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The CORONA Model in Improving Students' Scientific Writing Skills: Is it Effective?

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ABSTRAK

Model Menulis ilmiah merupakan salah satu keterampilan berbahasa yang perlu dikembangkan bagi mahasiswa. Namun kenyataannya, masih banyak mahasiswa yang memiliki kendala perihal menulis. Berdasarkan fenomena tersebut, maka perlu menyuguhkan sebuah pemodelan dalam menulis ilmiah. Salah satu model yang dijadikan disuguhkan dalam penelitian ini adalah model CORONA. Penelitian ini bertujuan untuk menganalisis kevalidan dan keefektifan model CORONA. Penelitian ini dilakukan melalui Focus Group Discussion (FGD) dari para ahli pendidikan bahasa. Penelitian ini menerapkan weak experiment, yaitu merupakan pre eksperimen dengan rancangan one group pre-test and post-test design. Adapun sampel penelitian terdiri atas dua kelompok yang masing-masing berjumlah 26 mahasiswa. Sebelum dilakukan pembelajaran dengan model CORONA, mahasiswa diberi tes awal (pre-test) tentang keterampilan menulis ilmiah, demikian juga setelah dilakukan pembelajaran mahasiswa diberi test yang sama. Data dikumpulkan dengan menggunakan lembar validitas instrumen dan tes. Data validitas dan reliabilitas model dianalisis dengan expert agreement, sedangkan data keterampilan keterampilan menulis ilmiah mahasiswa dianalisis dengan dengan pair t-test, n-gain, dan uji kesamaan dua rerata. Hasil penelitian menunjukkan bahwa: validitas isi dan konstruk masing-masing berkategori valid dengan skor 3,3 dan 3,5; dan reliabel dengan skor 85,90% dan 85,53%. Selain itu, hasil penelitian juga menunjukkan bahwa ada peningkatan keterampilan menulis ilmiah mahasiswa secara signifikan dengan rerata n-gain berkategori tinggi dan tidak berbeda untuk kedua kelompok.

ABSTRACT

Scientific writing is one of the language skills that needs to be developed for students. But in reality, there are still many students who have problems with writing. Based on this phenomenon, it is necessary to present a model in scientific writing. One of the models presented in this study is the CORONA model. This study aims to analyze the validity and effectiveness of the CORONA model. This research was conducted through Focus Group Discussion (FGD) from language education experts. This study applies a weak experiment, which is a pre-experimental design with one group pre-test and post-test design. The research sample consisted of two groups, each of which consisted of 26 students. Prior to learning with the CORONA model, students were given a pre-test on scientific writing skills, as well as after learning was carried out students were given the same test. Data was collected using instrument validity sheets and tests. Data on the validity and reliability of the model were analyzed by expert agreement, while data on students' scientific writing skills were analyzed by pair t-test, n-gain, and two means similarity test. The results showed that: content and construct validity were valid each category with a score of 3.3 and 3.5; and reliable with a score of 85.90% and 85.53%. In addition, the results of the study also showed that there was a significant increase in students' scientific writing skills with the mean n-gain being in the high category and not different for the two groups.

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1. INTRODUCTION

The era of globalization is marked by digitalization of human life. Therefore, the era as it is today is called the digital era. Of course it can not be separated from the development of science and technology. Although the current era is increasingly sophisticated and rapidly developing, it cannot be denied that the development of science and technology has a positive and negative impact on humans. The positive impacts include facilitating activities, such as communicating, traveling, gaining knowledge, and so on (Ghavifekr et al., 2014; Shahroom & Hussin, 2018). The negative impacts include global warming and moral decadence. This shows that the challenges faced by future generations will be even more difficult. It is a shared responsibility without exception. In the education sector, especially in universities, lecturers must prepare future generations who are skilled and able to face various challenges in the future. One of them is by preparing a generation that has quality work so that it can be used by many people. Phenomenal works for students are scientific works. Scientific work as a form of student competence itself (Haagsman et al., 2021; Hampton et al., 2022). The competence in question is the competence of scientific writing skills. Scientific writing skills do not necessarily develop by themselves following a person's physical development, but must be trained continuously if you want the person to have scientific writing skills (Febrina, 2017; Lebrun & Lebrun, 2021). Scientific writing skills are a business that requires a process. One of the main supports in the scientific writing process is to involve critical thinking skills. Critical thinking skills are a person's ability to analyze something using a system of reasoning, assessment or evaluation, to solve problems through logical solutions (Calle-Arango & Ávila Reyes, 2022; Cargill & O'Connor, 2021). Thus, this is confirmed by previous studies state scientific writing skills are skills or behavior in expressing ideas or ideas in writing that are presented logically and systematically which contain objective factual knowledge and experience (Nassar, 2022; Ode, 2022). In addition, scientific writing skills are the ability to optimize the mind in arranging ideas systematically so that they are able to write them into logical language.

In the Regulation of the Minister of Education and Culture (Permendikbud) No. 3 of 2020 concerning National Higher Education Standards, in this case the implementation of the Independent Learning-Independent Campus, it is stated that graduates must be skilled in comprehensive scientific mastery and have a wider scientific repertoire (Putri & Sulistyaningrum, 2021; Sopiansyah et al., 2022). Based on this statement, it is very clear that universities as formal educational institutions have a responsibility to educate their students in developing their potential. One of the important potentials that must be developed is scientific writing skills. In addition to scientific writing skills, it is one of the language skills that need to be developed, as well as one of the skills that are always needed in "almost" all courses (Alessy et al., 2022; Setiawan & Wardhani, 2022). Not only that, even being skilled in scientific writing to producing scientific writing is a mandatory requirement for every student at all levels of the program (bachelor, master, and doctoral) (Poe, 2022; Thomas, 2021).

Qualitatively based on the results of initial observations made by researchers in the field by directly analyzing student scientific writings, it turns out that there are still many writing deviations. The writing deviation in question is a discrepancy in the structure of writing, proper use of language, systematic writing logically, to the writing process such as determining topics, extracting data or writing material to the process of reviewing the results of writing. If it is concluded as a percentage, it can be categorized that the results of student scientific writing are still on a scale of 65%. Referring to the statement stated earlier, the percentage shows that most of the students do not have adequate scientific writing skills. It was also stated that there are still many students who have low-qualified scientific writing skills (Galla et al., 2019). The preliminary study resulted in N-gain in the low category (*n-gain* = 0.26 and 0.19) and the statistical results of the paired sample test on the pre-test and post-test of scientific writing skills showed a significant difference. Basically, a lecturer should be able to teach scientific writing skills to his students, but research shows that most lecturers do not understand how to teach scientific writing skills effectively (Bottomley, 2021; Mantra et al., 2019). This is reinforced by research data showing that most lecturers still use a lecturer-centered learning model with lecture, question and answer, and demonstration methods (Budiman et al., 2020; Gulzar & Leema, 2021).

Seeing these conditions, especially in learning scientific writing for students, it is necessary to conduct an evaluation. The innovation in question is applying the learning model. One of the learning models that can develop students' scientific writing skills is the CORONA model. The CORONA model is one of the models created by the researchers themselves in mid-2020. The word "CORONA" is taken from the name of a virus that was widespread at that time, with the reason to give the impression and motivation of students in participating in learning even though they are online (from home) due to restrictions. activities to prevent the spread of Covid-19. Researchers also assume that even though learning is online (from home), the learning process must be well controlled to achieve the quality and objectives of learning. This was confirmed by previous study that since the Covid-19 pandemic, the

learning process has been carried out from home and even so, learning must be maintained (Purba et al., 2022). Likewise, as emphasized by previous study although learning takes place from home, the quality of learning remains the main goal (Kurniasari, 2020). The basic concept of the CORONA Model is as a skill-based learning model. In its application, students are directed to optimize their creativity by using reason, ideas, and thoughts so that they are able to produce quality works. This achievement goes through various structured and systematic processes. The CORONA model stands for Consistent, Organize, Rationalization, Operation, Negotiation, and Application. First, consistent, with regard to the ability to focus on one topic of writing with full accuracy. Second, organize, with regard to the ability to sort, sort, and collect the sub-topics to be written. Third, rationalization, with regard to the ability to reason and analyze topic boundaries. Fourth, operation, please practice writing directly according to the previous design. Fifth, negotiation, with regard to accuracy, which is to re-read the writing intensively. Sixth, application, with regard to the confidence to display or publish the results of writing (Gelen Assoc, 2018; Muhsyanur, 2021). In its application, the CORONA Model consists of several activities. First, initial activities include activities; lecturers start learning by motivating students; the lecturer conveys the learning objectives or achievements; the lecturer conveys a series of learning activities; and the lecturer divides the students into several small groups. Core activities, core includes activities; the lecturer directs students to carry out the writing process by paying attention to the stages of writing which include pre-writing, writing, and post-writing with the CORONA model. This odel can improving students' ability to think creatively and critically, the ability of students to edit and edit their own writing, both independently and in groups, and the quality of student writing. Base on the benefits of this learning model, researchers are interested in conducting research with a purpose to analyze the validity and effectiveness of the CORONA model on Indonesian language learning in order to improve students' scientific writing skills.

2. METHOD

The CORONA model is said to be valid if the content validity and construct validity are valid and reliable. The validity of the CORONA model is formulated according to validity formula (Furió et al., 2013; Oliver et al., 2008). Criteria for the validity of the PBLA model are shown in Table 1.

Table 1. Criteria for Assessing the Validity of The Learning Model

Interval skor	Kriteria penilaian	Keterangan
$3.25 < P \leq 4.00$	Very valid	Can be used without revision
$3.20 < P \leq 3.25$	Valid	Can be used with minor revisions
$1.75 < P \leq 3.20$	Not valid	Can be used with major revisions
$1.00 < P \leq 1.75$	Invalid	Haven't used it yet and still need consultation

Base on Tabel 1 CORONA model is said to be effective if learning with the teaching model: (1) there is an increase in students' scientific writing skills (statistically) at = 5%, (2) the average gain is normalized score (n-gain average) at least in the moderate category, (3) the mean n-gain is not different (consistent) for each group. This study aims to improve students' scientific writing skills; The research was conducted on Indonesian language learning using the CORONA model. This research was conducted on Indonesian language learning with the CORONA model. The number of samples in the study were 52 students from a population of 130 seventh semester students, Ma'had Aly As'adiyah Sengkang, having their address at Campus IV Jalan Andi Unru, Ujung Baru, Tanasitolo District, Wajo Regency, South Sulawesi. Determination of the number of samples using cluster random sampling technique. The cluster random sampling technique is easier to do because it is applied to groups so it does not take time (Etikan & Bala, 2017; Ssenyonga et al., 2022). The class selected as the research sample was class VIIA and VIIC of the 5 (five) existing classes. Each class that was sampled had 26 students. All these students have the same level of scientific writing skills.

This research was conducted by establishing a discussion forum commonly called Focus Group Discussion (FGD) of experts consisting of three language learning experts and applying a quasi-experimental group of pre-test and post-test designs. This study is classified as a weak experiment using one group pre-test - post test. The CORONA (X) model before being implemented was validated by 3 (three) language learning experts and have a doctorate education background in language learning and the profession of language experts. Furthermore, the CORONA model which has been valid and reliable according to the experts is used in learning Indonesian on the topic of scientific writing techniques. This research was conducted by giving a pre-test (O1) before the group of students learned the technique of writing scientific papers. Next, the group of students learned to use the CORONA (X) model which consisted of a semester implementation plan (RPS), student textbooks (BTM), and student worksheets

(LKM). RPS, BTM, and LKM can be applied if their validity and reliability have been tested. After the learning process was completed, all groups of students were given a post-test (O2), with subjects and problems similar to the pre-test. Meanwhile, to obtain data on scientific writing skills, the Student Scientific Writing Skills Test Sheet Instrument was used.

The data that has been collected was analyzed to obtain the validity and effectiveness of learning with the CORONA model to improve students' scientific writing skills. Data analysis The validity of the CORONA model is calculated based on the mean of validator ratings and the reliability of the CORONA model is calculated according to R = [frequency of match between raters/(frequency of match between raters + frequency of discrepancy between raters)] x 100%. However, to analyze the impact of the CORONA model on improving students' scientific writing skills, an analysis of the collected pre-test and post-test results was carried out, then tested by: (a) using a pair t-test or non-parametric analysis of the Wilcoxon test; (b) calculate the mean n-gain with the formula: n-gain = (post-test score – pre-test score) / maximum score – post-test score), with categories: (1) high if n-gain 0, 70; (2) moderate if 0.70 > n-gain 0.30; and (3) low if n-gain < 0.30; (c) Anova or non-parametric analysis of Mann Whitney U test (Nisa et al., 2018; Thaçi & Sopi, 2022; Xodabande & Hashemi, 2022).

3. RESULT AND DISCUSSION

Result

The process of assessing language learning experts on the CORONA model is carried out through in-depth discussions through a discussion forum called Focus Group Discussion (FGD). The FGD discussed the draft model book which was equipped with learning tools in the form of syllabus, RPS, LKM, student teaching materials (BAM), tests, observation sheets, and questionnaires. The discussion and validation process was carried out for 2 (two) months. Details of the validity and reliability scores of each component of the CORONA model and its tools are shown in Table 2.

Table 2. Validity and Reliability of the CORONA Model

Item	Content validity				Construct validity			
	Validity		Reliablity		Validity		Reliablity	
1. *CORONA* Model	3.5	Valid	77.10	Reliable	3.3	Valid	77.67	Reliable
2. Sillabus	3.5	Valid	87.60	Reliable	3.3	Valid	87.50	Reliable
3. RPS	3.5	Valid	87.50	Reliable	3.3	Valid	87.80	Reliable
4. Student book	3.5	Valid	89.80	Reliable	3.3	Valid	87.60	Reliable
5. LKM	3.3	Valid	87.50	Reliable	3.3	Valid	87.10	Reliable
Average	3.5	Valid	85.90	Reliable	3.3	Valid	85.53	Reliable

The pre-test and post-test scores during the limited trial and the broad trial for Grades 1 and 2 are shown in Figure 2. Blue bars indicate pre-test scores while red bars indicate post-test scores.

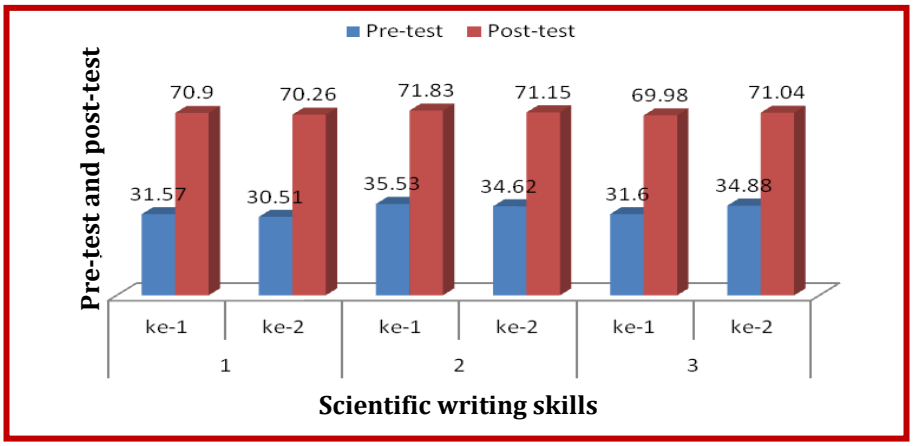

Figure 2. The average pre-test and post-test scores of students' scientific writing skills for grades 1 and 2 in a limited trial

Base on Figure 2 shows that the mean scores between the pre-test and post-test of students' scientific writing skills for grades 1 and 2 in the limited trial increased. The results of FGD activities as shown in Table 2 show that the CORONA model and its learning tools, rational, theoretical and empirical

support, model syntax, social systems, reaction principles, support systems, instructional impact & mentoring are categorized as valid and reliable. The quality of implementation is seen from the average score of 2 (two) observers at least 2.75 with a valid/good category. In this study, the results obtained were 3.5 for content validation and 3.3 for construct validation, which means that the CORONA model has good content and construct validation. Likewise, the syllabus, teaching plans, teaching materials, and student worksheets are valid and reliable. The mean scores of pre-test, post-test and n-gain regarding indicators of students' critical thinking skills according to Bloom's taxonomy are shown in detail in Table 3.

Table 3. The Mean Scores of Pre-Test, Post-Test, and N-Gain of Scientific Writing Skills of 1st and 2nd Grade Students in A Limited Trial

Meeting to	Class	Total students	Score	Scientific writing skill indicator		
				C4	C5	C6
1	The-1	26	*Pre-test*	32.21	33.14	29.37
			Post-test	72.23	70.25	70.21
			n-gain	0.59	0.56	0.58
	The-2	26	*Pre-test*	30.01	32.56	29.01
			Post-test	70.53	71.42	68.84
			n-gain	0.58	0.58	0.56
2	The-1	26	*Pre-test*	36.24	32.12	38.23
			Post-test	73.16	70.15	72.17
			n-gain	0.58	0.56	0.55
	The-2	26	*Pre-test*	34.62	33.01	36.23
			Post-test	73.16	69.85	70.45
			n-gain	0.59	0.55	0.54
3	The-1	26	*Pre-test*	31.52	31.92	31.35
			Post-test	70.12	70.53	69.29
			n-gain	0.56	0.57	0.55
	The-2	26	*Pre-test*	35.22	32.53	36.89
			Post-test	71.76	70.12	71.23
			n-gain	0.56	0.56	0.54

The learning outcomes achieved by the 1st and 2nd grades related to critical thinking skills in the wide trial are shown in Figure 3.

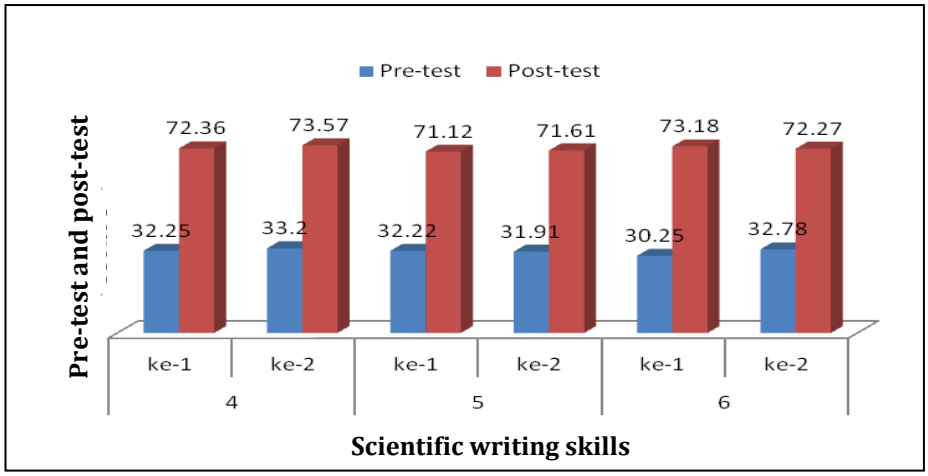

Figure 3. The average pre-test and post-test scores of students' scientific writing skills for grades 1 and 2 in a broad trial.

Base on Figure 3 shows that the mean scores between the pre-test and post-test of students' scientific writing skills for grades 1 and 2 in the broad trial increased. The mean scores of pre-test, post-test and n-gain regarding indicators of students' scientific writing skills according to Bloom's taxonomy are shown in detail in Table 4.

Table 4. The Mean Scores of Pre-Test, Post-Test, and N-Gain of Scientific Writing Skills of 1st and 2nd Grade Students in A Broad Trial

Meeting to	Class	Total students	Score	Scientific writing skill indicator		
				C4	C5	C6
4	The-1	26	*Pre-test*	33.71	33.18	2987
			Post-test	75.23	71.21	70.65
			n-gain	0.63	0.57	0.58
	The-2	26	*Pre-test*	34.24	33.12	32.23
			Post-test	72.16	74.32	74.23
			n-gain	0.58	0.62	0.62
5	The-1	26	*Pre-test*	31.42	32.24	33.01
			Post-test	71.53	70.98	70.84
			n-gain	0.58	0.57	0.56
	The-2	26	*Pre-test*	32.78	31.71	31.23
			Post-test	70.16	73.21	71.45
			n-gain	0.56	0.61	0.58
6	The-1	26	*Pre-test*	29.52	30.45	30.78
			Post-test	72.72	74.53	72.29
			n-gain	0.61	0.63	0.60
	The-2	26	*Pre-test*	33.4	31.91	33.02
			Post-test	70.97	73.12	72.73
			n-gain	0.56	0.61	0.59

Test the normality of pre-test and post-test scores with the Kolmogorov-Smirnov test using the IBM SPSS Statistics 25 software test as shown in Table 5.

Table 5. Normality Test of Pre-Test and Post-Test Scores of Writing Skills (Scientific work)

The meeting	Class	Test	N	Mean	Std. Deviation	Asymp. Sig. (2-tailed)	Normal distribution
1	The-1	*Pre-test*	26	31.57	5.13	0.31	Yes
		Post-test	26	70.9	7.84	0.58	Yes
	The-2	*Pre-test*	26	30.53	4.80	0.96	Yes
		Post-test	26	70.26	7.40	0.28	Yes
2	The-1	*Pre-test*	26	35.53	5.54	0.90	Yes
		Post-test	26	71.83	8.57	0.83	Yes
	The-2	*Pre-test*	26	34.62	4.90	0.94	Yes
		Post-test	26	71.15	5.10	0.77	Yes
3	The-1	*Pre-test*	26	31.6	4.90	0.33	Yes
		Post-test	26	69.98	5.54	0.67	Yes
	The-2	*Pre-test*	26	34.88	4.39	0.99	Yes
		Post-test	26	71.04	6.06	0.92	Yes
4	The-1	*Pre-test*	26	32.25	3.61	0.33	Yes
		Post-test	26	72.36	6.17	0.25	Yes
	The-2	*Pre-test*	26	33.2	4.30	0.71	Yes
		Post-test	26	73.57	7.42	0.65	Yes
5	The-1	*Pre-test*	26	32.22	4.29	0.90	Yes
		Post-test	26	71.12	6.36	0.82	Yes
	The-2	*Pre-test*	26	31.91	5.54	0.58	Yes
		Post-test	26	71.61	8.21	0.96	Yes
	The-1	*Pre-test*	26	30.25	4.24	0.67	Yes
		Post-test	26	73.18	6.97	0.94	Yes
6	The-2	*Pre-test*	26	32.78	5.11	0.33	Yes
		Post-test	26	72.27	6.25	0.92	Yes

Table 5 shows that the pre-test and post-test of students' scientific writing skills were normally distributed. To analyze the impact of the CORONA model, a paired t-test was carried out. Table 6 shows the results obtained in the paired t-test after fulfilling the pre-test and post-test normality tests.

Table 6. Paired T-Test Results For Students' Scientific Writing Skills

Couple	N	Mean	Std. Error Mean	t	df	p
Pair 1 (RPS1) Pre the-1 - Post the -1	26	51.24	0.183	-9.013	25	0.000
Pair 2 (RPS1) Pre the -2 - Post the -2	26	50.39	0.156	-10.579	25	0.000
Pair 3 (RPS2) Pre the -1 - Post the -1	26	53.68	0.185	-8.505	25	0.000
Pair 4 (RPS2) Pre the -2 - Post the -2	26	52.88	0.194	-7.931	25	0.000
Pair 5 (RPS3) Pre the -1 - Post the -1	26	50.79	0.158	-15.126	25	0.000
Pair 6 (RPS3) Pre the -2 - Post the -2	26	52.96	0.183	-7.336	25	0.000
Pair 7 (RPS4) Pre the -1 - Post the -1	26	52.30	0.178	-12.526	25	0.000
Pair 8 (RPS4) Pre the -2 - Post the -2	26	53.38	0.169	-13.182	25	0.000
Pair 9 (RPS5) Pre the -1 - Post the -1	26	51.67	0.216	-15.842	25	0.000
Pair 10 (RPS5) Pre the -2 - Post the -2	26	50.76	0.159	-15.951	25	0.000
Pair 11 (RPS6) Pre the -1 - Post the -1	26	51.71	0.136	-13.283	25	0.000
Pair 12 (RPS6) Pre the -1 - Post the -2	26	52.52	0.194	-12.520	25	0.000

Base on Table 6 shows that the t scores of students' scientific writing skills are t = 25.95, t = 25.92, t = 19.79, t = 30.86, t = 33.18 for degrees of freedom df = 25. The score is significant. at $p < 0.05$. The consistency of the CORONA model has an impact on improving students' scientific writing skills, then analyzed using ANOVA after meeting the normality and homogeneity tests of variance as shown in Table 7.

Table 7. ANOVA Results of Students' Scientific Writing Skills from All Classes

	Model	Sum of Square	df	Mean Square	F	Sig.
Gain RPS1	Between Groups	0.000	1	0.000	0.000	1.000
	Within Groups	20.923	50	0.418		
	Total	20.923	51			
Gain RPS2	Between Groups	0.019	1	0.019	0.019	0.891
	Within Groups	50.962	50	1.019		
	Total	50.981	51			
Gain RPS3	Between Groups	13.000	1	13.000	14.696	0.061

Model		Sum of Square	df	Mean Square	F	Sig.
	Within Groups	44.231	50	0.885		
	Total	57.231	51			
Gain RPS4	Between Groups	0.019	1	0.019	0.020	0.888
	Within Groups	48.038	50	0.961		
	Total	48.058	51			
Gain RPS5	Between Groups	7.692	1	7.692	6.821	0.072
	Within Groups	56.385	50	1.128		
	Total	64.077	51			
Gain RPS6	Between Groups	4.327	1	4.327	4.845	0.082
	Within Groups	44.654	50	0.893		
	Total	48.981	51			

Base on Table 7 shows that the calculated F produces F = 1.98 <Ftable (1; 50) = 2.28 with a significance level of p = 0.302> 0.05 for students' scientific writing skills. Therefore, there is a strong indication that the impact of the CORONA model on improving students' scientific writing skills for the groups is not different at the 5% significance level.

Discussion

CORONA Model Validity

The validity of the PBLA model was carried out through FGD activities by experts, namely language learning experts and Indonesian language lecturers. The valid CORONA model is in accordance with the aspects of necessity and novelty based on strong theory and empirical. The validation of the CORONA model is in line with the results of research conducted by previous study, that the validation of a product can be done through FGD by experts (Zakerabasali et al., 2022). The general purpose of FGD is to equalize every perception or an issue or topic or interest in the world of work (Hamdiui et al. 2022; Wu, Wu, Li, & Tong, 2022). Thus, through FGDs, new agreements and understandings will emerge regarding the issues being discussed. The CORONA model that is valid both in terms of content and construction must be tested for consistency to make it suitable and stable so that it can be used routinely. According to previous study product reliability is said to be stable if it meets the qualifications for measurement stability and internal consistency (Zamora-Antuñano et al., 2022). A model is said to be reliable if it has a percentage of 75%. Based on the FGD results, the consistency of internal reliability and inter-rater reliability of the CORONA model is reliable. This shows that the CORONA model has high content and construct reliability. This is also in accordance with the research of which states that a product has good quality when it refers to content validity and is able to describe the need, novelty, consistency between model components and theoretical and empirical support (Barakat-Johnson et al., 2022; Furió et al., 2013). The CORONA model learning tools are syllabus, teaching plans, teaching materials, and student worksheets. The learning tools in question are used according to needs, and have novelty features and are supported by strong theoretical and empirical studies and have consistency between components, good and appropriate literacy so that they can become a teaching plan for the CORONA model to improve skills if student scientific writing (Aliyyah et al., 2021; Kumar et al., 2021). The CORONA model is categorized as valid, so it can be used as a reference to improve students' scientific writing skills. This is in accordance with research conducted which states that in general, the validity of the teaching model can help researchers and practitioners to design teaching in accordance with the teaching principles that have been understood (Retnowati et al., 2021). In addition, the learning model can be used as a reference for lecturers, teachers, and practitioners in planning teaching programs (Carvalho et al., 2020; Yuan et al., 2021). A valid CORONA model can provide an opportunity for practitioners to apply it to language teaching by involving scientific processes and products, so that it can be used to improve students' scientific writing skills.

The Effectiveness of the CORONA Model

A good teaching model must have specific characteristics and objectives and meet validity, practicality, and effectiveness. Previous study stated that effective teaching occurs when the teaching process is designed according to the teaching plan or teaching guidelines (Iqbal et al., 2021). Effective teaching occurs when a lecturer has the right strategy to convey his knowledge to students structurally and is able to integrate theory and practice into the learning process (Lai et al., 2022; Lombardi et al., 2021). A teaching is categorized as effective if the lecturer has a good level of knowledge and understanding of teaching, and students actively participate in learning (Damşa et al., 2021; Rollwagen-Bollens et al., 2022). One of the characteristics of students who are active in participating in the learning

process is to have a good response to learning. Based on activity theory, student involvement increases and can improve learning outcomes, so such learning can measure the increase in student achievement and responses to learning (Liu et al., 2021; Ng, 2020; Venton & Pompano, 2021).

The improvement of students' scientific writing skills can be seen from the n-gain test of students' critical thinking skills related to the material of scientific writing techniques, obtained from the calculation of the scores achieved in the pre-test and post-test given to students before and after teaching when the CORONA model applied. The results of this study are supported by research conducted that state the problem of scientific writing skills of students is only up to the level of writing and most students show low scientific writing skills (Bacha, 2002; Lindsay, 2011). Whereas language learning is based on the characteristics of the subject of skills, which are assumed to be relatively difficult and complex, but have not been handled systematically (Adas & Bakir, 2013; Gluga et al., 2010). The skill of finding written ideas in abstract language learning is categorized as low and difficult to understand. The results of preliminary research conducted on 80 students showed that most of the students were able to present ideas well, but had not been able to write them down scientifically, let alone connect the concepts with the knowledge provided. This is due to the lack of students' understanding of writing models and concepts. In addition, due to the lack of literacy culture in reading and writing, insight is still minimal.

The increase in competence is in accordance with the indicators of scientific writing skills using the CORONA model, namely analysis, synthesis, and evaluation of Bloom's Taxonomy. Students are trained and directed to solve problems and develop ideas (by analysis, synthesis, and evaluation) in the writing process by using a learning syllabus, teaching materials, good worksheets and a good teaching environment and writing tools/techniques that give students a positive effect through a series of trainings and practices (Krathwohl, 2002; Tejedor et al., 2019). The learning syntax is structured according to the purpose of implementing the CORONA model, namely to improve students' scientific writing skills supported by empirical data and the latest teaching theories and supported by several research results, as follows (1) the effectiveness of learning occurs because of the quality of learning (Carless & Boud, 2018; Vergara et al., 2020), availability of facilities and infrastructure, active student participation and student responses; (2) active and responsive teachers accompany and guide their students in the ongoing learning process (Harris et al., 2020); (3) building self-confidence in interacting in the classroom during the learning process (Ahuja et al., 2019; Rao, 2019), social interaction between students so that they can motivate and motivate each other in developing ideas, students then become more active in class discussions and are able to maintain good study habits (Nguyen, 2021; Warsah et al., 2021).

The results of this study are also supported by several teaching theories regarding the application of the CORONA model to improve scientific writing skills. The theories are as follows: constructivist theory, which states that students individually must find and change complex information, check new information against old rules and revise unused information (Xu & Shi, 2018). Motivation theory, which states that a person will be motivated, i.e. what he does can attract students' attention (van Bavel et al., 2019). Top-down process, where students start with simple topics, then can develop their ideas in a broad, structured, and systematic way (Odena & Burgess, 2017). A cognitive level that directs students to formulate topics under adult guidance, or to collaborate with more capable peers (Irwanto et al., 2018). Students should be given complex, difficult, and realistic tasks and provided with step-by-step assistance to solve problems and behavioral learning theory, which states that behavior change results from observing the behavior and explanations of others (Huisman et al., 2018; Sheeran et al., 2017). The implication of this study make students' thinking flow in a structured and systematic way. In addition, the CORONA model is a unique learning model. It can be seen from the name of the model itself. Therefore, the CORONA model can be said to be a contemporary model, namely adjusting to the needs of the times. The application of the CORONA model in scientific writing as a form of support for the implementation of the Merdeka Learning-Independent Campus (MBKM) program promoted by the Indonesian government or education policy makers in Indonesia. Based on the research results, the CORONA model is one of the valid and effective models to be applied in scientific writing learning for students. The validity and effectiveness of the CORONA model does not mean that this research is over either. However, further research still needs to be done with different methods, approaches, and/or subjects. In addition, it also needs to be developed through collaborative and adaptive development research.

4. CONCLUSION

Based on the results of the research and discussion above, the application of the CORONA model in Indonesian language learning in scientific writing technique material is declared valid, reliable, and effective and fulfills the requirements to improve students' scientific writing skills. The validity, reliability, and effectiveness of teaching that apply the CORONA model to improve students' scientific writing skills

are based on several important things. First, the validity of the developed CORONA model for construct validation, which means that the CORONA model has good content and construct validation and the reliability of the CORONA for construct reliability so that it is reliable because it is greater. Second, there was a significant improvement in scientific writing skills before and after the implementation of the CORONA model. Third, the value of scientific writing skills is categorized as medium. Fourth, there is no difference in the increase in scientific writing skills (no difference in n-gain) for all classes. This is instructing that the CORONA model is consistent in improving students' scientific writing skills.

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