Portrait of Education in Indonesia: Learning from PISA Results 2015 to Present

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Abstract. This study aimed to analyze Indonesia's low Program for International Student Assessment (PISA) scores among PISA-participating countries in the world, using the qualitative Spradley model method. Data collection involved studying PISA results documents, curriculum documents, newspapers, and television news. Observations and interviews (both formal and informal) with teachers and prospective teachers who were studying at private tertiary institutions were also used considering that the main researcher has been a lecturer since 1986 until now. Data analysis techniques included domain analysis, content analysis, narrative analysis, and critical discourse analysis. Data analysis related to the implementation of the educational curriculum from the Dutch colonial era to the present. It was found that not all teachers used higher order thinking skills (HOTS) and teachers complained that the curriculum was often changed by the Ministry of Education. Even distribution of the quality of education is also not optimal and experiences difficulties. This is because Indonesia is the fourth most populous country in the world, with the population spread over 17,000 islands separated by sea. This study recommends that the Indonesian Government make solid short-, medium- and long-term education master plans so that teachers are not bothered with curriculum changes on a regular basis. If participation in PISA by Indonesia is continued, this study recommends that the practice of PISA questions be increased and that PISA participants be selected using purposive sampling considering that the quality of education is not evenly distributed.

Keywords: Indonesia; innovative learning; low assessment scores; PISA; qualitative approach

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1. Introduction

Indonesia is a maritime country that has marine waters covering an area of 5.8 million km², consisting of 0.3 million km² of territorial waters, 2.8 million km² of archipelago waters, and 2.7 million km² of exclusive economic zone. Furthermore, Indonesia has more than 17,508 islands, 50 straits, and 64 bays (Anoegrajekti et al., 2022; Bernardi, 2003). Indonesia has a population of 278.8 million people (the 4th most populous in the world) (Kompas, 2022a) and is the 4th largest country in the world by area (CNN Indonesia, 2022), with an area of 1.90 million km², almost eight times that of Russia (Kompas, 2022b). Naturally, the distribution of quality education is not maximized. Since 2000 until now, Indonesia has participated in Program for International Student Assessment (PISA). PISA is held every three years (2000, 2003, 2006, 2009, 2012, 2015, 2018). However, the latest PISA results, which should have been released in 2021, was not yet released by the Organization for Economic Cooperation and Development (OECD), namely the organizer of PISA, at the time of this writing. Because of this, this paper focuses on the 2018 PISA results.

In 2018, Indonesia ranked 62nd out of 70 countries in terms of literacy level. Indonesia is thus in the bottom 10 countries that have a low literacy rate in PISA (Anggraena, 2021; OECD, 2019a; Pratiwi, 2019). The low level of national literacy in Indonesia is supposedly because for decades the country remained on the downstream side (Indonesia Directorate General of Primary and Secondary Education, 2021; hereafter Indonesia Directorate, 2021). Another reason is that Indonesian people are continually judged to have a low reading culture (Utami, 2021). As a nation that was colonized by the Dutch for 350 years, there is a stigma (Absiroh et al., n.d.; Amin, 2019; Hasudungan, 2021; Tricahyono, 2020) that results in Indonesia's low competitiveness, low human resource development index, and low level of innovation (Indonesia Directorate, 2021).

For 350 years, Indonesia was colonized by the Dutch and other Western countries such as Britain, France, and Portugal, and finally by Japan from 1942 to 1945 until the nation gained its independence on 17 August 1945 (Absiroh et al., n.d.; Amin, 2019; Hasudungan, 2021; Tricahyono, 2020). Indonesia (Dutch East Indies) experienced a dark period in the history of its education when the Dutch colonizers allowed Indonesians to attend only low-level schools called *sekolah ongko loro*, where they were only taught to become laborers to meet the needs of the Dutch colonialists (Tricahyono, 2020). Even then, only the sons and daughters of aristocratic and *priyayi* families were allowed to go to school, namely families who were economically capable and educated. This paper describes why Indonesia's PISA score is low and what the portrait of education in Indonesia looks like from the Dutch colonial period to the present, where the country has experienced 11 changes to the education curriculum (Ismawati, 2015; Pratiwi, 2019) until its participation in PISA.

For the record, in 1975, Indonesia implemented a modern curriculum containing all experiences and learning activities determined by educational institutions to achieve national educational goals (*UU Sisdiknas*). The modern curriculum no

longer emphasizes memorization, but its orientation changed towards mastery of skills, namely higher order thinking skills (HOTS), and attitudes that change the paradigm from being a colonized nation to an independent nation, with the terms independent campus and independent learning (Makarim, 2020).

This study aimed to answer the following questions:

- What does the portrait look like of the implementation of education in Indonesia from the Dutch colonial period to the present?
- Why is Indonesia's PISA score low (bottom 10 countries)?
- Is a low PISA score an indication of failure in education in Indonesia?

This paper will answer the above questions by exploring various document sources and the history of education in Indonesia.

2. Literature Review

2.1 PISA in Previous Studies

Many studies have been conducted regarding PISA (Pratiwi, 2019; Sjoberg, 2018; Takayama, 2018). Sjoberg (2018) concluded that PISA is basically a political project formulated, regulated, and financed by the "owner", namely the OECD, and in line with OECD priorities. This project is explicitly normative, but is presented and understood as a neutral and objective measure of a country's schools following and representing future global competitiveness. From this perspective, PISA can be said to have been a global success.

On the other side, and more seriously, is a kind of epistemological dominance: The government's obsession with PISA scores distorts and limits the meaning and purpose of schools (Sjoberg, 2018). PISA results have been used by uninformed schools as if PISA was the only measure of school quality. Meanwhile, published PISA test scores have a negative correlation with inquiry-based teaching methods, especially in conducting science experiments. The PISA reports also almost never mention the United Nation's current sustainable development goals (SDGs) and there are no initiatives related to education for sustainable development (Sjoberg, 2018). Another "weakness" of PISA, according to Sjoberg (2018), is that money and resources spent on education have no effect on PISA scores (OECD, 2016). Class size is also not a problem related to the quality of education (OECD, 2016). PISA scores also have a negative correlation with the investment and use of ICT in teaching (OECD, 2017a). Furthermore, PISA science scores do not correlate with the amount of teaching time devoted to science at school (OECD, 2016; Sjoberg, 2018).

In their study, Takayama (2018) highlighted the problem of how to eliminate the cultural bias that is so important to the legitimacy of PISA, which has made extensive efforts to ensure the fairness of their tests. The study attempted to confound clean and convincing explanations of PISA's technical solutions to cultural biases about exam fairness. Specifically, the study responded to cultural biases in reading literacy. It was concluded that in order to achieve maximum PISA scores, students need to expand their sources of critical insight beyond Anglo-American and European countries to denaturalize the premise underlying

PISA that remains unproblematic for Anglo-European critical education policy scholars (Takayama, 2018).

Concerning PISA research in Indonesia, Pratiwi (2019) examined the effect of PISA achievement on the curriculum in Indonesia since becoming a PISA participant from 2000 to 2015. Pratiwi (2019) stated that Indonesia's index achievements were always at the lower level in the PISA index, as evidenced in the 2015 PISA results, where Indonesia was ranked 65th out of 69 participating countries. The study concluded that in every curriculum change, things that must be considered are related to the contextualization of Indonesia. PISA can therefore not be used as a benchmark for the success or failure of education in Indonesia (Pratiwi, 2019).

2.2 PISA and Indonesian Participation

PISA is an international program launched by the OECD in 1997, first conducted in 2000 and now covering more than 80 countries. Every three years, the PISA survey provides comparative data on the performance of 15-year-olds in reading, math, and science. Each implementation of PISA explores different "innovative realms", for example problem-solving, collaboration (PISA 2015), and global competence (PISA 2018).

PISA in Indonesia is attended by purposively selected 15-year-old school students (Anggraena, 2021). PISA organizers are the OECD and an international consortium that handles sampling, instruments, data, reporting, and secretariat issues (Anggraena, 2021; Pratiwi, 2019; Suyatman et al., 2021). PISA aims to assist countries in preparing human resources to have the expected competencies in the international market. PISA provides information not only on international benchmarks but also on student strengths and weaknesses and the factors that influence them (Anggraena, 2021; Pratiwi, 2019; Suyatman et al., 2021).

The PISA assessment subjects consist of basic literacy tests of several skills, including math, reading, and science, outside the national curriculum. Globally, PISA is believed to have high legality in describing the quality of a country's education. Indonesia is still in the lower ranks, that is, 65th out of 69 participating countries in 2015 (Pratiwi, 2019) or 74th out of 79 participating countries in 2018 (Indonesia Directorate, 2021; Suryana, 2021). These results should trigger teachers and students in Indonesia to improve their literacy and numeracy skills so they can compete in the global labor market. As an illustration, the PISA participating countries can be seen in Table 1 below.

Table 1: List of countries participating in PISA

Albania*	Finland	Lithuania	Romania*
Argentina*	France	Macau (China)*	Saudi Arabia*
Australia	Georgia*	Malaysia*	Serbia*
Austria	Germany	Malta*	Singapore*
Azerbaijan (only Baku City)*	Greece	Mexico	Slovakia
Belgium	Guatemala*	Moldova (Republic)*	Slovenia
Brazil*	Hong Kong (China)*	Mongolia*	Spain

Brunei Darussalam*	Hungary	Montenegro*	Sweden
Bulgaria*	Iceland	Morocco*	Switzerland
Cambodia*	Indonesia*	Netherland	Taipei (China)*
Canada	Ireland	New Zealand	Thailand*
Chile	Israel	North Macedonia (Republic)*	Turkey
China (People's Republic)*	Italy	Norway	Ukraine*
Colombia	Jamaica*	Palestinian Authority*	United Arab Emirates*
Costa Rica	Japan	Panama*	United Kingdom (excluding Scotland)
Croatia*	Jordan*	Paraguay*	Great Britain (Scotland)
Czech Republic	Kazakhstan*	Peru*	United States of America
Denmark	Korea	Philippines*	Uruguay*
Dominican Republic*	Kosovo*	Poland	Uzbekistan*
El Salvador*	Latvia	Portugal	Vietnam*
Estonia	Lebanon*	Qatar*	

* Non-OECD members

Source: OECD (n.d.a)

The ability to read is very important for various human activities, especially communicating with others (OECD, 2018a). In terms of reading ability, the PISA results show that 77% of students in all OECD countries achieve Level 2 reading skills. These students are able to identify the main ideas in relatively long texts, search for information based on explicit criteria which are sometimes complicated, and reflect on the purpose and form of the text. More than 85% of students in China, Canada, Estonia, Finland, Hong Kong, Ireland, Macau, Poland, and Singapore achieve a higher degree (OECD, n.d.a). For math and science skills, PISA results show that 76% of students across OECD countries achieve Level 2 or higher in mathematics. Students can interpret and recognize, without direct instruction, how the (simple) situation can be represented mathematically (for example, comparing the total distance of two different routes, or converting prices to different currencies). However, across 24 countries and economies, more than 50% of students (Indonesia included) score below this level of proficiency.

Indonesia voluntarily provides space for PISA to continue to evaluate student achievement so that it can be a reflection of education policy in the era of globalization (Indonesia Directorate, 2021; Pratiwi, 2019). The results of the PISA assessment in Indonesia unavoidably always attract media coverage (Kompas, 2020). The Indonesian Government has always been under public pressure because it has been deemed unsuccessful in implementing the national education system (Pratiwi, 2019). The 2000 PISA results placed Indonesia in 39th place out of 41 countries (OECD, 2003), with this matter reported by almost all media in Indonesia. After 18 years of being a PISA participant, the outcome remains the same. Indonesia, based on the 2018 results, occupies ranking 62 out of 70 countries related to literacy rates, placing the country in the bottom 10 countries with low literacy rates (OECD, 2019a), even though literacy skills are very important.

Literacy refers to the depth of one's knowledge of a field of knowledge. Low national literacy levels (Fahlevi, 2021) of students in Indonesia can be attributed to teachers' propensity to ask questions on a lower order thinking skills (LOTS) level. Various efforts have been made by the Indonesian Government to improve the quality of education through students' literacy and numeracy skills. This includes changing teaching strategies and methods that are oriented towards HOTS, namely the ability to think and not just memorize facts. HOTS require students to do something about these facts. Students must understand, analyze each other, categorize, manipulate, create new ways creatively, and apply them in finding solutions to new problems (Hasyim & Andreina, 2019; Riadi, 2016). Indonesia's PISA scores from 2006 to 2018 can be seen in Figure 1.
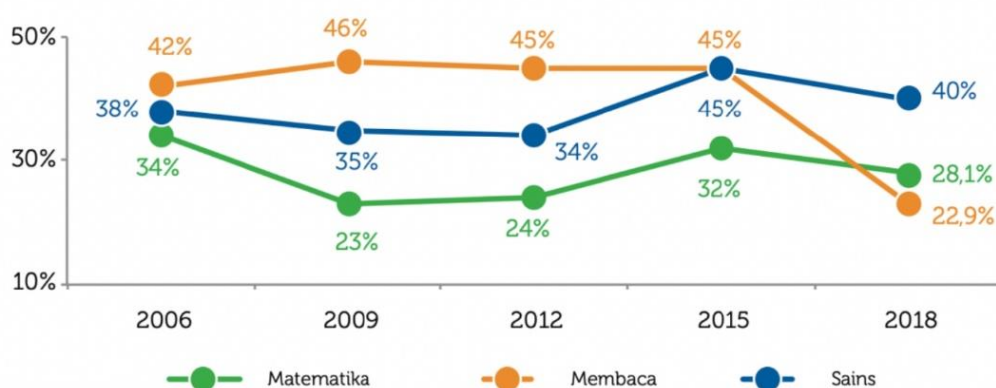

Figure 1: Indonesia's PISA results 2006–2018

Source: OECD (2018a)

As seen in Figure 1, the reading score (*membaca* – reading; the yellow line) was 42% in 2006, 46% in 2009, 45% in 2012, 45% in 2015, and 22.9% in 2018. Regarding science (*sains*; the blue line), Indonesia achieved 38% in 2006, 35% in 2009, 34% in 2012, 45% in 2015, and 40% in 2018. Achievement in math (*matematika*; the green line) was 34% in 2006, dropping drastically to 23% in 2009, 24% in 2012, significantly increasing to 32% in 2015, then dropping again to 28.1% in 2018. These figures show that in these five times that Indonesia participated in PISA, the country never achieved a score of 50% for reading, science, and mathematics.

There is a need to increase these scores to above 50% so that the literacy skills of students in Indonesia are not far below those of other foreign students. PISA scores can be increased by providing intensive training on questions related to literacy or language, mathematics, and science. The scoring system also needs to change. Students not only master the material but are also able to solve and interpret problems in various real-life situations. Various reading strategies that are used as a reference to foster a sense of pleasure in reading among students can be implemented. These include: 1) writing texts related to reading, 2) indicating what is liked and disliked of a text read and the reasons, 3) comparing books read with other books on the same topic, 4) comparing the contents of books that have been read, 5) answering questions related to book chapters, 6) expressing opinions about a reading text, 7) discussing a reading text with other students, and

8) summarizing the chapters in a book (OECD 2019a; Ministry of Education and Culture Research and Development/Depdikbud, 2019).

2.3 Integrated Design: Student Component
Within the PISA 2021 framework, mathematical literacy includes a synergistic and reciprocal relationship between mathematical thinking and computational thinking, algorithmic thinking, automation, decomposition, and generalization, all of which are important in the process of mathematical reasoning and problem-solving (OECD, n.d.a). Computational thinking in mathematics is conceptualized as the ability to define and describe mathematical knowledge that can be expressed by programming, enabling students to dynamically model mathematical concepts and relationships (Anggraena, 2021).

The taxonomy of computational thinking in PISA 2021 includes data practice, modeling and simulation practice, computational problem-solving practice, and systems thinking practice. PISA domains related to computational thinking include abstraction and symbolic representation, mathematical modeling, problem-solving, interpretation, application, and evaluation of mathematical results. In terms of mathematical content, computational thinking is mentioned in the discussion of all the sub-topics of mathematics: quantity, uncertainty and data, change and relationships, space and form (OECD, n.d.b).

Computational-thinking learning in Indonesia covers two areas, namely integrating thinking skills into existing subjects and providing certain classes and activities that specifically address computational thinking (Figure 2). Several recent studies have shown that computational thinking can be integrated into existing subjects. For example, unified modeling language (UML) principles learned in software engineering can be integrated into language learning at the primary school level in Austria (Anggraena, 2021). Integrated design figures can be seen in Figure 2.
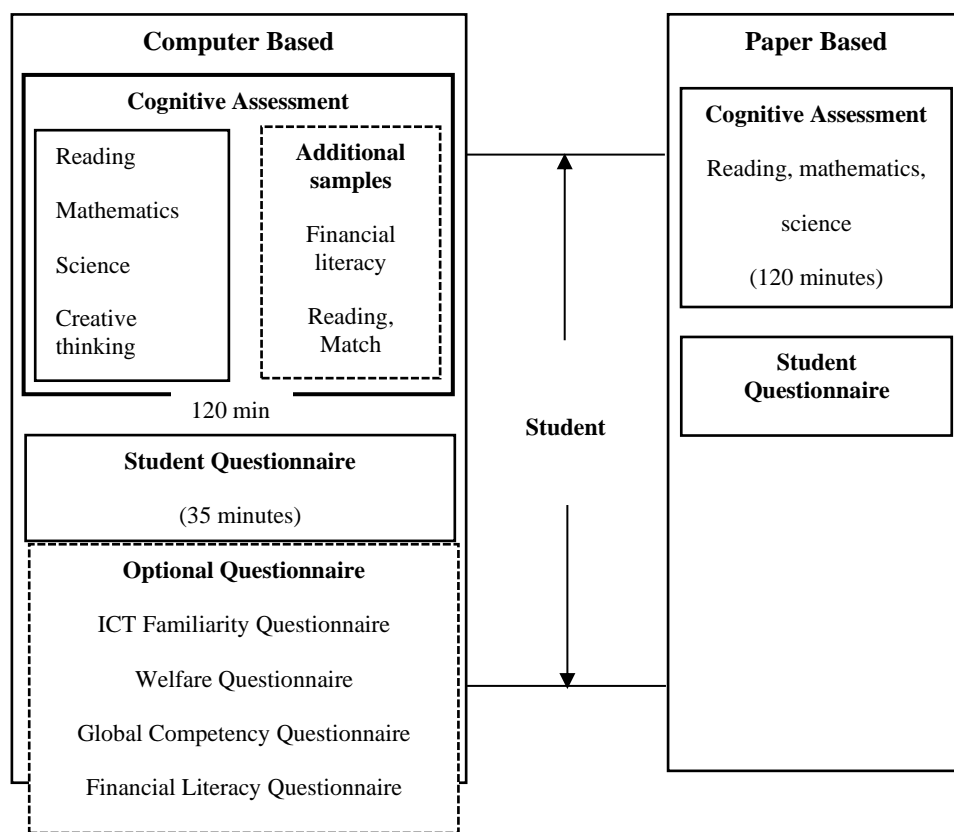
Figure 2: PISA integrated design 2021: Student component

Source: OECD (n.d., p. 6)

So far, exam questions in Indonesia still have a level of difficulty below PISA standards, which are already based on HOTS. The OECD has implemented an education system that is oriented towards fulfilling a global workforce which requires three learning components, namely reading, mathematics, and science, as benchmarks. This requires HOTS exam questions. Meanwhile, the curriculum in Indonesia has not implemented this system, except for the national exam in 2018, which started using HOTS.

In 2021, math literacy skills were redefined by the OECD. Mathematical literacy is an individual's capacity to reason mathematically and formulate, use, and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain, and predict phenomena. It helps individuals to know the role that mathematics plays in the world and to make the reasoned judgments and decisions required by constructive, engaged, and reflective 21st century citizens (OECD, 2018b). The PISA 2021 framework stipulates that mathematical literacy, which was originally focused on basic computational skills, must be redefined by paying attention to very fast technological advances. Of course, this also applies to other literacy skills besides mathematical literacy, namely reading literacy and scientific literacy (OECD, n.d.a). Schools, principals, and teachers play an important role in the PISA integrated design, as shown in Figure 3.
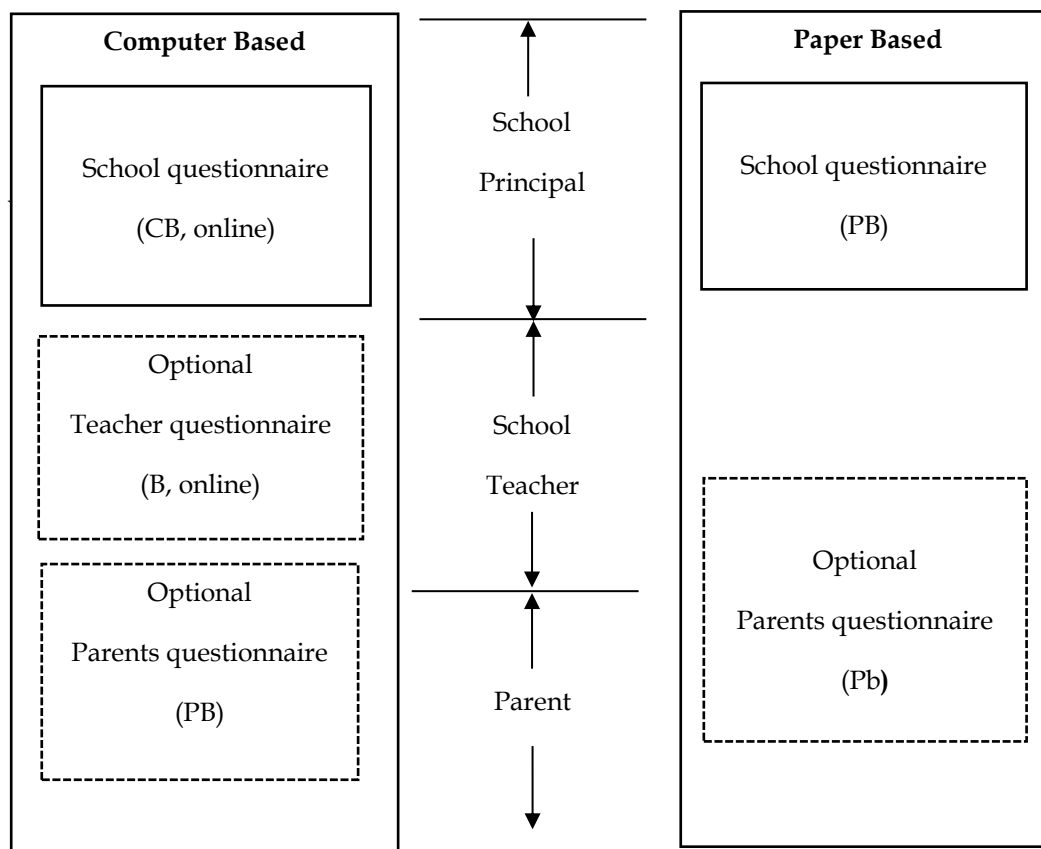
Figure 3: Integrated design of PISA 2021: Non-student components

Source: OECD (n.d., p. 6)

Mathematical literacy also plays an important role in the digital era, where information and knowledge technology is developing rapidly. Mathematical literacy is necessary to interpret and critically analyze everyday situations, solve problems, and evaluate existing information (Marlina et al., 2019). Unfortunately, the approach used by the teacher has not been able to improve students' abilities in this regard (OECD, 2015). Several recent studies have shown that computational thinking can even be integrated into existing subjects in the digital era. For example, UML principles learned in software engineering can actually be integrated into language learning at the elementary school level. The digital era allows for the creation of affinity spaces without being limited by geographical and temporal distance (Sya et al., 2022).

3. Research Methods
3.1 Research Design
This study used a qualitative approach employing the method of literature study and document study with content analysis and in-depth interviews. The literature study method as data collection technique was used by conducting a study of the PISA results, especially the last two periods, namely 2015 and 2018, because the 2021 PISA results had not been released at the time this paper was written. A review was done of books, literature, notes, and reports related to the problem being solved (educational problems and PISA) with reference to a qualitative

approach (Creswell, 1998, 2012; Denzin & Lincoln, 2004; Ismawati, 2016; Spradley, 2007). Qualitative research can be employed in different ways (Denzin & Lincoln, 2004; Spradley, 2007). In this study, it was employed by reading literature related to the problem of low PISA scores and investigating the learning practices in schools (namely at SMA Negeri 1, 2, and 3 Klaten by interviewing three teachers in the three schools) and teacher-producing institutions (namely the Faculty of Teacher Training and Education where the main researcher has been teaching since 1986 to the present). Not all prospective student teachers in the faculty were interviewed; only those who had been teachers were the subjects of the study. The questions asked in the interview aimed to gather the following information: (1) whether participants knew PISA, (2) how the learning practice was carried out in their school, (3) whether it was oriented towards PISA questions or not, and (4) their responses regarding Indonesia's low PISA scores. Content analysis methods were also used, which are basically oriented towards empirical findings in interviews, explaining the contents of the interviews according to the research objectives (Krippendorff, 1993). With an empirical orientation, content analysis contributes to knowledge.

3.2 Data Collection Techniques

Data collection techniques in this study included qualitative techniques, namely note-taking, content analysis, observation, and direct and indirect interviews (Faizti, 2021; Ismawati, 2016). Various sources were used in collecting data, such as online newspapers, television, and the 2015 and 2018 PISA reports. Direct (in-person) interviews were conducted while the teacher participants were taking the course *Research Methods for Indonesian Language and Literature Education,* which was taught at the Faculty of Teacher Training and Education, Widya Dharma University. Conversely, indirect interviews were conducted with teacher participants while at home, either by telephone or through the WhatsApp group. Data were collected in this study through recordings and notes, literature study, interviews with teachers and prospective teachers over an extended period as they were students on the campus, surveys at three schools, and by observation of participating teachers during teaching practice. In some cases, observations were carried out continuously so that we could acquire complete data. In-depth interviews were also used, which is a structured or unstructured data collection technique that can be done face-to-face or over the telephone with the participants. Participants were students in the Language Teaching Planning, Language Teaching Evaluation, Literature Teaching, and Language and Literature Teaching Research Methods classes.

3.3 Data Analysis Techniques

Data in qualitative research, which are mostly in the form of sentences and discourses, are sorted into data cards to be analyzed by parsing and grouping techniques into the domains found. The high variation of the data results in an unclear pattern during analysis, so the repeated reading technique is used (Faizti, 2021; Ismawati, 2016). In this study, the repeated reading technique was used with the Spradley domain model (Faizti, 2021; Ismawati, 2016; Spradley, 2007), yielding several domains, namely the domain of PISA scores from 2006 to 2018 for reading, mathematics, and science; the domain of implementing teaching in the classroom; and the domain of using methods, media, and evaluation. In

addition, content analysis, narrative analysis, and critical discourse analysis were also used for analysis of the implementation of educational documents from the Dutch colonial era to the present.

4. Results

Indonesia was ranked 74th out of 79 participating countries in the 2018 PISA results. Table 2 below presents the results of the 2000 to 2018 PISA studies released by the OECD. The 2018 PISA results show that for reading ability, Indonesian students achieved an average score of 371, while the OECD average score was 487. The average math score for Indonesia was 379 compared to the OECD average score of 487, and the average science score for Indonesia was 389, while the OECD score was 489. Indonesia was placed fifth from the bottom, and perhaps the same results will be yielded in PISA 2021 (Indonesia Directorate, 2021; Suryana, 2021).

Table 2: PISA Index for 2000 to 2018 showing Indonesia's achievement in PISA

Year	Factors tested	Indonesian average score	International average score	Indonesian rating	Number of participating countries
2000	Reading	371	500	39	41
	Mathematics	367	500	39	
	Science	393	500	38	
2003	Reading	382	500	39	40
	Mathematics	360	500	38	
	Science	395	500	38	
2006	Reading	393	500	48	56
	Mathematics	396	500	50	
	Science	393	500	50	
2009	Reading	402	500	57	65
	Mathematics	371	500	61	
	Science	383	500	60	
2012	Reading	396	500	62	65
	Mathematics	375	500	64	
	Science	382	500	64	
2015	Reading	397	500	61	69
	Mathematics	386	500	63	
	Science	403	500	62	
2018	Reading	371	487	74	79
	Mathematics	379	487	74	
	Science	389	489	74	

Source: (Indonesia Directorate, 2021; OECD, 2018a; Pratiwi, 2019)

Meanwhile, the results of an internal study at a prospective teacher education institution at a tertiary institution in Klaten, Central Java, Indonesia show that the literacy skills of teachers and prospective teachers of Indonesian, English, and mathematics are still low (Ismawati & Hersulastuti, 2021). The results of in-depth interviews with prospective teacher students show that their low literacy skills were due to their lack of reading books related to the following subjects:

(1) language and literature teaching research, (2) language and literature seminars, and (3) classroom action research and teaching English at the Department of English Education, and basic mathematics courses at the Department of Mathematics Education. The prospective teachers interviewed came from the three majors, namely Indonesian, English, and Mathematics. The content they create in the learning media they use in the micro-teaching practice class has very little to do with literacy skills.

Another study showed that teachers' teaching practices also affect students' literacy competence. Teachers' teaching practices, such as the support provided by the teacher and positive feedback, are known to influence students' reading motivation (Guthrie, 2013; Hattie & Timperley, 2007; Narciss & Huth, 2004; Paľová & Vejačka, 2022). The teacher's teaching practice is known to influence the value of the students' pleasure reading index, both independently and together (Fahlevi, 2021).

The interviews with the participating teachers from SMA Negeri 1, 2, and 3 revealed that so far, teachers have placed too much emphasis on the pedagogical aspect. They do this by presenting teaching materials very slowly, forgetting that in life teachers must teach using many variations to remain fresh. Pedagogically, material should be presented from the unknown to the known, simple to complex, easy to difficult, and concrete to abstract. In terms of language/terms used, vocabulary concepts must be in accordance with the conditions of students. Short and simple sentences must be used and tools must be selected according to the material. Furthermore, teachers are afraid to provide material outside the curriculum, even though there is a lot of new literature that students and teachers need to read, especially 21st century literature (Ismawati & Hersulastuti, 2021; Suciati, 2021).

Seeing the trend of Indonesia's PISA results from 2000 to 2018, it is necessary to immediately innovate in literacy learning. This might be difficult at first, because educational innovation is not a simple and easy process, including technological innovation with hands-on content and innovation in pedagogical approaches (Fu, 2020; Paľová & Vejačka, 2022; Youssef, 2012; Yuzulia, 2021). Most teachers in Indonesia still use the LOTS-type method, which needs to be innovated. This shows that the education system needs to be reformed as a whole. PISA is one of the benchmarks indicating the failure of Indonesian education trials, which changes every time there is a change of minister (Pratiwi, 2018).

The implementation of the Independent Curriculum proclaimed by the Minister of Education Nadiem Makarim (2020) is constrained because many schools are still not ready (Indonesia Directorate, 2021). Teachers, especially in remote areas, are not free to present each subject due to natural constraints and media limitations and tend to fail in meeting the target of completing curriculum materials. Teachers tend to only teach certain materials in the form of providing information (low cognitive, C1, C2) that students should have obtained themselves from various sources. Teachers only teach material in the form of knowledge, so that students tend to memorize it and not understand it more

deeply. Furthermore, the proportion between time allocation and subject matter is not appropriate, so teachers tend to only pursue curriculum targets (Ismawati, 2015; Nursalim, 2011).

To increase the realization of quality education in Indonesia, several practices of implementing learning in schools in villages, remote areas, and mountainous areas require extra assistance. Some schools have bad practices which must be done away with, such as reducing the time for teaching and learning activities and using that time for other interests, for example attending ceremonies, community service, mutual cooperation cleaning schools, meetings, etc. Other practices involving time reduction must also be eliminated, such as class preparation (during class changes), teachers arriving late to class, early teaching and learning activities, and so on. Implementation of teaching and learning activities that only focus on LOTS will affect the quality of learning and student learning outcomes, resulting in low PISA scores, because PISA questions have been designed using HOTS. The higher the literacy structure, the more the students' abilities are challenged at a more difficult level. Each stage of learning should be designed to stimulate higher order thinking. The goal is to produce students who are analytical and critical and able to solve problems and evaluate.

5. Discussion
To raise PISA scores, it is necessary to know that many factors influence students' literacy competence, including student internal factors such as learning motivation, toughness/resilience, and competitive nature, and external factors (Puslitjak, 2021). Motivation has an influence on learning of language, mathematics, and science and is related to learning achievement (Han et al., 2020; Wu et al., 2022; Gyanfi, 2020).

Students' basic literacy skills are also influenced by reading enjoyment, reading metacognition strategies, and classroom climate. Therefore, the policy adopted needs to promote student literacy activities and increase students' love of reading by increasing teacher capacity (Puslitjak, 2021). Teachers are trained to provide HOTS-level questions so that students are accustomed to critical thinking as a basis for 21st century skills.

So far, examination questions in Indonesia have been at a level of difficulty below PISA, which is HOTS based. This is because the OECD founding countries have implemented the most up-to-date Bloom's taxonomy system in their education systems. Meanwhile, the curriculum in Indonesia has not implemented this system properly, except for the national exam in 2018 (Hasyim & Andreina, 2019; Indonesia Directorate, 2021).

In 2018, the national exams in Indonesia were premised on HOTS and it is hoped that with HOTS, students will be able to achieve independence in answering PISA questions. The use of e-module media can also increase student learning independence and make it easier for students to learn independently. There is a strong correlation level and simultaneous and partial influence between digital

literacy and students' self-directed learning on the use of e-modules in evaluating learning processes and outcomes (Sanova et al., 2022).

The Center for Curriculum and Books of the Indonesian Ministry of Education and Culture (Fahlevi, 2021) has conducted a lot of research and formulated a series of solutions to improve the low PISA scores. This includes holding literacy training and providing assistance for teachers and students, both at the national and regional levels, as well as establishing literacy movements, from the national level to the local school level (Fahlevi, 2021).

One of the methods recommended for learning literacy in reading, mathematics, and science is quantum learning combined with the use of ICT (Ismawati, 2016; Raharjo, 2013). The simple quantum learning model used by teachers is organized into six steps, named *TANDUR* (acronym in Indonesian), as discussed below (Astuti, 2017; Ismawati, 2016).

- *Tumbuhkan* (grow): In this step, lecturers foster students' interest by arousing their curiosity.
- *Alami* (experience): Here, the experience of writing, for example poetry, will become an unforgettable memory if read and students want to feel directly how difficult it is to read, write, and count in the cases provided.
- *Namai* (name): From the direct experience, there must be empirical and scientific findings that need to be named. Here, students and teachers collaborate to mention the findings.
- *Demonstrasikan* (demonstrate): In this step, students and teachers together try to get new experiences in literacy by demonstrating what has been obtained in learning.
- *Ulangi* (repeat): The new experience in literacy will be fleeting if it is not repeated over and over again until the participant is addicted to reading, writing, and arithmetic anywhere and anytime. This means that literacy is a necessity.
- *Rayakan* (celebrate): A new experience in literacy should be celebrated. The more often success is celebrated, the more impressive the learning practice will be. In the end, students miss meeting with teachers and vice versa to discuss the new literacy they are reading and writing.

Learning will be more productive and effective if it is carried out in a pleasant atmosphere (Dryden, 2001; Meilani et al., 2020) and integrated with music. Music can be used to set the mood, promote desired learning outcomes, and highlight educational focal points (De Porter et al., 2005).

Learning to read and do science and mathematics in the form of real-life cases accompanied by music makes students feel close to the material and to be automatically interested in solving it. The use of ICT in learning is also something that is non-negotiable in the world of 21st century education. Twenty-first century learning is oriented towards collaboration, which can empower students in their ability to think and find and solve problems through the help of several supporting sources (Jamaludin et al., 2022; Tiruneh et al., 2018), and this of course requires ICT.

The low scores of Indonesian students are not really a cause for concern if the teacher equips their students with critical thinking skills that are closely related to students' in-depth understanding of the learning material content. The ability to think critically has penetrated into various aspects of human life and various disciplines such as science, history, literature, psychology, education, and everyday life (Berdahl et al., 2020; Jamaludin et al., 2022).

Critical thinking is a predictor of one's excellence in learning (Menap et al., 2021). Critical thinking is a form of thinking that is systematic and precise, which follows the rules of logic and scientific reasoning (Lau, 2011; Han et al, 2020). Furthermore, critical thinking is a very calculated component of intelligence (Albergaria-Almeida, 2011). It is seen as reasonable reflective thinking focused on deciding what to believe or do (Ennis, 2018; Menap et al., 2021). Critical thinking is also a key competency for lifelong learning. Teachers are role models for students and have a significant impact in their critical thinking, influencing students' academic achievement, personality development, and attitudes towards science (Paidi et al., 2021). The use of quantum learning models helps students manage and maintain lasting gains of knowledge, understanding, and learning.

Analytical thinking is one of the most basic HOTS needed to develop 21st century skills, which include critical thinking, problem-solving, creativity, and decision-making. Students need analytical thinking skills to solve various problems in everyday life. The ability to think analytically leads students to become independent and qualified thinkers (Aksu & Eser, 2020; Anggraini et al., 2019; Suyatman et al., 2021). Therefore, teachers need to continue instilling these skills in students in every lesson. The keys to critical thinking are asking questions, providing accurate and relevant information, setting assumptions, making reasonable and logical judgments, and drawing conclusions (Fatah et al., 2022), and this is what Indonesian students need for their future.

6. Conclusion
The portrait of the implementation of education in Indonesia from the Dutch colonial period where only nobles and the rich attended school has passed. Today, there is no discrimination in the administration of education in Indonesia. The low PISA scores are due to the lack of training on PISA questions with HOTS and a low reading culture. However, education that is only oriented towards PISA achievement will become a "factory" that produces intelligent and skilled human beings who are ready to be absorbed as industrial workers but are not humane. Education that only pursues meeting the needs of the global labor market promotes dehumanization. Indonesia (and other countries with low PISA scores) does not need to feel inferior, because PISA is only a small part of the indicators of educational success, and is not the dominant factor that determines the direction of education policy in Indonesia. Therefore, a low PISA score is not a portrait of failure of education in Indonesia. However, HOTS is still needed by humans to solve the problems of life in the post-pandemic world, so it is important to apply it in any form of learning and not only literacy learning in reading, mathematics, and science. The PISA score can be increased by providing intensive

training on literacy, math, and science questions outside of core class hours. This research recommends to education policy-makers in Indonesia to realize a balanced education, taking into account all the interests of Indonesia as the 4th most populous country in the world. On the one hand, education needs to pay attention to the global labor market; on the other hand, humane education remains a top priority for Indonesian citizens.

7. References

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