

Tabel 3
Fixed and random effects

	Q	df	p
Omnibus test of model coefficients	66.84	1	< .001
Test of residual heterogeneity	110.45	21	< .001

Note. p -values are approximate.

The test value of heterogeneous residuals is shown as the Q value (110.45) with a p-value of 0.001 < 0.05, meaning that the publication made as a sample meets the heterogeneity criteria (Hunter & Schmidt, 2004). These results are consistent with the results presented in Table (2) below.

Tabel 4
Residual heterogeneity estimates

Estimation	Value
τ^2	0.531
τ	0.729
I^2 (%)	87.239
H^2	7.836

Estimated heterogeneous residual values are shown at τ^2 (0.53) and τ (0.72) > 0.05. While the I^2 value (87.23%) is close to 100%, it means that the sample used meets the heterogeneity criteria. Based on the two approaches above, it can be concluded that the publication used as a sample meets heterogeneous assumptions, so that the analysis that will be used in estimating the summary effect size and publication can use random effects. The results of the effect size analysis using random effects are presented in the following forest plot.
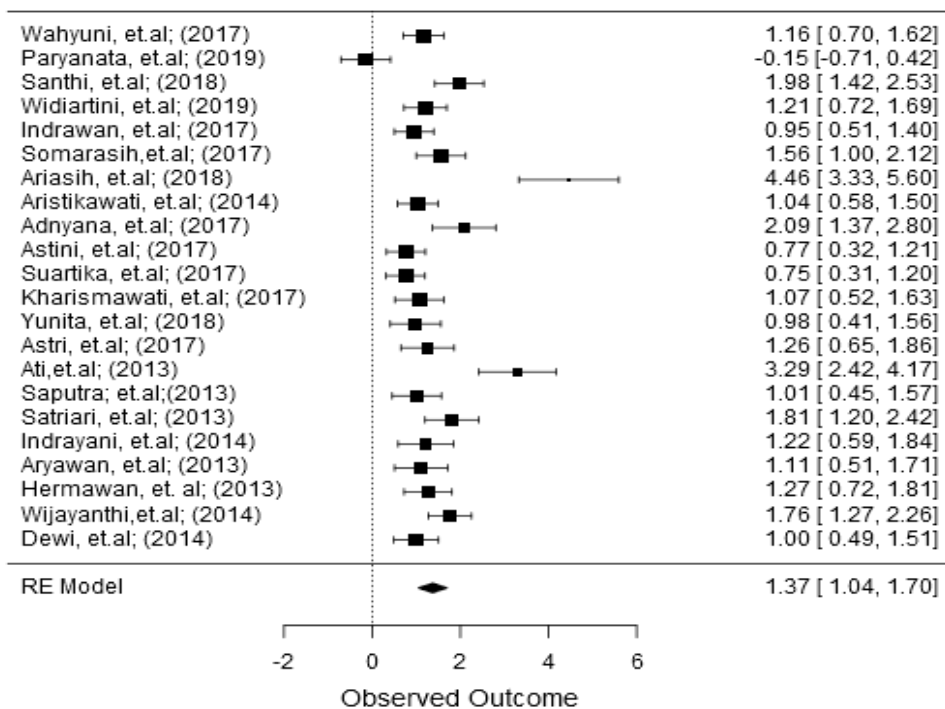

Figure 1
Forest plot random effect model

The resulting forest plot shows the effect size of each study sample (publication). There are 17 publications that have an effect size value > 1 and 5 publications that have an effect size value < 1. Each resulting effect size is located in the interval. Of the 22

research samples that have the largest effect size value, namely research publications Ariasih, et al., (2018). The resulting effect size is 4.46 between the intervals of 3.33 to 5.60. The smallest effect size value is research publication by Paryanata et al., (2019). The resulting effect size value of -0.15 is at intervals of -0.71 to 0.42. The value of summary effect (M) resulting from the whole sample of 1.37 is at intervals of 1.04 to 1.70. The distribution of effect sizes from each publication can also be presented in the form of the following funnel plot.
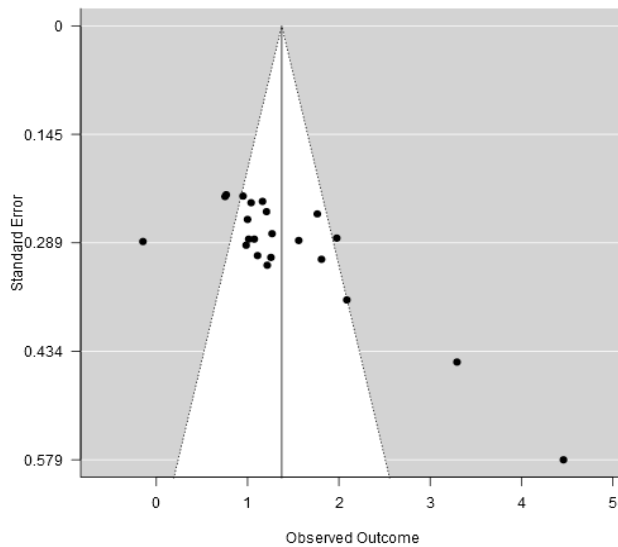

Figure 2
Funnel plot random effect model

The resulting funnel plot shows that in this study large samples were used. Black nokta gather in the funnel plot. The resulting standard error (SE) is in the range of 0.168 which means that the error generated from each publication is still very small. The resulting standard error value affects the summary effect size of the integrated learning model of local cultural wisdom (MBTKBL). The next stage of the analysis is testing the research hypothesis presented below.

$$\text{Ho}: \; M = 0$$

$$\text{Ha}: \; M \neq 0$$

Based on the values of M and SE, the Z value of 8.13 was obtained. The Z value is used to determine the p-value with the p-value one-tailed test approach. The Z value is substituted into the formula p-value = 1 - NORMSDIST (8.13), so that the p-value = 0.00 < 0.05 (95% confidence interval) is obtained. Thus the Ho hypothesis is rejected, meaning that there is strong evidence that the treatment given to the experimental group with an integrated learning model of local cultural wisdom is vastly different from the

control group that is not given an integrated learning model of local wisdom in improving learning outcomes.

The most important stage in a meta-analysis is checking publication bias. The approach used to check publication bias is trim fill analysis. The results of the trym fill analysis estimate are presented in the form of the following forest plot and funnel plot.
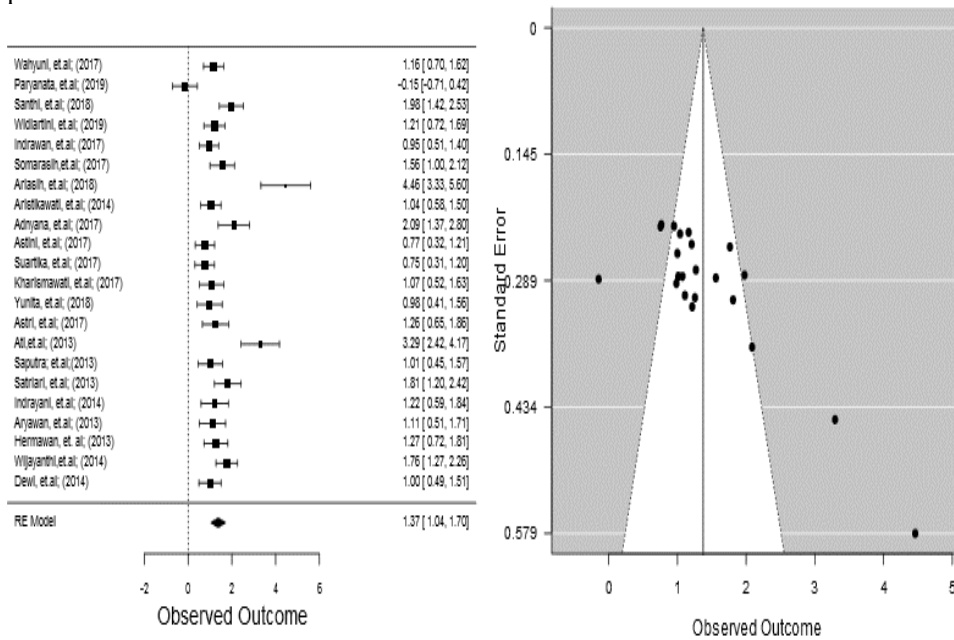

Figure 3
Trim fill analysis using random effects

Based on Figure (3) above, it is known that in the forest plot there are no additions of new samples that are recommended for inclusion in the analysis in other words no sample is lost. The summary effect (M) value is 1.37 at intervals of 1.04 to 1.70. This value is the same as the value generated in figure (1) so there is no indication of publication bias. Based on the appearance of the resulting funnel plot, there is no addition of an empty circle (nokta) which is characteristic of a publication bias. In addition, the resulting funnel plot is symmetrical and has the same appearance as the funnel plot shown in Figure (2). Based on the results of trim fill analysis, it can be concluded that there is no publication bias in the meta-analysis of learning models that integrate the local cultural diversity.

DISCUSSION

Learning models integrated with local cultural wisdom (MBTKBL) have a strong effect on improving student learning outcomes. Through a contrast group meta-analysis study,

a summary effect size of 1.37 was obtained. This value addresses the magnitude of the effect that results from the integrated learning model of local cultural wisdom (MBTKBL). Local wisdom integrated with the learning model is a way of life for the local community, for example, *Tri Hita Karana, Tri Kaya Parisudha*, and others. The values of local wisdom as a source of innovation in education that is educational and has an impact on cognitive aspects (Selasih & Sudarsana, 2018).

Local cultural wisdom describes how to behave and act based on the local culture. The local potential that exists in every region in Indonesia is an asset of natural resources. Local wisdom can be used as a source of the material (Uge et al., 2019). Learning in schools today has paid special attention to this aspect of local cultural wisdom. Local wisdom-based learning makes students able to connect phenomena or cultures that occur in the local community so that the learning outcomes of students (Rahmi, 2016). Local wisdom-based learning methods/models that support the learning process (Toharudin, 2021). The importance of integrating local wisdom in learning models to create learning that not only equips students with knowledge but also instills a sense of love for local diversity in their environment. Local wisdom-based learning is considered better than conventional learning because it is adapted to the daily context of students so that learning becomes more meaningful (Uge et al., 2019). The local wisdom-oriented learning model is effective to improve students' ability to problem-solving (Parwati et al., 2018). Local wisdom-based learning affects student learning outcomes (Ramdiah et al., 2020). The results of the research found by the author using a meta-analysis approach are in line with the results of research that has been carried out by other researchers, namely local cultural wisdom which is integrated into the learning model and has an impact on student success/outcomes in learning.

The experimental group that was treated with an integrated learning model of local cultural wisdom (MBTKBL) was far different from the control group and was not given a learning model integrated with local wisdom (T-MBTKB) in improving learning outcomes. This is known from the p-value = 0.00 < 0.05 and the rejection of the hypothesis Ho. Effective learning models will ease the burden on students in mastering material that has broad coverage (Eysink, 2016). The use of local wisdom in learning can help students to understand concepts contextually and correctly (Kurniawati et al., 2017). Another benefit of implementing MBTKBL is being able to instill and develop character values so that students who have the strength of character are formed (Harun et al., 2020 & Harun et al., 2020). Instilling the value of local wisdom from an early age can help a student in solving problems in the phenomenon he is facing. In addition, a student who is embedded in the values of local wisdom early on has a clear identity and is not easily influenced by other cultures. The culture in Indonesia is used as a moral guide so that in social interaction there are binding moral values.

The resulting summary effect is positive and in the strong category (Cohen et al., 2007) shows that the application of MBTKBL in the experimental group is running effectively. Learning is said to be effective if students are actively involved in organizing and finding information (Eggen & Kauchak, 1979). In the application of MBTKBL students are very involved because there are values of local wisdom that encourage students to be

active. For example, through *Tri Hita Karana*-based type of TTW cooperative learning model can create learning that requires students to be active in learning and to master learning levels (Indrawan et al., 2017). The role of NHT cooperative learning based on local wisdom in the learning process is that communication and interaction will be established between students and students, students and teachers, and the opposite (Astri et al., 2017). Thus local wisdom becomes an alternative to developing active, innovative, creative, effective, and fun learning models. The default value of the resulting error is very small, so it affects the summary effect of the integrated learning model of local cultural wisdom (MBTKBL). These results are confirmed by the absence of publication bias so that the average value of the effect size is maximal.

CONCLUSION

Through a systematic review and meta-analysis group contrasts study, it was found that there was a difference in the increase in student learning outcomes taught using the local culture wisdom integrated learning model (MBTKBL) as an experimental group with students who were not taught with the local cultural wisdom integrated learning model (T-MBTKBL) as a control group. The resulting summary effect size of 1.37 is at intervals of 1.04 to 1.70. The summary effect size is categorized as a strong effect, meaning that MBTKBL is considered to provide a very strong effect on improving student learning outcomes. The amount of summary effect generated in the analysis of random effects is inseparable from the small default value of the resulting error which is 0.168 and there is no publication bias. MBTKBL is very useful for schools, especially for teachers who teach in class. The teacher can use the wisdom of the local culture to be integrated into the learning model. The implementation of MBTKBL in the classroom, besides having an impact on improving student learning outcomes, also maintains local cultural wisdom in Indonesia. The results of the study are very useful for the government to make policies about school curricula based on local excellence or local wisdom. The following morning, the researchers who wanted to conduct a systematic review and meta-analysis group contrast study of the MBTKBL were expected to be able to use more research samples (publications), so they could represent all the provinces in Indonesia. There needs to be a comparative analysis using mixed-effects and random effects in determining the resulting summary effect size.

The limitation of this study is that the articles used as artifacts in the meta-analysis are still very limited. This means that articles that examine the integration of local cultural wisdom into learning are still very limited in experimental research so the more limited articles that are used as artifacts will affect the maximum value of effect size and the resulting publication bias. The analysis of moderator variables was not carried out because the use of moderator variables as an intermediary for the treatment effect was still a step used in research. Even though the effect of the treatment given can be explained in detail through the moderator variable. Moderator variables can strengthen or weaken the relationship between variables and are difficult to change over a certain period. In this study, there were no moderating variables in each article that were used as artifacts, so no moderator analysis was carried out.

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