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The Effect of Teacher Competency on the 2021 Elementary School National Assessment Result

Amelia Wahyu Puspitaningtyas [1*], Thia Jasmina[1]

[1]*Department of Economics, Faculty of Economics and Business, Universitas Indonesia, Jl. Salemba Raya IV No.4, Kota Jakarta Pusat, 10430, Indonesia*

Corresponding Author: Amelia Wahyu Puspitaningtyas
Email: ameliawepe@gmail.com

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Abstract

Education aims to develop students' potential and competencies as measured by the National Assessment (AN) as the latest standardized test organized by the Ministry of Education, Culture and Research. The AN results are contained in the Education Report Card platform. In the education system, teachers play a crucial role in ensuring that the learning process is optimized. Therefore, knowledge of the influence of teacher competence on student competence can help improve the overall quality of education. This study aims to provide empirical evidence regarding the relationship between teacher competence and AN outcomes at the primary school level in 2021. The method used is logistic regression with the dependent variable being student literacy and numeracy competency achievement at the district/city level. The independent variables of this study consist of teacher competency as the main independent variable described by the percentage of certified teachers, while the control independent variables consist of teacher characteristics, school characteristics, socio-economic characteristics, and regional characteristics. The results of this study show that there is no significant relationship between teacher competencies and students' literacy and numeracy competencies. The control variables that were significant for literacy competencies consisted of student-teacher ratio, school accreditation, school internet access, life expectancy, and district geographical location, while in numeracy competencies only the variables of electricity and school internet access, as well as life expectancy and per capita expenditure were significant.

Introduction

Education aims to develop the potential of students, as stated in Law of the Republic of Indonesia Number 20 of 2003. One of the targets in the fourth goal of the Sustainable Development Goals (SDGs) is target 4.1.1. is related to the completion of free, equal and quality primary and secondary education. This education must also lead to relevant and effective learning outcomes. One of the indicators of this target is the percentage of children in grades 4 (four) and 6 (six) of Elementary School (SD), as well as in grade 9 (nine) of Junior High School (SMP) who have achieved minimum proficiency in reading and mathematics (Badan Statistics Center, 2019). The quality of education at the elementary level must be considered considering that two of the three grade levels of children as indicators of the success of the SDGs are located at the elementary school level. Literacy and numeracy competencies are basic abilities needed by all students and need to be developed across subjects, so teachers need to focus on developing reading/literacy and logical-systematic/numeracy thinking competencies (Kemdikbudristek, 2023b).

In the education system, teachers have a crucial role in ensuring the learning process runs optimally, so teachers must have good competencies and qualifications. Law Number 14 of

2005 concerning Teachers and Lecturers emphasizes that teachers are required to have academic qualifications, good competencies and an educator certificate. Teacher professional and certification programs have been implemented in Indonesia since 2005 and graduation from this program is the main requirement for obtaining an educator certificate which is a condition for receiving teacher professional allowances. The Teacher Professional Education Program (PPG) is a national program carried out by the government to prepare teachers to master four mandatory competencies, namely pedagogical, social, personality and professional competencies, in accordance with national education standards. By fulfilling the qualification and competency requirements for teachers, teachers who have completed PPG can apply to obtain an educator certificate, in accordance with Permendiknas Number 9 of 2010 and Permendikbud Number 87 of 2013. This shows that teachers who have an educator certificate are teachers who have competence good ones, and most of them are graduates of the PPG program. Teachers who have been certified will receive additional income in the form of Teacher Professional Allowance (TPG). The APBN allocation for TPG in 2020 is IDR 50.9 trillion for 1,153,717 teachers (Ministry of Finance, 2020).

The aim of this research is to provide empirical evidence regarding the relationship between teacher competence and the results of the National Assessment at the elementary school level in 2021. The results of this research can provide an understanding of the important role of teacher competence in improving student competence, especially at the elementary school level. Thus, this research can provide valuable information for developing educational policies and improving the quality of learning at the elementary school level .

Methods

Research Variable

In this study, there are two dependent variables that represent the results of the National Assessment reported in the Education Report Card issued by the Ministry of Education and Culture, namely literacy competency and numeracy competency. Based on educational production theory, students' literacy and numeracy competencies are output variables. This research uses teacher competency which is described by the percentage of certified teachers as the main independent variable, while for control variables the researcher uses variables that represent teacher, school, socio-economic and regional characteristics. All variables in this study were aggregated at the district/city level of analysis. The definitions and units of all variables used in this study are shown in Table 1.

Table 1. List of Variables, Data Types, and Data Sources

Variable	Definition and Units	Data source	Hypothesis
Dependent Variable			
Literacy Competency (*Literacy)*	2021 AN SD literacy competency achievements per district/city, 0 = literacy competency category below minimum competency, 1 = category literacy competency reaches minimum competency.	2022 Public Education Report Card, Ministry of Education and Research and Technology Education Assessment Center.	N/A
Numeracy Competency *(Numeracy)*	2021 AN SD numeracy competency achievements per district/city,	2022 Public Education Report Card, Ministry of	N/A

	0 = category numeracy competency far below minimum competency, 1 = category numeracy competency below minimum competency.	Education and Research and Technology Education Assessment Center.	
Main Independent Variables			
Teacher Competency *(Certificate)*	Percentage of elementary school teachers who have been certified per district/city. (%)	Basic Education Data, Kemdikbudristek.	Positive
Control Independent Variables			
Teacher Characteristics			
Teacher Qualifications *(Qualif)*	Percentage of elementary school teachers who have a minimum bachelor's degree/qualification per district/city. (%)	Basic Education Data, Kemdikbudristek.	Positive
Teacher Age *(Age)*	Average age of elementary school teachers per district/city. (year)	Basic Education Data, Kemdikbudristek.	Positive
Teacher Working Period *(Tenure)*	Average tenure of elementary school teachers per district/city. (year)	Basic Education Data, Kemdikbudristek.	Positive
School Characteristics			
Studen-Teacher Ratio *(STR)*	Ratio of teachers and students per district/city . (ratio)	Basic Education Data, Kemdikbudristek.	Negative
School Accreditation *(Sch_accred)*	Percentage of elementary schools accredited A per district/city. (%)	Regional Education Balance, Kemdikbudristek.	Positive
School Conditions *(Sch_cond)*	Percentage of elementary schools in good physical condition and slightly damaged per district/city. (%)	Regional Education Balance, Kemdikbudristek.	Positive
School Electricity Access *(Sch_electricity)*	Percentage of S D who have access to electricity per district/city. (%)	Basic Education Data, Kemdikbudristek.	Positive
School Internet Access *(Sch_internet)*	Percentage of elementary schools that have internet access per district/city. (%)	Basic Education Data, Kemdikbudristek.	Positive

Socioeconomic Characteristics			
Life Expectancy *(UHH)*	Life expectancy per district/city. (year)	Central Bureau of Statistics.	Positive
Per Capita Expenditure (*Expenditure)*	Adjusted per capita expenditure per district/city. (thousand rupiah)	Central Bureau of Statistics.	Positive
Regional Characteristics			
Location *(Region)*	District/city location, 0 = Outside Java and Bali, 1 = Java and Bali.	Central Bureau of Statistics.	Positive
Urban-Rural *(Urban)*	district/city administrative status, 0 = district, 1 = city.	Central Bureau of Statistics.	Positive

Sampling Method

This research has a target population of all districts/cities in Indonesia, totaling 514 districts/cities in 2021. However, the sampling technique for literacy and numeracy competencies is different. In the literacy competency research, the districts/cities used as research samples were districts/cities that implemented AN at the elementary school level in 2021. There were 6 districts that did not implement AN, and 7 districts/cities were found to be *outlier data*, so the number of samples in the study literacy competency is 501 districts/cities.

As with literacy competency, not all districts/cities in Indonesia can be used as samples for numeracy competency research. Districts/cities that can be used as samples in this numeracy research must implement AN at the elementary school level in 2021 and fall into the categories far below minimum competency and below minimum competency. In AN achievement of numeracy competency, there are 4 districts/cities that fall into the category of achieving numeracy competency. Because if the 4 samples are combined into a group below minimum competency, it can change the definition of achievement, then districts/cities in the category of achieving minimum competency are not included as research samples, so in this study there are two categories of numeracy competency dependent variables, namely below minimum competency and far below minimum competency. Apart from that, as is the case with literacy competency, there are 7 districts/cities which are outlier data. Outlier data are cases or data points that show unusual characteristics or are very different from other data in a collection of samples (Gujarati, 2003), so they are excluded from the research so that the number of samples in the numeracy competency research is 497 districts/cities.

Analysis Techniques

In this research, the data used as the dependent variable was obtained from the results of the 2021 National Assessment on indicator A.1. Literacy competency and A.2 numeracy competency. Each of these data is grouped into two categories so that to analyze the influence of the independent variable teacher competence on the two dependent variables, you can use the *logistic regression model* (Hosmer et al., 2013). This research uses two dependent variables with one main independent variable, so two research models are formed.

$$l(x) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right]$$

$$= \beta_0 + \beta_1 Sertificate_{\ i} + \beta_2 Qualif_i + \beta_3 Age_i + \beta_4 Tenure_i + \beta_5 STR_i + \beta_6 Sch\_accred_i + \beta_7 Sch\_cond_i + \beta_8 Sch\_electricity_i + \beta_9 Sch\_internet_i + \beta_{10}\ UHH_i + \beta_{11} Expenditure + \beta_{12} Region_i + \beta_{13} Urban_i + \varepsilon_i \quad (3)$$

$$n(x) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right]$$

$$= \beta_0 + \beta_1 Sertificate_{\ i} + \beta_2 Qualif_i + \beta_3 Age_i + \beta_4 Tenure_i + \beta_5 STR_i + \beta_6 Sch\_accred_i + \beta_7 Sch\_cond_i + \beta_8 Sch\_electricity_i + \beta_9 Sch\_internet_i + \beta_{10}\ UHH_i + \beta_{11} Expenditure + \beta_{12} Region_i + \beta_{13} Urban_i + \varepsilon_i \quad (4)$$

Equation (3) is a literacy competency research model, while equation (4) is a numeracy competency research model. All research data is aggregated at the district/city level.

Results and Discussion

This research consists of 2 dependent variables, so the descriptive analysis in this research is divided into 2 parts, namely descriptive analysis of literacy competence and descriptive analysis of numeracy competence.

Descriptive Analysis of Literacy Competencies

The first descriptive analysis carried out was univariate analysis which was carried out by tabulating binary data to show the sample distribution in each variable category as well as descriptive statistical analysis which showed the number of observations, average (*mean*), standard deviation, as well as the smallest and largest values for each each variable.

Table 2. Descriptive Statistics of Research Data on the Dependent Variable Literacy Competence (Dummy)

Variable	Amount	Percentage
Dependent Variable		
Literacy		
0: Below minimum competency	379	75.65
1: Achieve minimum competency	122	24.35
Independent Variable		
Regions		
0: Outside Java and Bali	373	74.45
1: Java and Bali	128	25.55
Urban		
0: District	403	80.44
1: City	98	19.56
Number of Observations	**501**	**100**

Source: Author's Preparation

In this research, students' literacy competence is described by the *Literacy variable* which is divided into two categories. The first category is below the minimum competency achieved by 75.65% of the observation areas, while 24.35% fall into the category of achieving minimum competency. The sample distribution on this variable shows that the literacy competence of elementary school students in Indonesia has generally led to better competence but still needs to be improved. Apart from the dependent variable, there are 2 (two) independent control variables in binary form, namely the *Region* and *Urban variables*. In the *Region variable*, the 501 districts/cities that were the research sample were divided into two categories, namely Outside Java and Bali, and Java and Bali. This grouping aims to group regions that generally have better infrastructure than other regions.

Table 3. Descriptive Statistics of Research Data on the Dependent Variable Literacy (Numerical)

Variable	Obs	Average	Standard Deviation	Min	Max
Certificate (%)	501	37.74	11.96	1	70.82
Qualification (%)	501	83.63	10.81	34.12	98.17
Age (years)	501	43.55	1.91	36.35	49.36
Tenure (years)	501	16.13	2.23	8.89	21.64
STR (ratio)	501	15.69	4.06	6.72	32.66
Sch_accred (%)	501	22.85	20.80	0	90.85
Sch_electricity (%)	501	94.63	9.67	19.64	100
Sch_internet (%)	501	75.09	21.29	3.77	100
Sch_cond (%)	501	75.44	12.18	20.38	100
UHH (year)	501	69.70	3.32	59.41	77.65
Expenditure (thousand rupiah)	501	10,394.05	2,592.82	4,462	23,575

Source: Author's Preparation

The Certificate variable describes the percentage of certified teachers in each sample district/city. This indicator is used by the government to see teacher competency profiles after UKG is no longer implemented. The average of this variable is 37.74%, which is quite far from the government's target for the percentage of certified teachers nationally in 2024, which is 51% (Perdirjen GTK Nomor 3928/B/HK/2020). Apart from that, the distribution of certified teachers is considered less even, which can be seen from the minimum and maximum figures for this variable, where the sample districts/cities have the smallest percentage of certified teachers at 1%, which shows that there are districts/cities that do not have certified elementary school teachers and there are those that do. 70.82% of elementary school teachers have teaching certificates.

Bivariate analysis in this research will provide a general description of the relationship between each dependent variable and the main independent variable. This analysis is carried out by comparing the averages of the independent variables. Literacy competency research shows that the average percentage of certified elementary school teachers in the category below minimum competency is lower than in the category achieving minimum competency. This shows that in general districts/cities that have more certified elementary school teachers will have better literacy and numeracy competency achievements in 2021. In terms of literacy competency, districts/cities that fall into the category below minimum competency have a percentage of certified elementary school teachers of 35.36% and those that fall into the category of achieving minimum competency have a percentage of certified elementary school teachers of 45.17%. However, the difference in the percentage of certified teachers in each category is only less than 10%.

Table 4. Comparison of Descriptive Statistics for Each Literacy Competency CategoryVariable	**Category below minimum competency**			**Category reaches minimum competency**		
	Obs	**Average**	**Standard Deviation**	**Obs**	**Average**	**Standard Deviation**
Certificate (%)	379	35.36	11.81	122	45.17	9.02
Qualification (%)	379	80.93	10.66	122	92.03	5.80
Age (years)	379	43.45	1.95	122	43.85	1.72

Tenure (years	379	15.95	2.28	122	16.68	1.97
STR (ratio)	379	15.17	4.12	122	17.30	3.42
Sch_accred (%)	379	15.22	12.81	122	46.53	22.97
Sch_electricity (%)	379	93.25	10.35	122	98.94	5.15
Sch_internet (%)	379	69.23	20.36	122	93.31	11.64
Sch_cond (%)	379	72.45	11.41	122	84.74	9.58
UHH (year)	379	68.62	2.80	122	73.07	2.44
Expenditure (thousand rupiah)	379	9,683.58	2,012.94	122	12,601.19	2,937.51

Source: Author's Preparation

Apart from the variable percentage of certified teachers, other variables also show that the category of achieving minimum competency in literacy competency has a higher average score than the category below minimum competency. However, several variables show quite small differences. In the teacher age variable (age), the difference between the two categories for each literacy and numeracy competency is very small, namely .4 years. Meanwhile, several school characteristic control variables show quite large differences, especially the school internet access variable which has a difference of 24.08%.

Descriptive Analysis of Numeracy Competency

Slightly different from literacy competency which has a sample of 501 districts/cities, research with the numeracy competency variable uses 497 districts/cities as its sample.

Table 5. Descriptive Statistics of Research Data on the Dependent Variable Numerical Competence (Dummy)

Variable	Amount	Percentage
Dependent Variable		
Numeracy		
0: Far below minimum competency	24	4.83
1: Below minimum competency	473	95.17
Independent Variable		
Regions		
0: Outside Java and Bali	373	74.05
1: Java and Bali	124	24.95
Urban		
0: District	401	80.68
1: City	96	19.32
Number of Observations	**497**	**100**

Source: author's preparation

Table 6. Descriptive Statistics of Research Data on the Dependent Variable Numeracy (Numerical)

Variable	Obs	Average	Standard Deviation	Min	Max
Certificate (%)	497	37.66	11.91	1	67.46
Qualification (%)	497	83.55	10.81	34.12	98.17
Age (%)	497	43.54	1.89	36.35	49.36
Tenure (%)	497	16.12	2.22	8.89	21.64
STR (ratio)	497	15.68	4.07	6.72	32.66

Sch_accred (%)	497	22.66	20.77	0	90.85
Sch_electricity (%)	497	94.60	9.69	19.64	100
Sch_internet (%)	497	74.92	21.28	3.77	100
Sch_cond (%)	497	75.37	12.14	20.38	100
UHH (year)	497	69.67	3.31	59.41	77.65
Expenditure (thousand rupiah)	497	10,368.60	2,582.4	4,462	23,575

Source: Author's Preparation

Like literacy the Numeracy variable in this study is also divided into two categories but with different category labels. In the first category, namely far below minimum competency, there were only 4.83% of the sample, while the remaining 95.17% fell into the category below minimum competency. The sample distribution for the *dummy variables Region* and *Urban* in this numeracy competency research is not much different from literacy competency research. In general, descriptive statistics on numerical variables in research with the dependent variable *Numeracy* are almost the same as descriptive statistics in research with the dependent variable *Literacy*. The average percentage of certified elementary school teachers in this study was 37.66% with the minimum value being 1% and the maximum value being 67.46%. As is the case with literacy competency research, the average score for the percentage of certified elementary school teachers is still far from the government's target, namely 51%.

The control variables for numeracy competency are also divided into 4 (four) groups, namely teacher characteristics, school characteristics, socio-economic and regional characteristics. In the teacher characteristics control variable group, the teacher qualification variable shows quite ideal conditions, where the average percentage of qualified elementary school teachers reaches 83.55%, there are even districts/cities where almost all elementary school teachers have at least Bachelor's or DIV qualifications, with a percentage of 98.17%.

Table 7. Comparison of Descriptive Statistics for Each Numeracy Competency Category

Variable	Category Below Minimum Competency			Category Reaches Minimum Competency		
	Obs	Average	Standard Deviation	Obs	Average	Standard Deviation
Certificate (%)	24	22.05	9.69	473	38.46	11.46
Qualification (%)	24	67.31	13.67	473	84.37	9.98
Age (years)	24	43.22	2.79	473	43.56	1.84
Tenure (years	24	14.30	2.36	473	16.22	2.18
STR (ratio)	24	14.10	4.63	473	15.76	4.03
Sch_accred (%)	24	10.57	8.94	473	23.27	21.02
Sch_electricity (%)	24	87.51	16.95	473	94.96	9.06
Sch_internet (%)	24	44.75	23.82	473	76.45	19.99
Sch_cond (%)	24	72.18	11.66	473	75.54	12.15
UHH (year)	24	65.96	2.40	473	69.86	3.23
Expenditure (thousand rupiah)	24	7,381.88	1,447.86	473	10,520.14	2,535.59

Source: Author's Preparation

The average percentage of certified elementary school teachers in the category far below minimum competency is lower than in the category below minimum competency. This shows that in general districts/cities that have more certified elementary school teachers will have better numeracy competency achievements in 2021. In terms of numeracy competency, districts/cities that fall into the category far below the minimum competency have a percentage of certified elementary school teachers of 22.05% and those that fall into the category below the minimum competency have a percentage of 38.46%. The difference in the two categories is 16.41%. Other variables give different results in this analysis, where all teacher characteristic variables, namely teacher qualifications, teacher age, and teacher tenure show small differences. Meanwhile, in the school characteristics variable, the school accreditation variable has a quite large difference, namely 12.7% and the school internet access variable has a difference of 31.7%.

The Relationship between Teacher Competence and Student Literacy and Numeracy Competence

The results of research on both models show that teacher competence as proven by an educator certificate does not have a significant influence on student competence. If you look at the odds ratio, for both literacy competency and numeracy competency, the value is close to one. In model 1 of literacy competency, the odds ratio for certification is 1.04 and in model 2 of numeracy competency is 1.05. These results show that there is no difference in the opportunities for students to achieve minimum competency with elementary school teachers who are certified educators or not. The results of this inferential analysis are in line with the results of the research descriptive analysis, where the difference between the average percentage of certified elementary school teachers in the category below minimum literacy competency and achieving minimum literacy competency is only 10%. The same thing also happens in the numeracy competency model, where the difference between the average percentage of certified elementary school teachers in the category far below the minimum numeracy competency and below the minimum numeracy competency is only 16%. This can happen because teacher certification status does not always represent good teacher competence. Certification status is obtained from passing the PPG program, while increasing teacher competency can be obtained from other activities before or after participating in PPG. Some efforts that teachers can make to improve their competence are conducting classroom action research while teaching (Sukanti, 2008), joining Teacher Working Groups (KKG) so that teachers can learn from best practices by their colleagues (Sukirman, 2020), as well as various other activities such as attending seminars, workshops and trainings organized by certain institutions (Mahsunah et al., 2012). In addition, certification status is not regularly evaluated using certain parameters, such as teacher performance and student learning outcomes. These results are in accordance with research conducted by Fahmi et al., (2011); Kusumawardhani, (2017); dan Siswandari & Susilaningsih, (2013), where there is no strong evidence that teacher certification can improve the quality of learning and student learning outcomes because certification does not always represent good teacher competence.

The results of this research can be influenced because the dependent variable used is the results of 2021, which is the latest standardized test, measuring student competency which is different from previous standardized tests, namely the National Examination (UN) and the National Standard School Examination (USBN). Although a literacy is generally equated with Indonesian language subject exams, the types of questions tested in 2021 are different from USBN Indonesian. At the elementary school level, students are not only given simple texts, but are given texts that have deep messages and meanings, so that students who take can be inspired. Apart from that, students are also tested to interpret the content of the text and reflect

it with other things outside the text (Kemdikbudristek, 2020). As with literacy competencies, numeracy competencies in are also different from USBN in Mathematics subjects. Some of the questions tested on a numeracy are questions at the Higher Order Thinking Skill (HOTS) level.

In 2020, the curriculum used at the elementary school level is the 2013 curriculum (K-13). The curriculum requires teachers to encourage students to think at the HOTS level (Kemdikbudristek, 2022), where students are expected to not only be able to use information to answer questions but also to understand that information. However, the implementation of elementary school learning at the HOTS level is not yet optimal in various regions. According to Sofyatiningrum et al. (2019), in real conditions, the implementation of K-13 is not immediately followed by the implementation of HOTS level learning. Learning at several elementary schools in various regions such as Banjarmasin, Bandung, Yogyakarta, and Palembang shows that HOTS is only written in learning documents such as Learning Implementation Plans (RPP), student books, and Student Worksheets (LKS). The implementation of HOTS-based learning has not been carried out optimally in the classroom because teachers do not really understand the essence of HOTS-based learning so they are not ready to implement it. The K-13 training that elementary school teachers have participated in generally does not touch on HOTS so that the understanding of teachers, principals and supervisors varies. The teacher as a facilitator should provoke students to ask questions and new ideas that will be discussed in class. However, elementary school students who are not used to thinking critically and still want to be fed information by teachers also result in the implementation of HOTS-based learning being hampered. One effort that can optimize the implementation of HOTS-based learning is workshops and training organized by the Regional Government.

Teacher Professional Education

Since 2015, one of the main requirements for a teacher to obtain an educator certificate is to have passed the PPG program, both pre-service PPG and in-service PPG (UU Guru dan Dosen Tahun 2005). PPG graduates are expected to have complete teacher competencies, namely pedagogical, social, personality and professional competencies. The results of this research which show there is no difference in student competency between certified and non-certified teachers cannot conclude that certified teachers are not necessarily competent. This can also be influenced because the curriculum in the PPG program does not match the output of students tested with 2021. The PPG program curriculum implemented before 2022 does not include teachers' abilities to teach literacy and numeracy to students. In accordance the PPG curriculum consists of deepening the material taught, developing learning tools, peer-teaching, PPL, enrichment and remediation, as well as deepening pedagogical material which is given specifically to PPG students who do not have a graduate education background. Different from the previous curriculum, in the PPG program which has been implemented since 2022, there have been additional courses related to student literacy competencies. These courses are Basic Literacy which is only given to students of the PPG PGSD and PGPAUD programs, as well as Literacy courses across Subjects. However, in the latest pre-service PPG program curriculum there are no courses related to numeracy competency.

Government Efforts to Increase Students' Literacy and Numeracy Competencies

Several efforts have been made by the Ministry of Education and Culture to improve student literacy and numeracy competencies, both from the student side and from the teacher side. One of the government's efforts to improve literacy competency in elementary schools is the use of mother tongue in learning, especially in the early elementary grades. The use of the mother tongue has been proven to improve the quality of the learning process which will ultimately

improve student learning outcomes. This is because students are more confident so they are more active in learning (Sofyatiningrum et al., 2021). Although according to educational production theory, students' abilities are not only influenced by teachers, but teachers have an important role in improving students' abilities. Apart from students' enjoyment of reading, students' literacy abilities are also influenced by students' metacognitive reading strategies and classroom discipline climate, both of which are built by the teacher. In addition, teachers' teaching practices can influence students' enjoyment of reading so that their literacy competence increases (Nuraini et al., 2021). This teaching practice consists of students' enjoyment when the teacher teaches, teacher stimulation so that students want to read, teacher feedback and support, as well as directed and adaptive learning. Due to the large role teachers play in increasing students' literacy competencies, the Ministry of Education and Culture has made several efforts on the part of teachers. On the official website of the Directorate of Basic Education Teachers, the Directorate General of Teachers and Education Personnel, which is the Ministry of Education and Culture's work unit tasked with formulating and implementing policies in the field of elementary and middle school teachers, there are several strategic programs which are an effort to improve students' literacy and numeracy competencies. Some of these efforts include issuing Director General's Regulation Number 0340/B/Hk.01.03/2022 concerning the Literacy and Numeracy Competency Framework for Teachers in Elementary Schools, implementing technical guidance and webinars, as well as publishing modules to strengthen teacher competency for literacy and numeracy. These efforts have been carried out since 2022, so they have no impact on the 2021 AN SD results.

Teacher Characteristics

This research uses three control variables that describe teacher characteristics, namely teacher qualifications, teacher age, and teacher tenure. These three teacher characteristic variables are not significant in both models, which shows that there is no evidence to show that the teacher's final educational level, teacher age, and teacher tenure have an effect on students' literacy and numeracy competencies. Although generally the length of service has an influence on teacher performance and professionalism (Hasan, 2015; Rida et al., 2013)as well as student learning outcomes (Bhai & Horoi, 2019)because senior teachers have generally attended training that can improve their performance, literacy and numeracy competencies are competencies that have only been measured in AN 2021 so elementary school teachers may not have participated in training. -training related to learning that prioritizes the competencies tested on AN.

School Characteristics

In the literacy competency research model, the only school characteristic variable that was not significant was the physical condition of the school, while the RGS, school accreditation, school electricity access and school internet access variables showed significant results. The RGS variable has an odds ratio of 0.88, which indicates that districts/cities with greater RGS have a smaller chance of achieving minimum literacy competency. A larger RGS indicates that the class size is larger, so the opportunity to achieve better competency will be smaller because smaller class sizes can significantly improve student learning outcomes (Schanzenbach, 2020), especially affecting student literacy learning at the elementary school level (Betts et al., 2003). Even though the school accreditation variable is significant for literacy competency, which is in accordance with research from Zulfahita et al. (2020), this variable has an odds ratio of 1.02, which shows that districts/cities with A-accredited schools have almost the same chances as districts/cities that do not have A-accredited schools to achieve minimum literacy competency. The school electricity access variable has an odds ratio of 0.85, which shows that districts/cities that have schools with more electricity access have a smaller chance of achieving the minimum literacy competency. The final school control variable that is significant in literacy competency

is school internet access, with an odds ratio of 1.08 which indicates that schools with internet access have a greater chance of achieving better literacy competency (Kho et al., 2019).

School control variables that are significant for numeracy competency are school electricity access and school internet access. These two variables show that school facilities influence numeracy competency. The availability of good facilities in schools will support learning and improve student learning outcomes. Having electricity and internet access in schools, both in the library and in the classroom, will increase students' motivation to study, search for information and practice questions (Lonsdale et al., 2003)so that their numeracy competency increases. The school accreditation variable does not have a significant effect on numeracy competency because mathematical critical thinking skills, which are one indicator of numeracy competency, also depend on students' willingness to learn and practice questions (Sukriyah et al., 2019).

Socio-Economic Characteristics

The control variables for socio-economic characteristics consist of life expectancy and adjusted per capita expenditure. For this characteristic, only district/city UHH has a significant effect on students' literacy competence. A high UHH indicates that health conditions in an area are relatively good. In this research, UHH provides 1.50 times the opportunity for districts/cities to achieve better literacy competencies. Good health conditions contribute to students' learning activities so that their learning achievements can increase (Rahmat et al., 2015). The socio-economic characteristic control variables that are significant in this numeracy competency model are UHH and per capita expenditure. Students with good economic conditions will have good cognitive abilities in mathematics subjects, especially at the beginning of school (Croninger et al., 2007). However, in this study, the odds ratio for per capita expenditure is 1, which indicates that districts/cities with good economic conditions have the same opportunity as districts/cities with poor economic conditions to achieve numeracy competency below the minimum competency. Meanwhile, districts/cities that have good health conditions have a 1.17 times greater chance of achieving numeracy competency below the minimum competency compared to districts/cities that have less good health conditions.

Regional Characteristics

In the literacy competency model, the Region variable has a significant effect on students' literacy competence, while the administrative status of the district/city does not have a significant effect. The odds ratio of 4.13 shows that the chances of districts/cities located in the Java and Bali region are much greater to achieve minimum literacy competency than districts/cities located outside the region, where although geographically the Java and Bali regions only cover 7, 04% of Indonesia's geographical area but 45.96% of elementary schools in Indonesia are in this region (Badan Pusat Statistik, 2021; Kemdikbudristek, 2023a). This shows that access to educational services is a factor that greatly influences student competence because students can make good use of school facilities and infrastructure and reduce the opportunity cost of attending school (Hartono·, 2008).

Conclusion

The results of this research show that teacher competency does not significantly influence the results of the 2021 National Assessment. Teacher competency in this research is measured by the percentage of certified teachers, while the 2021 AN results are represented by the minimum student achievements in literacy competency and numeracy competency. The results of the logistic regression analysis of this research conclude that the greater the percentage of certified teachers in a district/city does not affect the opportunities for students in that district/city to achieve literacy and numeracy competencies. This is partly due to teacher certification status

which does not always represent good teacher competency, AN 2021 measures student competency which is different from previous standardized tests (UN and USBN), the application of the HOTS-based curriculum is not optimal, and PPG material is not in accordance with the material. AN. In the research control variables, the significant variables in the literacy competency model consist of RGS, school accreditation, school internet access, UHH, and geographic location of the district/city. Meanwhile, in the numeracy competency model, the significant variables are school electricity and internet access, as well as UHH and per capita expenditure for each district/city.

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