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Meta-Analysis *of Tri Hita Karana* in Experimental Quasi-Research of Science Learning

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Abstract

Local wisdom is a cultural heritage from human ancestors that must be re-earthed because its current position has been shifted by the currents of globalization. The integration of the Tri Hita Karana (THK) concept in science learning becomes a very important thing to be implemented immediately related to the urgency of sociocultural life that leads to Society 5.0 and aspects of cultural literacy in 6Cs Competency. In science learning, THK can be used to teach students to "think local act global". This study aims to examine: 1) the effectiveness of THK in quasi-experimental research in science learning, and 2) the design of data analysis techniques for quasi-experimental research with the integration of THK in science learning. Furthermore, this research is included in the type of meta-analysis research that examines the literature or references quantitatively based on the effect size of the combination of each previous study. This research systematically uses the PRISMA research protocol to explore in-depth research articles related to THK elements from 2017 to 2021 in the science learning process. The results showed that 1) the application of various types of learning models using the THK perspective which was applied to the experimental design had a significant effect on each of the influencing variables (p-value = 0.001) < (0.05). 2) All quasi research articles that were studied used a non-equivalent posttest only control group design with t-test data analysis techniques, namely 88.89% and Manova 11.11%. This research implies that there is a space with other quasi research designs such as Pretest-Posttest, Non-Equivalent Control Group Design, Times Series, and Factorial, while in terms of data analysis techniques, variations of other inferential statistical analysis such as ANOVA, ANCOVA, and MANCOVA for the effectiveness of scientific knowledge research related to quasi-experimental related to THK.

Keywords— Tri Hita Karana, Meta-Analysis, Science Learning, PRISMA, Quasi Experiment

INTRODUCTION

Local wisdom is a cultural heritage of human ancestors that must be reburied because its current position has been shifted by the current globalization. Generally, in the learning process, teachers consider that wisdom is not a problem that must be taught in contextual learning models. But the fact is that something ethnic or full of cultural values often occurs conflict because of the low and narrow view of the community about the culture and local wisdom itself. In the context of culture in Indonesia, ethnic-religious[1] conflicts have destroyed several regions in Indonesia in the past and if ignored, the concept of Indonesian cultural diversity seems to exist. [2], [3]. If the younger generation abandons local wisdom as part of the nation's culture, it will result in a generation that is indifferent, apathetic, and even loses the nation's identity [4].

Learning based on local wisdom not only helps students to change their mindsets during the learning process, but it can also have a significant impact as advice for local government policies. The basis of local wisdom is useful for implementing intercultural communication, preventing problems, supporting harmony between communities, and its values become the capital of the intercultural communication field [5]. Thus, the integration and orientation of local wisdom in each subject become a very important thing to develop students' academic abilities as well as the development of the identity and personality of the nation.

In the era of industrial revolution 4.0 and 5.0 local wisdom again gained portions and revitalization in a concept known as *cultural literacy* in 6C's Competency [6]. Learning, which originally separated science and technology[7] from local culture, became a complete unity and must be maintained. *Tri Hita Karana* emerged as one of the local wisdom of Balinese people who are timeless. *Tri Hita Karana* derives from the root words "*Tri*" meaning three, "*Hita*" meaning prosperity and happiness, and Karana meaning cause. Thus *Tri Hita Karana* can be defined as three causes of happiness that teach people to live in harmony with God (*parahyangan*), others (*pawongan*), and the surrounding environment (*palemahan*) [8]–[11].

The integration of *the Tri Hita Karana* Concept (THK) in science instruction is crucial to be implemented immediately. THK can be used to teach students "*think locally and act globally*", which is thinking about the value of THK's local wisdom that can be implemented globally. From this point of view, it can be seen that the value of THK value can be entered can be various types of learning situations and conditions. Every implementation of the learning process, especially science must emphasize aspects *of parahyangan*, *pawongan*, and *palemahan*. Mainly *palemahan* and *pawongan* are objects of science studies such as biology, chemistry, and physics. The more students learn and explore science, the students will be met severely, namely God Almighty who is the answer to everything difficult to explain scientifically in science.

Meta-analysis studies are quantitative studies that analyze empirical research that has been conducted by researchers and synthesize them into conclusions that outline the effectiveness and direction of *the grand theory* of continuous research. A meta-analysis, is a set of statistical techniques to synthesize the results of several studies and is used when the formulation of research problems focuses on quantitatively utilizing conclusions[12]. About THK research, meta-analysis studies can determine the design of effective research designs to be implemented in the science learning process.

In its implementation to find out the significance of and direction of THK integration in the classroom activities, the meta-analysis of quasi-experimental research in science learning is the most fundamental thing that can be used to provide a clear research roadmap. Quasi-experimental research is a minimum generalization requirement that can be done by education practitioners to be able to see how the significance of the research is related to the concept *of Tri Hita Karana.* For example, there has been no similar research that examines how "*Tri Hita Karana Meta-Analysis in Experimental Quasi-Experimental Research of Science Learning*". Thus in terms of the urgency of research, this research becomes very important to be implemented immediately.. Based on the preliminary description, this research is intended for 1) To analyze the effectiveness of the use of Tri Hita Karana in quasi-experimental research of science learning based on a meta-analysis, and 2) To describe the design and techniques of quasi-experimental research data analysis related to Tri Hita Karana in Science Learning.

Methodology

This study is part of a sort of meta-analysis that analyses literature or references quantitatively based on the effect size of each previous study combined. Systematically this study uses the PRISMA (Preferred *Reporting Item for Systematic Review and Meta-Analysis*) research protocol to explore in-depth the article of research articles related to elements of *Tri Hita Karana* in the science learning processed field[13]. The source of article references accessed is limited to portal garuda from 2017 to 2021 this is because other scientific reference sites do not provide article research. quasi-experimental associated with THK.

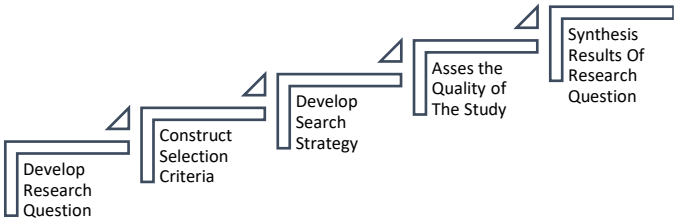
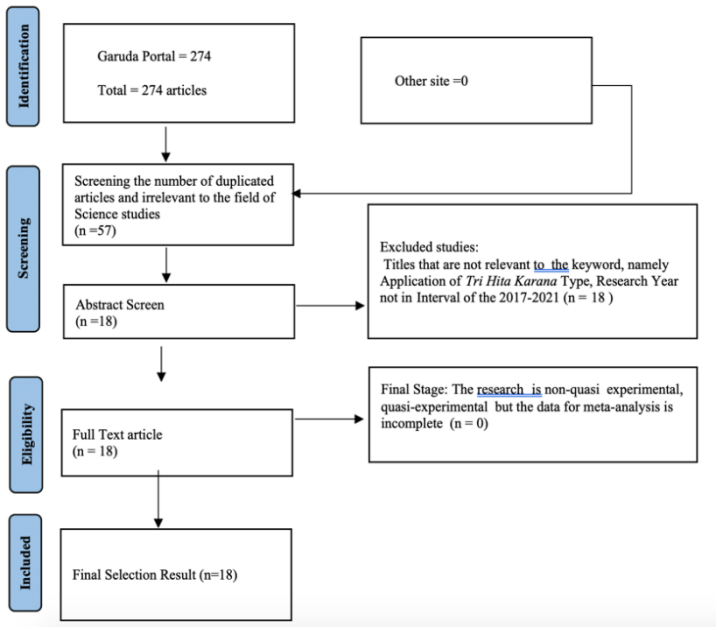


Figure 01. Prisma Protocol Stages in Research[13]



Furthermore, in this study, data analysis techniques were used using *continuous random-effect* methods, especially *Dersimonian Laird*. This method is a simple *non-interactive* method and is most often used in the meta-analysis research field[14].

Results and Discussion

Results

The mechanism for implementing the PRISMA protocol can be described as follows:

Then in full the results of the data tabulation for meta-analysis can be displayed as follows:

Table 01. Meta-Analysis Article Tabulation Results

Author	Ne	Xe	Sde	Nc	Xc	Sdc	Design	Data analysis techniques
Wiguna et. al (2017)	24	31	5.02	22	22.64	4.64	Non equivalen posttest only	t-test
Anjani et.al. (2017)	34	80.05	7.97	42	70.14	8.57	Non equivalen posttest only	t-test
Widiartini et. al (2019)	35	75.72	10.35	42	63.66	9.49	Non equivalen posttest only	t-test
Saputra et.al (2018)	25	77.68	12.53	21	63.38	12.51	Non equivalen posttest only	t-test
Suryantari et.al (2018)	36	0.41	0.138	33	0.29	0.13	Non equivalen posttest only	t-test
Yunita et.al. (2018)	28	22.04	3.31	24	18.75	3.27	Non equivalen posttest only	t-test
Narayani et.al. (2019)	27	18.62	1.81	24	17.08	1.92	Non equivalen posttest only	t-test
Kusumayani et.al. (2019)	32	80.25	8.64	22	70.95	8.94	Non equivalen posttest only	t-test
Indrayani et.al. (2019)	28	22.57	3.27	24	17.75	3.15	Non equivalen posttest only	t-test
Tiarini et.al. (2019)	24	23.4	3.83	28	20	3.68	Non equivalen posttest only	t-test
Arisanti et.al. (2020)	24	21.17	2.68	30	16.10	3.17	Non equivalen posttest only	t-test
Suryawan et.al. (2020)	34	61.74	3.95	37	57.43	7.83	Non equivalen posttest only	t-test
Sustainable et.al. (2019)	35	23.06	2.92	22	19.36	4.4	Non equivalen posttest only	t-test

Citragotra et.al (2019)	26	18.04	4.85	30	15.23	4.32	Non only	equivalen	posttest	t-test
Markandya et.al. (2019)	23	98.83	6.71	23	71.55	6.51	Non only	equivalen	posttest	Manova
Niraha et.al. (2019)	47	123.98	2.72	42	110.72	2,917	Non only	equivalen	posttest	Manova
Jaya & Asri (2020)	32	83.06	9.4	30	12.43	12.43	Non only	equivalen	posttest	t-test
Son (2019)	34	23.12	3.99	29	16.21	4.09	Non only	equivalen	posttest	t-test

Based on the results of the analysis, the mean *effect size* of 17 research articles analyzed was 1,686, with a lower limit of = 1,215, and an upper limit = 2,157. Because the p value < α (0.05) it can be concluded that the application of various types of learning models using the Tri Hita Karana perspective applied with the quasi-experimental design has a significant influence on the each variable is bound to it.

Table 03. Heterogeneity of research data

Heterogeneity			
tau^2	Q(df=17)	Het. p-Value	I^2
0.931	190.384	< 0.001	91.071

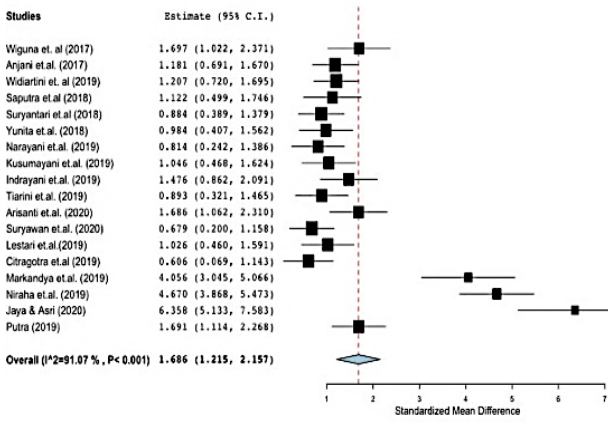


Figure 1. *Forest Plot* based on *effect size standardized mean difference* research quasi experiments in science learning.

Forest Plot in figure 1 shows a collection of several primary studies that form a main line known as *individual trees*[15]. The size on the symbol signifies the variance of each study, the smaller symbol indicates a higher variant. The main mean (*grand mean*) of the entire research article is shown in the "*blue diamond*" at the base of *the forest plot*[16]. In general, it can be known that in the implementation of quasi-experimental research the Tri Hita Karana Concept using various types of learning models and approaches can be categorized into two parts, namely the first tri Hita Karana research with *effect size* in the medium category as many as 15 studies[17]–[28]. As well as the second, Tri Hita Karana research with a high *effect size* of 3 studies[29]–[31].

Discussion

Effectiveness of Tri Hita Karana in Quasi Experimental Research of Science Learning

Based on the results of the *effect size* analysis, it can be known that there are two groups of quasi-experimental research related to the concept of Tri Hita Karana, namely 3 articles belonging to the group with a high *effect size* and 15 articles included in the low *effect size* group. If further analyzed for the three articles with a high *effect size* on each article, then it can be known that the three articles have the same bound variables, namely measuring the competence of students' IPA knowledge[29]–[31]. THK research using IPA Knowledge Competency research variables or IPA learning outcomes can provide a high *effect size* in the learning process, although variables It is also used in research with a medium *effect size*. Thus, if studied in more depth related to the assumptions underlying why the three types of research obtained a more in-depth *effect size*, namely factors from aspects. Data analysis techniques used in research. The first two studies used *more advanced* data analysis techniques, namely MANOVA when compared to other studies so as to provide a large *effect size*[29], [30]. While other studies use score gains in their research which can also increase *the effect size* in a study[31].

In addition to the variable competence of IPA knowledge, variables related to attitudes or characters are also researched in research with a high *effect size*, namely empathy, and attitudes of concern for environment[29], [30]. Empathy is the basis or foundation for the formation of student character[32]. Empathy is the ability to understand what others feel, appreciate, understand, and accept all the differences and limitations that exist in a social interaction[33]. In relation to THK, empathy is more developed by students in the process of social interaction both inside and outside the classroom through aspects of social harmony (*pawongan*). Teachers can facilitate students in interacting in the classroom effectively in THK learning while still referring to the *student centered learning* approach. Furthermore, positive results were obtained related to the empathy study of students in THK learning [29]. The next attitude variable contained in the meta-analysis study studied in the high *effect size* group is the variable of student concern for the environment. Environmental[34] concern is a mindset and behavior that aims to prevent damage to the natural environment and make initiatives to restore natural damage that has already occurred [35], [36]. In the context of THK, students' concern for the surrounding environment can be developed through the concept of ecological harmony, namely *palemahan*. In the learning process in the classroom students can be directly involved with the potential of the surrounding environment, related to their respective sociocultural contexts with activities *minds on* and *hands on activity*.

In 15 articles with *the effect size* category that is generally reviewing student IPA learning outcomes. There is only one study that examines how character education can be measured in learning models that integrate aspects of THK [23]. This is in line with the concept of THK which develops moral values, ethical values, and the values of unity and unity[37]. The study of character building in science education with reference to THK is very *visible* to be developed as well as other local wisdom studies.[38]–[42]. Grounding character education will be a real thing when contained in aspects of local wisdom of the local culture, in this case related to THK as One of the local wisdom that has universal value.

Tri Hita Karana's Quasi-Experimental Research Data Analysis Design and Techniques in Science Management

Quasi-experimental research is an alternative experimental study conducted when the researcher is not able to randomize the subject of the study perfectly [41][42]. However, although it could not randomize individuals in the study. Randomization can be done based on the class that will be used as a research class. Quasi-experiments can produce a lot of useful knowledge if using equivalent or equivalent groups in the research process and have control and threats of validity. lower than pre-experimental studies[45], [46].

The results of the interpretation of Table 01. show that 100% of research designs used in quasi-experimental research in science learning or SCIENCE OR IPA use *a non-equivalent posttest only control group design* research design. Meanwhile, from data analysis techniques, t-test analysis is the most widely used analysis in quasi-experimental research, namely 88.89% and Manova 11.11%. Thus, it is very wide open types of research design and data analysis techniques in other THK research in the context of quasi-experimental research.

As one of the local wisdom models THK has not been optimal to be implemented in a form of research design because the previous experimental quasi-research only focused on the design of *posttest only control group. design* and inference analysis techniques in the form of t-test and Manova. The limitations of this research are an opportunity for subsequent research to review similar research but with different research designs anddata analysis techniques. Because of the limitations of THK testing can have an impact on errors in quadrant 4, namely wrongly concluding globally how effective THK is in the science learning process in particular.

From the aspect of research design, other types of research designs in quasi-experimental research such as *Pretest-Posttest design, Non-Equivalent Control Group Design, Times Series,* and factorial design in quasi-research Experimental will increase the characteristics of scientific knowledge about THK holistik. Quasi-experimental research designs such as *Pretest-Posttest, Non-Equivalent Control Group Design* will be able to accommodate students' initial knowledge in the learning process. Initial knowledge is the foundation or foundation for students to receive knowledge within their cognitive structure in the process of accommodation and assimilation. paying attention to students' initial knowledge means that it is one of the efforts in reducing research biases that may arise due to differences in initial knowledge among students (Dirks et al., 2014; Parta, 2016). Then from the perspective of the design[47], [48] design, it is a design that can explain how competencies or variables are bound to be measured related to THK research can produce an ajeg output (Sugiyono, 2017). This consistency or diversity will[44] generalization of THK research as one of the *grandories* of local wisdom that can be implemented in various situations and conditions. Furthermore, for the design of factorial types, THK research design can be directed in research using multivariate analysis that ca se *the main effect, simple effect*, interactional *effects* occur in each of the research variables used (Creswell, 2009). By knowing the interactions[43]occur in the research model, it will be useful to provide a clear reference to education practitioners about how to combine. THK with learning models, as well as other research variables.

From the aspect of data analysis techniques, the combination of variative data analysis techniques outside the t-test technique and MANOVA will provide a complete picture of the interrelationship of each research variable and can reduce bias in research.For example, the use of quasi-experimental research designs using factors such as ANACOVA and MANCOVA will be able to reduce the bias of quasi-experimental research related to THK. The use of covariates such as IQ will be able to reduce quasi-experimental research errors that are oriented and based on THK. Thus the results of the resulting research will be more representative.

In the context of globalization, the quasi-experimental learning models analyzed in this meta-analysis study have not analyzed the competence of millennial learning or 6Cs Competency (*communication, collaboration, creative thinking, creative thinking, creative thinking, culture,* and connectivity) in science learning. Thus, this becomes a very high urgency to immediately be implemented in quasi-experimental research oriented and THK-based in science learning in the future.

Closing

Conclusion

The conclusions of this study can be described as follows:

1) The application of various types of learning models using *the THK* perspective applied with a quasi-experimental design has a significant influence on each of its bound variables (p value = 0.001) < α (0.05). Based on the results of the *effect size* analysis, it can be known that there are two groups of quasi-experimental research related to the concept *of Tri Hita Karana*, namely 3 articles that belong to the group with a high *effect size* and 15 articles included in the medium *effect size* group , no articles are found that fall into the category of low effect size.
2) All quasi research articles studied using *a non-equivalent posttest only control group design* design with t test data analysis techniques are 88.89% and Manova 11.11%.

Suggestion

1) It is interesting to study further about the empty space of quasi-experimental research related to THK from the aspect of research design. Other types of research design in quasi-experimental research such as *Pretest-Posttest design, Non-Equivalent Control Group Design, Times Series,* and

factorial design in quasi-experimental research are the direction of THK research in the case of quasi-experimental research of science learning. in the future.

2) The lack of research variables related to measuring students' attitudes in the form of empathy, caring for the environment, and character education are further study materials that can be implemented. in quasi-experimental research in subsequent science learning.
3) In the context of globalization, the quasi-experimental learning models analyzed in this meta-analysis study have not analyzed the competence of millennial learning or 6Cs Competency (*communication, collaboration, creative thinking, creative thinking, culture,* and connectivity) in science learning. Thus, it becomes a very high urgency to immediately be implemented in quasi-experimental research oriented and THK-based in science learning. in the future.

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