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A Literacy and Numeracy Model to Enhance the Independent Learning Education for Islamic Elementary School Teachers

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Abstract

This study aims to determine the effectiveness of the literacy-numeration model in increasing educational learning independence for class teachers and students at *Madrasah Ibtidaiyah*, Magelang Regency, Indonesia. Qualitative and quantitative approaches were used as research methods. Data were collected by using interviews, observation, and documentation techniques. The collected data were then analysed with hypothesis test, validity, reliability, normality, paired t-test, and simple independent-test. This research was conducted on a subject population of 43 Madrasah Ibtidaiyah class teachers. The results showed the effectiveness of the development of independent learning education with literacy and numeracy models for class teachers and students of *Madrasah Ibtidaiyah* in Magelang Regency, Indonesia. The results of the output test "paired Samples Test" yielded that Sig.(2-tailed) was 0.000 <0.05, thus, Ho was rejected and Ha was accepted. This result suggest that there is a significant effect of the literacy-numeration model on the development of independent learning education for students and teachers of *Madrasah Ibtidaiyah* in Magelang Regency, Indonesia.

Keywords: *literacy-numeration model, independent learning education, Islamic elementary school teachers.*

Abstrak

Penelitian ini bertujuan untuk mengetahui efektivitas model literasi-numerasi untuk meningkatkan kemandirian belajar pendidikan bagi guru kelas dan siswa di Madrasah Ibtidaiyah Kabupaten Magelang, Indonesia. Pendekatan kualitatif dan kuantitatif digunakan sebagai metode penelitian. Teknik pengumpulan data menggunakan wawancara, observasi, dokumentasi. Analisis data menggunakan uji hipotesis, validitas, reliabilitas, normalitas, uji-t berpasangan, dan uji-independent sederhana. Penelitian ini dilakukan pada subjek populasi sebanyak 43 orang guru kelas Madrasah Ibtidaiyah. Hasil penelitian menunjukkan keefektifan pengembangan pendidikan merdeka belajar dengan model literasi dan numerasi untuk guru kelas Madrasah Ibtidaiyah di Kabupaten Magelang, Indonesia. Berdasarkan hasil output "paired Samples Test" diketahui Sig.(2-tailed) adalah 0,000 < 0,05 maka Ho ditolak dan Ha diterima. Maka dapat dapat disimpulkan bahwa terdapat pengaruh yang signifikan keefektifan model literasi-numerasi terhadap pengembangan pendidikan merdeka belajar bagi guru kelas Madrasah Ibtidaiyah di Kabupaten Magelang.

Kata kunci: *model literasi-numerasi, pendidikan merdeka belajar, guru madrasah ibtidaiyah.*

INTRODUCTION

Literacy culture in Indonesia is a very interesting issue to explore because of the low level of literacy and it is not yet entrenched among the community, especially in schools or madrasah institutions (Perdana & Suswandari, 2021); (Marmoah & Poerwanti, Suharno, 2022)**.** Traditionally, literacy culture is seen to be able to read and write in a language (Rahmah, 2015), hence literacy can be seen as a unified process with two complementary aspects (Cahya & Artini, 2020).

Currently the development of information and communication technology is suggested to distract public from traditional learning activities, especially students to read books (Purnama et al., 2021); (Lei et al., 2021). What happens is students absorbing the culture of speaking and listening rather than reading. They write down what they listen without a clear reference. In Indonesia, literacy culture is still dominated by using social media as a technological advancement. People read information from WhatsApp, in which the information is not necessarily credible; in fact people prefer to read from WhatsApp rather than reading references from the primary source (Suswandari, 2018).

Numerical literacy has been known for a long time in the history of human civilization, which functions effectively in learning, work, and interaction activities (Kemendikbud, 2021); (Napoli & Purpura, 2018); (Sikora et al., 2019)**.** Numerical Literacy is developed systematically and continuously in the field of education to support both intra and extra-learning activities in parallel formal classes, especially at the elementary school education level (Grotlüschen et al., 2020); (Purpura et al., 2011).

Numerical literacy as knowledge and skills are related to understanding numbers, symbols, and analysis of quantitative information (graphics, tables, charts and mathematical symbols), to help solve problems in the current generation (Pangesti, 2018). Having good numerical literacy skills, students are able to apply their mathematical knowledge in real life (Jain & Rogers, 2019). Numerical literacy is defined as the ability to apply numerical concepts and arithmetic operations skills in everyday life. Numerical literacy is also used to

translate quantitative information. Numerical literacy is an activity to develop reading knowledge and encourage math skills in all aspects of life (Haerudin, 2018).

The principle of the numerical literacy program is to provide education by developing reading habits (Rohim & Rahmawati, 2020), writing (Davy Tsz Kit et al., 2022), and counting (Khakima et al., 2021) for all people who are aware of the concept of education throughout life. The design of the numerical literacy program is divided into two, namely general and specific program. In the general program, the design of the numerical literacy program has an implementation mechanism that is carried out before learning begins with a duration of 15 minutes (Marmoah & Poerwanti, Suharno, 2022). Numerical literacy focuses on the implementation of learning by adjusting the components of mathematics learning materials and material on thematic learning themes (Ekowati et al., 2019).

Merdeka Belajar (the freedom to learn) is a new education policy designed by the Ministry of Education and Culture. The essence of Merdeka Belajar (the freedom to learn) policy is freedom of thought for teachers to provide independence in developing students' thinking patterns in understanding material contextually associated with the facts of everyday life (Houtman, 2020).

The concept of independent learning education has several criteria (Rossiter et al., 2017), namely 1) minimum competition assessment, in which the focus is not on how much the ability of students to get marks after doing assignments from the teacher, but on how students think critically using their cognitive power (Seibert, 2021). In the context of literacy, this assessment assesses students' logical and abstract reasoning, how students think about the aims and objectives of the material and the numerical context, not only memorizing formulas but discovering the basic concepts which they apply to solve broader problems; 2) expansion of the assessment of learning outcomes, in which the focus is that students will be given space to develop themselves according to their interests and talents.

However, many *Madrasah Ibtidaiyah* (Islamic Elementary Schools) have not developed literacy knowledge and numeracy skills program, including mathematics understanding (Colwell & Enderson, 2016). Therefore, the application of unstructured literacy and numeracy in real situations in life is also ignored (Clarke & Roche, 2018); (Hoogland et al., 2018); (Arifuddin et al., 2022). The low literacy and numeracy abilities in Indonesia are based on research data (Haerudin, 2018) and also from the results of the 2019 Program for International Student Assessment (PISA) standard showing Indonesia's position in the 74th position out of 79 countries (Mustaghfiroh, 2020). The data from the 2015 Trend in Mathematics and Science Study (TIMSS) also showed a math score of 379 below the average score of 500 and scientific literacy with a score of 397 below the average of 500 (Hadi & Novaliyosi, 2019; Megawati & Sutarto, 2021)**.**

From the total of 43 *Madrasah Ibtidaiyah* as the research subjects, this research adapted the basic research cluster of the study program to obtain data, all of which are currently implementing literacy-numeration programs for educators-students at the beginning of learning in both online and/or offline contexts. As matters of fact, the identified problems are 1) students' low interest in reading because the books provided are not updated (Anisa et al., 2021); 2) not enough library book facilities as a source of support for the literacy-numeration program (Putri Pradana, 2020); 3) the lack of information obtained for educators-students to

follow the mandatory policy mechanism of the implementation of literacy-numeration in madrasas (Setiawan & Sukamto, 2021).

METHODS

Qualitative and quantitative approaches were used as a starting point in this research (Sugiono, 2018). As many as 43 *Madrasah Ibtidaiyah* were involved as the research subjects. Quantitative data testing was conducted in three stages, i.e., the preparation stage, the implementation stage, and the data testing stage. The first stage was carried out by identifying potential funding problems for the concept of new research findings and conducting studies of relevant theoretical reviews (Snyder, 2019) and policy studies on the results of previous research on the literacy-numeration model at *Madrasah Ibtidaiyah*.

In the second stage, the research implementation used qualitative (Bazen et al., 2021) data collection techniques, i.e., interview (Thelwall & Nevill, 2021) which was conducted to find field data regarding the concept of the literacy-numeracy model. This interview was conducted involving research subjects such as high-grade students (4-6), teachers as executors, school principals as policy implementers, and literacy-numeration program facilitators appointed by the Ministry of Religion particularly the Madrasah Development Division. The second data collection technique was observation carried out to obtain data regarding the process, implementation, and evaluation of the concept of the literacy-numeration model at *Madrasah Ibtidaiyah* determined as feasible as a successful project for the implementation of the literacy-numeration program at *Madrasah Ibtidaiyah*. The third data collection technique was documentation and observation (Hamilton & Finley, 2020) which were carried out to obtain policy data in the form of implementation guidebooks, planning documentation, implementation processes, and evaluation of the mandatory literacy-numeration program in *Madrasah Ibtidaiyah*. From the three qualitative test results, the hypothesis analysis of doubt (true-false) of the literacy-numeracy model as the development of independent learning education for elementary school teachers was found.

The data was tested quantitatively by using several tests (validity, reliability, normality, paired sample t-test, independent t-test using SPSS version 26). Those tests were used to measure the level of practicality of implementation and effectiveness of the literacy-numeration concept model as the development of independent learning education for class teachers at *Madrasah Ibtidaiyah* in Magelang Regency, Indonesia.

RESULTS AND DISCUSSION

Validity Test

The validity test (Kane & Bridgeman, 2017; Sireci, 2007) consists of 10 point statements related to the literacy and numeracy model as the development of independent learning education for class teachers and students at *Madrasah Ibtidaiyah*, Magelang Regency, Indonesia using the SPSS 26. Then, the data analysis was interpreted with r table at a significance level of 5% with N=43, obtained r-table (N-2) of 0.3008. The results can be explained in Table 1:

Table 1. The results of the validity test of the literacy and numeracy models

Items	Result	r-Table	Recommended
Item_1	0.848	0.3008	Valid
Item_2	0.664	0.3008	Valid
Item_3	0.780	0.3008	Valid
Item_4	0.905	0.3008	Valid
Item_5	0.787	0.3008	Valid
Item_6	0.745	0.3008	Valid
Item_7	0.489	0.3008	Valid
Item_8	**0.180**	**0.3008**	**Invalid**
Item_9	0.839	0.3008	Valid
Item_10	**0.111**	**0.3008**	**Invalid**

Table 1. Describes the validity test of the implementation of the literacy-numeracy model as the development of independent learning education for class teachers and students at *Madrasah Ibtidaiyah*, Magelang Regency. The result showed that 90% of the items are valid.

Reliability Test

The reliability test (Cheng et al., 2012) of 10 items related to the statement of the literacy and numeracy model as the development of independent learning education for class teachers and students of *Madrasah Ibtidaiyah*, Magelang Regency was conducted by using the SPPS program 26. The results show a reliability of 0.858 > 0.7 (Gugiu & Gugiu, 2017), This means that the literacy and numeracy model as the development of independent education has a strong level of reliability. The result is presented in Table 2 as follows:

Table 2. The results of the reliability test of literacy and numeracy models

Reliability Statistic		
Cronbach's Alpha	N of Items	Criteria
0.858	10	*Strong*

Normality Test

Normality test (Orcan, 2020), (Bayoud, 2021) with the One-Sample Kolmogorove-Smirnov Test was conducted to measure the effectiveness of the numeration model as the development of independent learning education using the SPPS program 26. The decision-making results are normally distributed with a significance value of > 0.05, but in the item test process (N=43) there are (N=22) used as outliner data with a range of 50%. The data is still quite reasonable, this is because the maximum outliner limit is 50% of the total data (Rousseuw, Peter J. & Leroy, 1987; Hubert & Van Driessen, 2004). The result of the normality test is presented in the table. 3 as follows:

Table 3. The results of the normality test of the literacy model

Test variable	Asymp. Sig. (2-tailed)	Recommended
Literacy and numeracy models as the development of independent learning education	0.151	Normal

Table 3. shows the normality test results yielding a significance value for each literacy and numeracy variable with a result of 0.115 > 0.05. This conclusion is drawn based on the Komlogrove-Smirnov analysis which shows that the data is normally distributed.

The Paired Sample T-Test

1. Test results of paired sample t-test literacy program on the development of independent learning education.

Table 4. The result of paired sample t_test

Paired Samples Statistics				
Mean		N	Std. Deviation	Std. Error Mean
PreTest_Literacy	**55.12**	43	13.693	2.088
PostTest_Literacy	**87.91**	43	5.009	0.764

Table 4. describes the descriptive statistics of the two samples studied, namely the pre-test and post-test. For the pre-test score, the literacy result for the development of self-educational learning on average was 55.12. Meanwhile, the post-test score obtained an average value of 87.91. The number of respondents as the research sample was 43 class teachers. For std values (standard deviation) on the pre-test was 13.693 and the post-test was 5.009. Lastly, the Std. Error for the pre-test was 2.088 and for the post-test was 0.764.

Because the average value of literacy results as the development of independent learning education at the pre-test is 55.12 < post-test 87.91, it can be concluded descriptively that there is a difference in the average literacy results as the development of independent learning education between pre-test and post-test.

Table 5. Data from the correlation test results of the literacy pre-test and post-test

Paired Samples Correlations				
		N	Correlation	**Sig.**
Pair 1	PreTest_Literacy & PostTest_Literacy	43	0.101	**0.520**

Table 5. Explains the correlation or relationship between pretest-posttest variables. Based on the results, the correlation coefficient (Correlation) is 0.101 with a significant value (Sig.) of 0.520. Because the sig value is 0.520 > probability 0.05, it can be said that there is no relationship between the pretest variables and the posttest variables.

Table 6. Data from the pre-test and post-test literacy comparison test results

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	**Std. Deviation**	**Std. Error Mean**	**Lower**	**Upper**	**t**	**df**	**Sig. (2-tailed)**
Pair 1	PreTest_Literacy - PostTes_Literacy	-32.791	14.098	2.150	-37.129	-28.452	**-15.253**	**42**	**0.000**

Table 6. shows the results of the paired sample test, namely the value of Sig. (2-tailed) is 0.000 <0.05, then Ho is rejected and Ha is accepted. This means that there is an average

difference between the results of developing independent learning education literacy on the pre-test and post-test.

2. Paired numeration program t-test results.

Table 7. Test paired sample t-test in numeration

Paired Samples Statistics					
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	PreTest_Numeration	61.88	43	9.696	1.479
	PostTest_Numeration	91.47	43	3.869	0.590

Table 7 describes the results of the descriptive statistics of the two samples studied, namely the pre-test and post-test. For the pre-test scores, the average score in numeration was 61.88. Meanwhile, the post-test score obtained an average value of 91.47. The number of respondents or class teachers used as the research sample was 43 class teachers. For Std. Deviation (standard deviation) in the pre-test was 9.696 and the post-test was 3.869. Lastly, the Std. Error mean for the pre-test was 1.479 and for the post-test was 0.590.

Because the average value of the numeration results as the development of independent learning education at the pre-test is 61.88 < post-test 91.47, it can be concluded descriptively that there is a difference in the average numeration results as the development of independent learning education between the pre-test and post- test.

Table 8. Data from the correlation test results of numeration pre-test and post-test

Paired Samples Correlations				
		N	Correlation	**Sig.**
Pair 1	PreTest_Numeration & PostTes_Numeration	43	0.322	**0.035**

Table 8. shows the correlation between pretest and posttest variables. The results showed a correlation coefficient (Correlation) of 0.322 with a significance value (Sig.) of 0.035. Because the sig value is 0.035 <probability 0.05, it can be interpreted that there is a significant relationship between the pretest results between the posttest.

Table 9. Data from the numerical comparison test results of the pre-test and post-test variables

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	**Std. Deviation**	**Std. Error Mean**	**Lower**	**Upper**	**t**	**df**	**Sig. (2-tailed)**
Pair 1	PreTest_Numeracy-PostTes_Numeracy	-29.581	9.210	1.404	-32.416	-26.747	**-21.062**	**42**	**0.000**

Table 9. shows the results of the paired sample test with Sig. (2-tailed) 0.000 <0.05, hence, Ho is rejected and Ha is accepted. Therefore, it can be concluded that there is an

average difference between the results of the pretest and posttest. This means that there is an influence of numeracy on the development of independent learning.

3. Independent simple t-test test results.

Tabel 10. Table of results of differences in the development of independent learning education in the literacy and numeracy groups.

Group Statistics

	Model	N	Mean	Std. Deviation	Std. Error Mean
Test results	Literacy	43	87.91	5.009	0.764
	Numeracy	43	91.47	3.869	0.590

Table 10. shows "group statistics", it is known that the amount of data resulting from the development of independent learning education for the literacy group and the numeracy group are 43 class teachers respectively. The average score for the development of independent learning education for the literacy group was 87.91, while for the numeracy group was 91.47. Thus, based on the results of the analysis of descriptive statistical data, it can be concluded that there is an average difference in the results of the development of independent learning education between the literacy group and the numeracy group.

Table 11. Data on the significance of the difference in the average results of the literacy group and the numeracy group.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Test results	Equal variances assumed	3.993	.049	-3.687	84	.000	-3.558	.965	-5.477	-1.639
	Equal variances not assumed			-3.687	78.962	.000	-3.558	.965	-5.479	-1.637

Table. 11 shows the results of the Sig. Levene's Test for Equality of Variances which is 0.049 <0.05, hence, it can be interpreted that the variance of the data between the literacy class and the numeracy class is not the same. Thus, the interpretation of the table of independent sample test results above is guided by the values contained in the table. 11 "equal variances are assumed".

Table. 11 also shows the results of "independent sample test" in the section "variants assumed to be the same" showing the value of Sig. (2-tailed) of 0.000 <0.05, then as a basis for decision making in the independent sample t-test it can be concluded that H0 is rejected and Ha is accepted. Therefore, it can be concluded that there is a significant (real) difference between the average results of the development of independent learning education in the literacy group and the numeracy group.

Lastly, Table. 11 also shows the result of "Mean Difference" which is -3.558. This value indicates the difference between the average results of developing classroom teacher education independence in the literacy group and the average results of developing educational independence in the numeracy group or 87.91-91.47 = -3.558 and the difference is -5.477 to - 1.693 (95% Confidence Interval of Lower Upper Difference).

Measuring the character of teacher professionalism must be the main goal for establishing a strategic plan to educate the nation's life. Qualified teachers must have competence, namely pedagogic competence, professionalism, personality, and social competence (Oktradiksa, 2012; Symeonidis et al., 2023). These four competencies are holistic and constitute a unit that characterizes professional teachers to carry out their professional duties properly (Oktradiksa & Aufa, 2018). A teacher needs to improve his competence and performance gradually, in stages, and continuously through continuous teacher professional development (Vásquez et al., 2017).

One evidence of increasing the performance of professional competence is by involving independent learning education by teachers and students through the literacy and numeracy model program, as shown by the test results based on Table 1 with good quality significance based on the results of the comparison validation test r table > 0.3008 with the results of data analysis 90% declared valid.

The roles and responsibilities of teachers in the future will be increasingly complex along with the development of the rate of information and the characteristics of the generation of learners in the 4.0 era (Vrchota et al., 2020). Therefore, teachers need to improve their professional competence to keep up with the increasingly dynamic and creative learning trends. In this information age, teachers are also required to be selective and literate in developing students' learning processes so that they contribute positively to student learning outcomes.

The goal of teacher professionalism and pedagogical competence can be achieved through the development of independent learning education (Afandi et al., 2022) with literacy and numeracy programs (Banawi et al., 2022). Pedagogic competence refers to the mastery of learning theory and the principles of educational learning. Meanwhile, professional competence refers to the mastery of material, structures, concepts, and scientific mindsets that support the subjects being taught. The results of this can be proven in the Table. 2 showing a reliability of 0.858 > 0 (Gugiu & Gugiu, 2017). Hence, the literacy and numeracy models to improve these two competencies are in the strong category.

Teacher professionalism and pedagogical competence are an important part of supporting children's basic literacy skills (Yusof et al., 2015). Teachers must understand that literacy is an interesting issue to pay attention to. If students' reading and writing skills do not receive a high portion of attention, students will be hindered in obtaining their achievements. Likewise, class teachers and students of *Madrasah Ibtidaiyah* in Magelang Regency, Indonesia need to be trained in reading and writing from an early age, because this will lead them to the ability to gain knowledge and nurture their love for reading. Based on the results of the "paired samples test" output test in the table. 7, it is known that the value of Sig. (2-tailed) is 0.000 <0.05 which concludes that there is a significant difference in the average between the learning literacy results of *Madrasah Ibtidaiyah* students in Magelang Regency.

The objectives of the literacy program for educators are: 1) improving the pedagogical and professional abilities of teachers (Oktradiksa, 2012), 2) facilitating teacher learning resources in developing learning activities, 3) building a teacher's mindset about the importance of literacy, 4) building a teacher's mindset that continues to developing (Growth Mindset), (Growth Mindset), 5) identifying various activities in literacy skills, and 6) creating a literate classroom environment.

CONCLUSION

The concept of independent learning is very popular with the support of the use of learning technology. The literacy and numeracy model produces significant, practical, and effective data to foster student learning experiences to encourage learning at *Madrasah Ibtidaiyah* in Magelang Regency, Indonesia. Therefore, the numeracy literacy model is an alternative to increase learning independence for teachers, especially in *Madrasah Ibtidaiyah*.

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