Musringudin - Exploring the Scientific Culture of Elementary School Teachers in Jakarta

by Layanan Perpustakaan Uhamka

Submission date: 24-Apr-2026 10:26AM (UTC+0700)
Submission ID: 2942067971
File name: IAFOR-JOURNAL_1.pdf (1.05M)
Word count: 7514
Character count: 44275

Exploring the Scientific Culture of Elementary School Teachers in Jakarta

Musringudin
Universitas Muhammadiyah Prof Dr Hamka, Indonesia

Yulian Dinihari
Indraprasta University, Indonesia

Abstract

This study examines the implementation of scientific culture among elementary school teachers in Jakarta, aiming to identify its strengths and weaknesses as a foundation for teacher professional development. Using a mixed-methods design, data were collected from teachers through questionnaires, interviews, document analysis, and classroom observations. The quantitative findings indicate that teachers demonstrate a strong scientific culture in two main areas: (1) the development of active, creative, and innovative learning plans that utilize the environment and information and communication technology, and (2) the application of varied learning strategies, models, methods, and media. However, several dimensions remain weak. Negative indicators were found in the areas of classroom action research and dissemination. Similarly, the sustainable professional development dimension, covering book and paper publication, module writing, implementation of best practices, and creation of innovative works, showed limited progress. These findings highlight that while teachers exhibit a generally positive scientific orientation, the culture of research and scholarly dissemination remains underdeveloped. Strengthening teachers' research engagement and publication skills is essential to foster a more robust scientific culture in schools and to enhance their role as reflective practitioners and agents of educational improvement.

Keywords: action research, publication, scientific culture, teacher's professional development

Scientific culture is a highly relevant topic in education because schools and universities are institutions where scientific activities and resources are deeply embedded. Teachers play a central role in shaping competitive and competent students who become high-quality human resources in various fields. Therefore, teachers must be at the forefront as role models, demonstrating the ability to think critically, engage in inquiry-based activities, and create works that embody a scientific mindset. A strong scientific culture helps teachers not only transmit knowledge but also develop it, ensuring that their teaching practices remain evidence-based and innovative. Scientific culture reflects rational and logical conceptual knowledge applied to the development of science and technology, maintained through strict procedures, norms, and traditions passed down across generations (Wang, 2018). It represents both a way of thinking and a continuous process of preserving scientific traditions within education. Practically, it is implemented by adhering to established procedures and values that guide scientific inquiry and the creation of new knowledge (Dewey et al., 2021; Maxera & Alvarez-Blanco, 2022). Through this process, scientific culture enhances human skills and knowledge, which ultimately improve the quality of life (Costanzo & Golombek, 2020). Cultural and scientific activities also provide valuable lessons for shaping a better future (Eileen Carlton Parsons, 2013).

Although there is no universally accepted definition of scientific culture, its indicators consistently involve individual and collective engagement in activities with scientific value (Shang, 2019; Godin & Gingras, 2000). Such participation, both academic and institutional, illustrates how science becomes a shared social endeavor. As Hester du Plessis explains (Marec & Schiele, 2018), scientific culture requires the active involvement of individuals, communities, governments, and institutions to support the development and utilization of scientific knowledge for the common good.

Science as a culture cannot stand alone; it depends on collaboration among scientists, educators, communities, and policymakers (Costanzo & Golombek, 2020; Carty et al., 2014). Within this context, teachers are key agents who translate rational, logical, and empirical ways of thinking into meaningful educational practice. Scientific culture thus embodies rationality, criticality, objectivity, universality, skepticism, and empiricism (Yang Zhang & Liu, 2022; Yuan, 2022; Halim et al., 2009). These characteristics are closely related to research activities (Marec & Schiele, 2018; Dewey et al., 2021; Matosin et al., 2014), which, when internalized by teachers, can significantly enhance their professionalism and contribute to improving the overall quality of education.

At the practical level, scientific culture is interpreted as a routine activity carried out personally or communally to obtain knowledge that has an impact on the development of science (Godin & Gingras, 2000); (Wang, 2018); (Dewey et al., 2021); (Shang, 2019). The process of obtaining knowledge is carried out through stages of logical, rational thinking and research activities (Yang Zhang & Liu, 2022); (Yuan, 2022); (Godin & Gingras, 2000). Scientific culture is a research activity whose results must be published to be used as a reference for further research. Even research with negative findings is still important to publish because it can be used as a consideration for other researchers in determining relevant research topics (Matosin et al.,

2014). As a scientific activity, the process of formulating knowledge is guided by the rules, regulations, values, norms, and traditions of science that must be strictly adhered to by researchers in conducting research (Halim et al., 2009); (Dewey et al., 2021); (Wang, 2018). A society with a strong scientific culture can be identified by applying scientific knowledge and its methodology in gaining new knowledge (Carty et al., 2014).

Scientific elements can be represented in research activities (Marec & Schiele, 2018). An activity that begins with a question continues to develop and use a model to explain phenomena, plan and conduct investigations, analyze and interpret data, use mathematical logic, construct explanations, adequate and relevant empirical evidence, logical or rational, and communicate research results clearly and persuasively (Costa & Broietti, 2021). It is emphasized by (Feuer et al., 2002) that research must meet the principle of having empirically investigable questions, using relevant theories, applying appropriate methods, stating clear and coherent arguments, research findings that can be replicated and generalized across studies, and the data and research methods used that are open to criticism and analysis by other researchers.

Scientific culture has distinctive characteristics, including practicality. At this level, the development of science and technology is carried out through the scientific community's activities with experts' guidance, including publication and dissemination of knowledge. Second, precision and rationality: scientific culture is the best knowledge system regarding precision and systematics. Third, the objective is to focus on the objectivity of knowledge and avoid the influence of other social factors (Shang, 2019). Scientific knowledge views science as it is, not based on its value. At the axiological level, science must still have value for the benefit of the universe. Fourth, Inheritance: it takes place from generation to generation as a habit. Scientific culture is not only done once or twice but must become a habit. Fifth, Penetration: it refers to the application of scientific knowledge, methods, values and ethics (Wang, 2018).

According to Shi-ran & Qi, scientific activities include translating books, publishing written works, and correspondence (Ambrosio et al., n.d.). Michel Claessens stated that a nation with a strong scientific tradition in the institutional structure to disseminate science and integrate it into the culture of society (Marec & Schiele, 2018). In addition to publication or dissemination, scientific culture is also expressed through the ability to use data and facts in processing information (Dragoş & Mih, 2015), which are characteristics of research activities and scientific spirit (Yiming Zhang & Zhang, 2018) to obtain the truth and build scientific knowledge (Halim et al., 2009). Furthermore (Lamanauskas et al., 2020) emphasize teacher activities in action research as an indicator of scientific culture.

Based on research by (Salesman & Tapung, 2022), some Indonesians allocate reading time for only 59 minutes per day, a reading tradition below the UNESCO standard average of 4-5 hours per day. This is quite a sad situation compared to the globalization era, which demands high competitiveness. So it is important to prepare future human resources systematically, programmed, and comprehensively. In the context of education, Nail Ilham found that the

learning process will be optimal if the evidence-based practice method is applied, especially in science teaching. In improving the quality of education, teachers need to practice action research to implement teachers' knowledge and understanding of scientific research. Relevant research activities will support teaching activities (Ilhan, 2021).

Strengthening scientific culture is expected to have a significant impact on society by promoting rational thinking and evidence-based decision-making (Yang Zhang & Liu, 2022). A strong scientific culture positively influences both social and personal aspects, such as individual decision-making and community engagement (Carty et al., 2014). Individuals with well-developed rational abilities, rooted in scientific culture, are better equipped to make logical decisions and link scientific knowledge with societal issues, including democratic participation.

At the school level, teachers play a pivotal role in facilitating effective learning and achieving educational objectives. Studies indicate that learning processes are more effective when teachers adopt evidence-based practices, particularly in science teaching, compared to traditional methods (Ilhan, 2021). Such practices encourage teachers to engage in educational research, including action research and good practice documentation, to support and enhance teaching quality. To implement this effectively, teachers must possess knowledge of scientific research methods and the skills to apply them in educational contexts.

Scientific culture in education is closely connected to scientific literacy. Holbrook and Rannikmae (2009) emphasize that scientific literacy can be improved through science education that integrates relevant scientific skills and knowledge into everyday life. Strategies to strengthen scientific culture include promoting communication that reflects the spirit of science, enhancing public understanding and participation, and embedding humanistic values in science learning (Yang Zhang & Liu, 2022). Moreover, fostering teachers' understanding of educational research activities can enhance professionalism and stimulate positive changes in education (Lamanauskas et al., 2020). Building a research community and providing strong institutional leadership are also critical for sustaining scientific culture within educational institutions (Feuer et al., 2002).

Despite these findings, most research has focused on general scientific literacy rather than on teachers' scientific culture and their engagement in classroom-based research at the primary school level. This gap highlights the need to examine how primary school teachers adopt and implement scientific culture in their professional practices. Therefore, this study aims to investigate the scientific culture of primary school teachers and their involvement in educational research activities, with the following research questions:

1) How do primary school teachers perceive and practice scientific culture in their teaching?
2) To what extent are teachers engaged in classroom-based research to support teaching and learning?

3) What factors facilitate or hinder the development of scientific culture among primary school teachers?

Methodology

Research Design

This study employed a mixed-methods design with triangulation to explore the scientific culture of elementary school teachers. Quantitative data were collected through structured questionnaires, while qualitative data were obtained via interviews, observations, and document analysis. Triangulation ensured the validity and reliability of the findings by cross-verifying data from multiple sources. The study focused on four dimensions of scientific culture: 1) active, creative, and innovative learning planning and use of the environment and ICT; 2) professional competence and performance development; 3) enhancement of knowledge, skills, and insights; and 4) development of creative learning strategies, models, methods, techniques, and media. These dimensions were operationalized into 41 indicators, derived from a combination of literature review, relevant educational policy frameworks, and pilot studies.

Participants and Sampling

The study involved 142 teachers from 12 state and private elementary schools in Jakarta, Indonesia. Schools were selected based on accessibility, administrative cooperation, and resource considerations. Participants included 78.9% female and 23.1% male teachers, with 90.2% holding a bachelor's degree and 9.8% holding a master's degree. No participants had a doctoral degree. The sample was purposive to ensure representation of diverse educational units while remaining feasible for data collection.

Instruments

Data were collected using a structured questionnaire for quantitative assessment of the 39 indicators. The questionnaire underwent reliability testing, showing acceptable consistency for each dimension. Some of the indicators in this research instrument were adopted from the criteria and accreditation tools for primary and secondary education issued by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia. The rest were developed based on theoretical studies that served as references in this study. The following is a list of questions used to obtain data about scientific culture in schools.

Table 1

Indicators of Scientific Culture at School

1. Writing a simple research design in the lesson plan.
2. Assigning all students to conduct simple research according to the design.
3. Giving project assignments to students.
4. Utilizing the surrounding environment as a learning resource.
5. Utilizing Information Technology & Computers (ITC) as a learning resource.
6. Utilizing ITC as a teaching medium.
7. Innovating beyond utilizing the environment and ITC in learning.
8. Observing the teacher's teaching activities.
9. Developing questionnaires on teaching implementation.
10. Creating audio or video recordings of teaching.
11. Writing reflective notes on teaching.
12. Conducting an evaluation of the teaching process in the classroom.
13. Discussing and/or disseminating the results of evaluations and reflections.
14. Conducting classroom action research (CAR).
15. Disseminating the results of classroom action research.
16. The school provides reading materials relevant to the learning material.
17. Reading reference books relevant to the learning material.
18. Discussing learning materials and/or teaching methods with colleagues.
19. Participating in teacher workgroup/subject teacher meetings or similar activities at one's own or other schools.
20. Engaging in online learning activities.
21. Attending training/seminars/workshops.
22. Publishing books written independently.
23. Publishing papers.
24. Publishing scientific works resulting from research or best practices.
25. Writing teaching modules.
26. Creating innovative works.
27. Sharing best practices within and outside the school, orally or in writing.
28. Using a variety of teaching media.
29. Using a variety of learning materials.
30. Using a variety of teaching tools.
31. Responding appropriately to students' answers.
32. Forming heterogeneous study groups.
33. Providing positive feedback on students' assignments.
34. Applying the discussion method in teaching.
35. Applying the question-and-answer method in teaching.
36. Applying the simulation method in teaching.
37. Implementing hands-on learning.
38. Conducting project-based learning.
39. Applying teaching methods that align with the learning objectives.

Data Collection and Analysis

Quantitative data were collected via Google Forms, while qualitative data were gathered through interviews, observations, and document studies. Ethical approval was obtained, and all participants provided informed consent. Quantitative responses were coded and analyzed to produce percentages for each indicator, providing a numerical representation of teachers' scientific culture. Qualitative data were reduced, categorized, and compared with quantitative findings to confirm patterns and enhance validity. This integration facilitated a comprehensive understanding of scientific culture in the participating schools.

Limitations

The study is geographically restricted to Jakarta, which may limit generalizability. Additionally, the reliance on self-reported questionnaires introduces the potential for response bias. Furthermore, qualitative findings influenced by self-reporting tendencies and the cross-sectional design limit the ability to track changes in scientific culture over time.

Findings and Discussion

Scientific culture in this study is measured in four major dimensions. Each dimension is broken down into several indicators according to the level of achievement. First, the dimension of active, creative, innovative learning planning and utilizing the environment and Information & Computer Technology is described in seven indicators. Second, the dimension of self-evaluation and reflection is described in eight indicators. Third, the dimension of Continuous Professional Development which is translated into thirteen indicators. Fourth, the dimension of Development of learning strategies, models, methods, techniques, and media which is represented in twelve indicators.

The dimensions of active, creative, innovative learning planning development and utilizing the environment and Information & Computer Technology (ICT) present positive data. In this dimension, the indicators used as measuring tools are described in seven categories. Starting with whether teachers make simple research designs outlined in lesson plans, showing a figure of 92%,3 teachers have done so. Second, it is about how to implement simple research that has been formulated. Data shows 94.4% of teachers have carried it out together with students. Next, 95.1% of teachers stated that they gave students assignments in the form of projects. The fourth indicator, regarding the utilization of the environment as a learning resource, 97.9% of teachers have utilized it in their learning. Fifth, teachers have utilized information technology and computers as learning resources, 95.8% have utilized various media such as e-books, e-libraries, social media, articles, and videos. Furthermore, regarding the utilization of information technology and computers as learning media, data shows that 91.6% of teachers have used it. This means that teachers, in accordance with the needs and availability of information technology and computer media, have implemented learning through learning management systems (LMS), e-learning, blended learning, Google Meet, Zoom, Google Classroom, or other similar media.

Data obtained were generally positive in the dimensions of developing strategies, models, methods, and learning media used by educators in the learning process. For example, regarding the application of learning media in teaching activities, 97.9% of teachers have used various media. The indicator of teachers using various teaching materials was also identified as reaching 98.6% having implemented various variations of teaching materials in their learning. Likewise with learning aids, 93% of teachers have implemented them for learning success and not only relying on lectures in front of the class.

Data on the implementation of project-based learning shows that 89.5% of teachers have implemented them and 10.5% indicated that they had not implemented the method. The indicator of teachers implementing learning methods in accordance with learning objectives reached 97.9%. Another method used is discussion, with an achievement of 95% of teachers having implemented it. The question-and-answer method was carried out by 98.6% of teachers, and 91.6% used simulation.

The indicators still require intervention in the dimension of competency development and teacher performance improvement through self-evaluation and reflection activities. Starting with whether teaching and learning activities are observed, the results are that the principal, colleagues, or supervisors observe 99.3% of learning carried out by elementary school teachers at the research location. The second indicator shows that 80.4% of teachers reflect by asking for feedback on the learning process that has been carried out. Feedback is obtained through questionnaires distributed to students, colleagues, and parents of students to obtain input related to the learning that has been carried out.

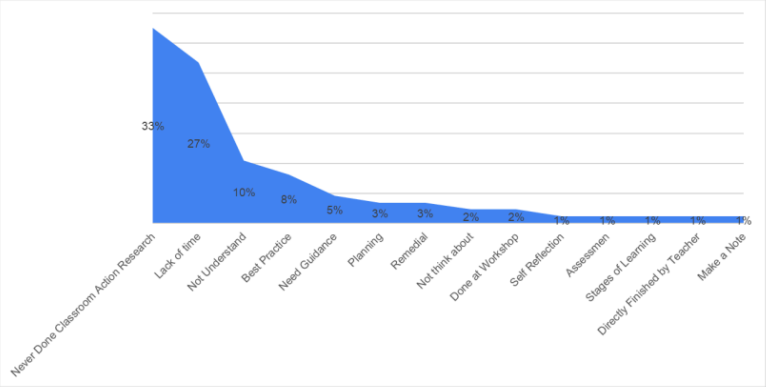
The analysis of evaluation activities on the learning process reveals that 99.3% of teachers have done it. The indicator regarding whether teachers make audio or video recordings of learning that can be used for self-evaluation and reflection by re-watching or re-listening to the learning process that has been carried out shows that 83.9% of teachers have done it. The remaining 16.1% stated they had not recorded audio or video. Furthermore, for the indicator of teachers making learning reflection notes, 89.5% have done it, and 10.5% have not done it. In general, teachers in elementary schools that were the samples in this study have conducted self-evaluation and self-reflection on the implemented learning process, with an average of 86.7% of teachers. Dissemination activities are needed as a follow-up to teacher self-evaluation and reflection results. The data that was successfully processed showed that 81.8% of teachers disseminated the results of evaluation and self-reflection to colleagues through discussions, seminars, or workshops.

The findings regarding classroom action research (CAR) were that 62.2% of teachers had not conducted it and 37.8% stated that they had conducted it. Likewise, regarding the dissemination of the results of classroom action research, 66.4% of teachers did not conduct it and 33.6% stated that they had conducted it. The 33.6% who conducted dissemination were assumed to come from 37.8% of teachers who had conducted CAR. Compared to all teachers, the percentage of those who had conducted dissemination was very small, or around 12.7% of the total. This data also confirms that teacher performance on this variable needs more attention.

Action research can improve teachers' understanding of students' needs and teaching practices (Connor et al., 2006) and help improve the quality of learning (Morales et al., 2016). In addition to improving teaching competence, action research also has a positive effect on the professional development of teachers in the future (H. Zhang et al., 2022). Teaching and learning activities whose implementation is based on the results of action research will significantly improve student learning outcomes (Meesuk et al., 2020), because by increasing the quality of teaching, students' academic performance will improve (Huang, 2024). The following is a diagram of variations in teacher responses to classroom action research, classified into several categories.

Figure 1

Reasons for Not Conducting Classroom Action Research



Based on the data that can be collected, the reason teachers do not conduct classroom action research is 33% only stating that they do not do it. It is still ambiguous, but referring to interview data and document studies, this reason points to the competencies that according to (Lamanauskas et al., 2020) teachers do not yet have in conducting classroom action research.

> *"I've never felt fully equipped to conduct research on my own. We don't receive enough guidance in training, and I often feel unsure about where to start with action research."* (Respondent 4)

Another reason stated 27% due to time constraints, and 10% said they did not understand classroom action research. For time constraints, further study is needed whether it is due to the density of administrative tasks as teachers, teaching, or other reasons.

> *"Because I still feel like I don't understand it well, I'm still learning how to do it and need guidance in conducting classroom action research, especially with the curriculum*

> *changes. Furthermore, I'm faced with the dense material to complete and the relatively short time available to prepare for school exams."* (Respondent 9)

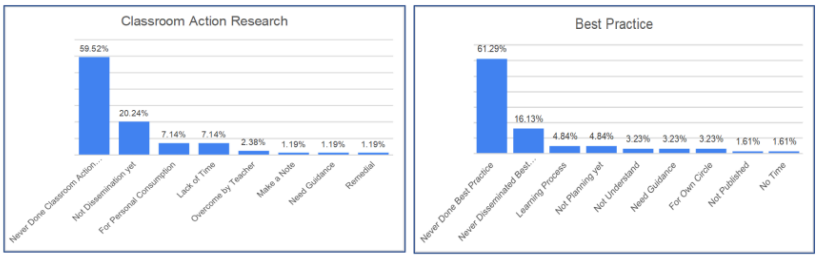
In-depth data and information on the application of knowledge and competencies are explored through classroom action research dissemination activities and best practices carried out by teachers.

Some teachers do not disseminate the results of classroom action research because they have never conducted research, which amounted to 59.52%, almost the same as the best practice, which is 61.29% has not been disseminated because they have never conducted best practice. As many as 20.24% of teachers only said they had not disseminated and the reason for not disseminating best practice was 16.13%. This data can mean that they have conducted classroom action research and best practices but have not been disseminated or there is a possibility that they have not conducted research so that nothing can be published. Another reason teachers do not disseminate action research results is that for personal consumption, the number is 7.14%, and for those who stated time constraints, it is 7.14%. Meanwhile, the reasons are that the problems that occur are resolved directly by the teacher 2.38%, making notes, remedial, and needing guidance are each 1.19% so that research does not need to be conducted. Teachers have not disseminated best practices because they are in the learning process and there is no plan; the number of each indicator is 4.84%. For the indicators of not understanding, needing guidance, and only for their circle, the number for each is 3.23%. Each 1.61% of the indicators do not publish or have time.

The activity of sharing good practices indicates that it has not gone according to expectations. Based on the existing data, 53.1% have implemented it, while 46.9% have not. Dissemination of classroom action research results and good practices is not always in the form of written publications. Still, it can be done through seminars, discussions, conferences, presentations or other forms that essentially share information about learning success with the general public to become role models. It is hoped that teachers participating in the activity will be motivated to improve their professionalism, and student learning outcomes can be improved, thereby contributing to improving school quality ((NCB), 2017). The following describes the reasons for not disseminating classroom action research results and best practices.

Figure 2

Reasons of Not Disseminating Classroom Action Research & Best Practices



In fact, research activities are a fundamental aspect of scientific culture (Prastowo, 2013) that educators are expected to carry out. However, the findings indicate that engagement in research and dissemination of results remains low and has not yet become a routine practice for elementary school teachers, especially in the educational units sampled in this study. The ability to conduct research is closely linked to the teaching and learning process (Bamroongkit, 2021), fostering collaboration among students and encouraging critical thinking. Research in any field requires creativity, and the process of generating and managing ideas is inherently tied to research activities (Martin, 2009). Despite this, most teachers reported that they simply did not conduct research, largely due to minimal institutional support, such as the lack of staff assistance, limited time allocation, and insufficient funding, as noted by (McGill & Settle, 2012).

Interestingly, while engagement in research is low, teachers show very high involvement in ICT use and pedagogical practices. This discrepancy may reflect that professional development activities, such as access to reading materials and classroom resources, are more readily provided and integrated into daily teaching routines. For example, all respondents confirmed that their schools supplied reading materials relevant to their subjects, and 97.2% actively used these references in teaching. These indicators scored very highly, even reaching the maximum, suggesting that teachers are more inclined to engage in activities that have immediate classroom applications and observable outcomes. In contrast, research and writing require long-term commitment, independent initiative, and institutional incentives that appear less accessible or emphasized in the sampled schools.

> "It's easier to use ICT in the classroom because the tools are available. But writing papers or conducting research? That feels like something far removed from our day-to-day responsibilities." (Respondent 2)

This contrast highlights a critical issue in teacher professional development: while pedagogical and ICT competencies are being cultivated effectively, fostering a sustainable culture of research and scholarly writing requires targeted support, structural facilitation, and recognition from educational institutions.

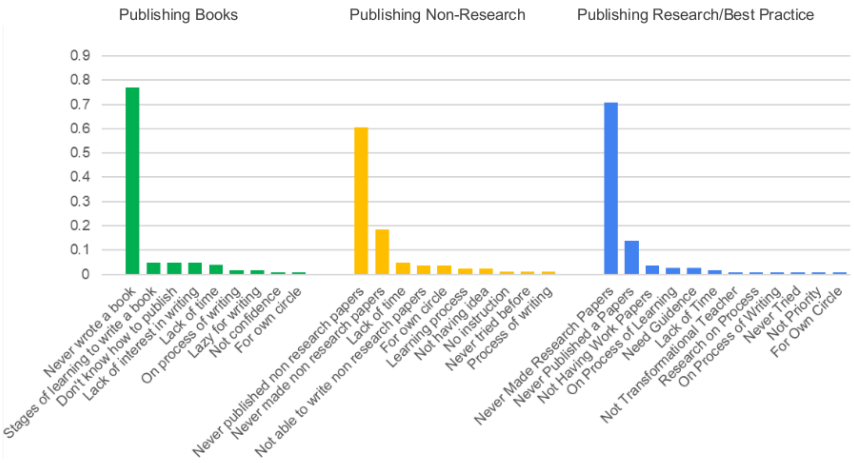
Educators also discussed subject matter or learning methods with colleagues, which reached 96.5%. The indicator discussing teacher deliberation activities showed that 89.5% had implemented it and 10.5% had not. Most teacher deliberation activities were carried out at the sub-district and city levels. Educators carried out self-development through online independent learning activities, with a percentage of 77.6% carried out using platforms provided by the Ministry of Education. While the other 22.4% were carried out offline. Self-development activities were also carried out through Education & training, seminars, or workshops and had been carried out by 95.1% of teachers online and offline.

The following interesting findings are about the publication activities of books produced by teachers, showing that 87.4% have not done it and 12.6% have done it. Furthermore, they have not published a book because they have never written a book, and the number reaches 77%. Other reasons such as still being in the learning stage, not knowing how to publish, and not being interested in writing a book, are on average 5%, and those who stated that there was no time were identified 4%.

> "the reason why I don't write a book is because I don't like writing and don't understand the steps to making a book, and until now there has been no training for writing books facilitated by the school." (Respondent 12)
>
> Another teacher said "Limited time: Teacher often have busy schedules with teaching duties, lesson preparation, grading, and other responsibilities. As a result, they have little extra time to devote to writing books." (Respondent 3)

Figure 3

Reasons for not Publishing Books, Non-Research Papers, and Research or Best Practice



In addition to book publications, this study also collected data on the publication activities of papers, which, based on the results of the analysis, shows that 90.2% of teachers had never published a paper. Among the reasons that emerged were 60% stating that they had never published a paper. This statement is somewhat unclear and does not indicate what is actually behind teachers not publishing papers. Still, from other reasons that can be identified it indicates that teachers need guidance in writing papers. For example, 19% of teachers have never written a paper, 5% do not have time, and 4% cannot write a paper, so it can be interpreted that they do not yet have the intended competence. There are also 4% who stated that writing activities are only for their own interests. Other reasons are still in the learning stage at 2%, do not have an idea to write 2%, and 1% each for the indicator of no instructions from superiors, have never tried, and are in the process of writing.

> "I know writing is important, but I don't know where to start. There's no specific training on writing academic papers at our school." Another teacher mentioned, "I'm already busy with teaching, so writing papers feels very distant from my daily responsibilities." (Respondent 7)

The paper referred to in this study is a scientific paper but not the result of research, including; editorials, letters to the editor, book reviews/movie reviews, case reports/case series, commentaries, and narrative reviews (Rezaeian, 2014) including opinion papers, review papers (George & Moreira, 2009). The high number of teachers who have never published non-research papers is a paradox that must be solved immediately because the variable of institutional support in providing reading sources reaches 100% and 97.2% of teachers actively read relevant references. Considering the reasons for not having published because they have never made non-research papers, are unable to write papers, are still learning, have no ideas, and have never tried, leads to the need to improve paper writing competency.

> "I read a lot, but when it comes to writing, I just don't know where to begin. We're not given much direction on how to start writing papers." Another teacher added, "I don't feel like I have the time or the skills to write something that others will read. I would definitely need guidance on how to write papers that would be published." (Respondent 5)

Writing skills are not innate talents but skills that must be developed and trained (Grogan, 2021) through extensive reading activities and developing drafts of writing are important first steps in writing. This means that intervention is needed to develop writing skills (Dorji, 2020) and training can be an alternative.

Furthermore, data on publications of research results or best practices that have been carried out by teachers. Regarding the publication of research results or best practices, 79% of teachers stated that they had never published scientific papers. Among the reasons that can be identified are 71% because they have not conducted research or best practices. Meanwhile, 14% stated that they had never published, this is likely because they had never done research or best

practice so nothing was published. 3% each for the reason of not having work, still in the learning process, and needing guidance, while 2% stated time constraints.

Meanwhile, related to teacher activities in writing learning modules, data shows that 49.7% of teachers do not or have not written learning modules. Around 50.3% of elementary school teachers in Jakarta have written learning modules. This data is still far from expectations because every educator must create learning modules according to the subjects they teach. Teacher self-development in the form of innovative work relevant to the subjects taught is reflected in 38.5% who have not developed innovative work and 61.5% who stated that they have created innovative work.

Discussion

The proportion of teachers who have not disseminated their work corresponds directly with the number who do not engage in Classroom Action Research (CAR), despite CAR being a critical competency for enhancing teacher professionalism (Lamanauskas et al., 2020). The underdeveloped research culture among teachers can largely be attributed to their insufficient conceptual and procedural understanding of CAR. A substantial number of teachers remain unaware of how to systematically design, implement, and report CAR, thereby necessitating sustained and intensive academic support.

Institutional reinforcement is therefore indispensable. Educational units, particularly through the strategic role of school leadership (Feuer et al., 2002), must cultivate an enabling environment for research-based professional practice. Likewise, the Department of Education plays a pivotal role in formulating regulatory frameworks that facilitate teachers' capacity building in conducting CAR. This institutional responsibility echoes Hester du Plessis's assertion (Marec & Schiele, 2018) that the development of a scientific culture requires active participation from individuals, communities, governments, and institutions to ensure the production and utilization of scientific knowledge for collective benefit.

Strengthening teachers' engagement in CAR ultimately enhances the competitiveness of their pedagogical competence. Their practice becomes grounded not merely in theoretical propositions but in empirical evidence that accurately reflects students' learning needs in authentic classroom settings, evidence obtainable exclusively through systematic CAR. The common claim that teachers' heavy workloads hinder their ability to conduct CAR warrants serious consideration, as it indicates the persistence of excessive administrative demands that significantly curtail the time available for research activities.

A similarly weak pattern appears in the domain of publication, which remains a major indicator of scientific culture. Teachers' involvement in producing scholarly works, books, research papers, practice-based articles, or instructional modules remains minimal, and written knowledge sharing with professional peers has not yet become a normative practice. Limited knowledge of publication processes is among the primary reasons for this low engagement. Importantly, such challenges are inseparable from teachers' underdeveloped writing

proficiency, which, as (Grogan, 2021) notes, does not constitute an innate capacity but must be cultivated through deliberate practice. Extensive reading and iterative drafting represent foundational stages in strengthening writing competence. These conditions suggest a pressing need for carefully designed interventions to enhance teachers' academic writing abilities (Dorji, 2020), with professional development programs serving as viable forms of support. When viewed alongside indicators related to school support, specifically the provision of reading materials relevant to instructional content, it is evident that an ideal professional culture would encourage teachers to write actively and consistently until they are able to produce meaningful scholarly contributions.

The findings indicate that the publication of books, papers, and other scientific outputs remains weak and has not yet developed into a consistent culture among educators, despite widespread access to reading materials and active participation in professional discussions. This discrepancy suggests that structural barriers, rather than individual motivation or access to resources, play a significant role. Specifically, limited time due to teaching loads, insufficient institutional support for research activities, gaps in research competence, and unclear policy incentives appear to hinder the transformation of reading habits into tangible scholarly outputs.

Comparing these findings with studies from other national and international contexts, similar patterns emerge. In Malaysia and China, for instance, teacher research productivity is heavily dependent on structured institutional support, access to funding, and formal mentorship programs (Ng et al., 2019);(Hoffmann et al., 2023). In European contexts, systemic frameworks that provide reduced administrative burdens and incentivize publication have been shown to enhance scientific culture among educators (Hadjinicola & Soteriou, 2006). The Jakarta context aligns partially with these patterns: teachers demonstrate strong engagement with reading and peer discussions, but this does not translate into research outputs, highlighting a gap between individual initiative and structural facilitation.

These observations imply that fostering a robust scientific culture among teachers requires systemic reforms. Professional mentoring and targeted research training can strengthen competencies, while the reduction of administrative workload would free time for sustained inquiry and writing. Institutional incentives—such as recognition, funding for classroom action research, and support for publication—are crucial to convert the positive reading and discussion habits into measurable scholarly productivity. By addressing these structural barriers, educational institutions in Jakarta could better align teacher scientific culture with international best practices, ultimately promoting a more consistent and productive research environment.

Conclusion

The analysis indicates that teachers demonstrate a generally strong scientific culture, which plays a crucial role in improving learning quality and, consequently, the overall quality of education. Across the four dimensions assessed, teachers showed high performance in active, creative, and innovative learning planning, utilizing the surrounding environment and ICT,

with indicator scores ranging from 91.6% to 97.9%. In competency development and performance improvement, scores varied more widely, from 33.6% to 99.3%, with learning observation and evaluation activities showing lower implementation. Continuous professional development exhibited a broad range as well, from 9.8% to 100%, with the highest score reflecting institutional support in providing relevant reading materials for teaching duties. The development of strategies, models, methods, and learning media ranged from 89.5% for project-based learning implementation to 100% for teacher feedback and responses to student assignments. Despite these strengths, eight indicators, including classroom action research and its dissemination, publication of books, papers, best practices, writing modules, and creating innovative works, showed weak performance. Overall, teachers demonstrate strong pedagogical innovation but limited engagement in research and dissemination activities.

Implications

These findings suggest the need for targeted capacity-building programs to strengthen teachers' skills in classroom action research and academic writing. Given that research and dissemination are currently weak, such programs could provide the guidance and training necessary for teachers to engage in scholarly activities more effectively. Additionally, collaboration among educators and consistent institutional support are essential for sustaining a robust scientific culture. Schools and educational institutions should facilitate mentoring, provide resources, and incentivize research activities to foster a more research-driven environment. Finally, future research should explore comparative studies across provinces or conduct longitudinal tracking to better understand the evolution of teachers' scientific culture over time. These studies could offer valuable insights into the systemic changes needed to enhance teachers' engagement in research, helping to inform policy and practice for fostering research engagement within educational settings.

References

(NCB), N. C. B. (2017). *Dissemination of Best Practice in Teaching and Learning Department of Education Dissemination of Best Practice in Teaching and Learning Research* (Issue 61).

Ambrosio, U. D., Sebastian, J., Macioti, M., Goonatilake, S., Shi-ran, D. &, Qi, H., & Andre, M. (n.d.). Science and the meeting of two worlds Impact. In *Impact of Science on Society* (Issue 167).

Bamroongkit, S. (2021). Factors Influencing Research Skills. *Social Science Asia*, *7*(2), 37–41. https://socialscienceasia.nrct.go.th/index.php/SSAsia/article/view/238%0Ahttps://socialscienceasia.nrct.go.th/index.php/SSAsia/article/download/238/191

Carty, A., Bly, A., Burke, K. A., Einsiedel, E. F., Franz-Odendaal, T. A., Ingram, J., Katz, S., & LePage, M. (2014). *Science Culture: Where Canada Stands/The Expert Panel on the State of Canada's Science Culture* (Issue January).

Connor, K. A. O., Greene, H. C., & Anderson, P. J. (2006). *Action Research: A Tool for Improving Teacher Quality and Classroom Practice.*

Costa, S. L. R., & Broietti, F. C. D. (2021). Scientific Practices in Science Education Publications: An Analysis of Research Contexts. *Science Education International*, *32*(4), 282–291. https://doi.org/10.33828/sei.v32.i4.1

Dewey, J., Roehrig, G., & Schuchardt, A. (2021). Development of a framework for the culture of scientific research. *CBE Life Sciences Education*, *20*(4), 1–17. https://doi.org/10.1187/cbe.21-02-0029

Dorji, J. (2020). through Mini Revision Lessons and Feedback. *Journal of English Teaching*, *7*(1), 56–66.

Dragoş, V., & Mih, V. (2015). Scientific Literacy in School. *Procedia - Social and Behavioral Sciences*, *209*(July), 167–172. https://doi.org/10.1016/j.sbspro.2015.11.273

Feuer, M. J., Towne, L., & Shavelson, R. J. (2002). Scientific Culture and Educational Research. *Educational Researcher*, *31*(8), 4–14. https://doi.org/10.3102/0013189X031008004

George, S., & Moreira, K. (2009). Publishing non-research papers as a trainee: A recipe for beginners. *Singapore Medical Journal*, *50*(8), 756–758.

Godin, B., & Gingras, Y. (2000). What is scientific and technological culture and how is it measured? A multidimensional model. *Public Understanding of Science*, *9*(1), 43–58. https://doi.org/10.1088/0963-6625/9/1/303

Grogan, K. E. (2021). Writing Science: What Makes Scientific Writing Hard and How to Make It Easier. *The Bulletin of the Ecological Society of America*, *102*(1), 1–8. https://doi.org/10.1002/bes2.1800

Halim, L., Meerah, T. S. M., Osman, K., Buang, N. A., Othman, R., Samsudin, M. A., & Sugimura, M. (2009). The level of scientific culture among Malaysian and Japanese students. *Procedia - Social and Behavioral Sciences*, *1*(1), 2809–2813. https://doi.org/10.1016/j.sbspro.2009.01.499

Hoffmann, K., Berg, S. A., Brancolini, K. R., & Kennedy, M. R. (2023). Complex and Varied: Factors Related to the Research Productivity of Academic Librarians in the United States. *College and Research Libraries*, *84*(3), 392–427. https://doi.org/10.5860/crl.84.3.392

Huang, J. (2024). *The Impact of Teaching Quality on Student Academic Performance : Student Engagement as a Mediator*. *01009*.

Ilhan, N. (2021). The Effect of Research Evidence-Based Teaching Practices in Science Classrooms on Student Teachers' Attitudes towards Educational Research. *Journal of Science Learning*, *4*(4), 316–326. https://doi.org/10.17509/jsl.v4i4.32025

Lamanauskas, V., Augienė, D., & Makarskaitė-Petkevičienė, R. (2020). Primary school teachers' educational research: Educational practice and professional development context. *International Journal of Cognitive Research in Science, Engineering and Education*, *8*(3), 1–18. https://doi.org/10.23947/2334-8496-2020-8-3-1-18

Marec, J. Le, & Schiele, B. (2018). *Culture of Science* (J. Lebel (ed.)). ACFAS.

Matosin, N., Frank, E., Engel, M., Lum, J. S., & Newell, K. A. (2014). Negativity towards negative results: A discussion of the disconnect between scientific worth and scientific culture. *DMM Disease Models and Mechanisms*, *7*(2), 171–173. https://doi.org/10.1242/dmm.015123

McGill, M. M., & Settle, A. (2012). Identifying effects of institutional resources and support on computing faculty research productivity, tenure, and promotion. *International Journal of Doctoral Studies*, *7*, 167–198. https://doi.org/10.28945/1581

Meesuk, P., Sramoon, B., & Wongrugsa, A. (2020). Classroom Action Research-based Instruction: The Sustainable Teacher Professional Development Strategy. *Journal of Teacher Education for Sustainability*, *22*(1), 98–110. https://doi.org/10.2478/jtes-2020-0008

Morales, M. P. E., Abulon, E. L. R., Roxas-Soriano, P., David, A. P., Hermosisima, M. V. C., & Gerundio, M. G. (2016). Examining teachers' conception of and needs on action research. *Issues in Educational Research*, *26*(3), 464–489.

Ng, Q. R., Renandya, W. A., & Chong, M. Y. C. (2019). Extensive reading: Theory, research and implementation. *Teflin Journal*, *30*(2), 171–186. https://doi.org/10.15639/teflinjournal.v30i2/171-186

Rezaeian, M. (2014). The Necessity and Importance of Writing and Publishing Non - Research Papers. *World Family Medicine Journal/Middle East Journal of Family Medicine*, *12*(6), 43–44. https://doi.org/10.5742/mewfm.2014.92537

Salesman, F., & Tapung, M. M. (2022). The Quality Of Human Resources And The Scientific Culture Issue Post-Pandemic Covid-19 (A Case Study In Indonesia). *Journal of Positive School Psychology* , *2022*(6), 8894–8900. https://www.journalppw.com/index.php/jpsp/article/view/9202

Shang, Z. (2019). On the Distinctive Features of the Modern Scientific Culture. *Cultures of Science*, *2*(3), 193–202. https://doi.org/10.1177/209660831900200303

Wang, C. (2018). Scientific Culture and the Construction of a World Leader in Science and Technology. *Cultures of Science*, *1*(1), 1–13. https://doi.org/10.1177/209660831800100102

Zhang, H., Han, C., Ma, H., & Wang, L. (2022). The quality enhancement of action research on primary school English instruction in Chinese rural areas: An analysis based on multimodality. *Frontiers in Psychology*, *13*(September), 1–13. https://doi.org/10.3389/fpsyg.2022.1013021

Zhang, Yang, & Liu, X. (2022). Let scientific culture become the basic feature of social culture. *Cultures of Science*, *5*(3), 146–148. https://doi.org/10.1177/20966083221117842

Zhang, Yiming, & Zhang, Z. (2018). 'Kexue Wenhua' in Chinese and 'Scientific Culture', 'Science Culture', 'Culture of Science' and 'Science as Culture' in English: The Meanings and the Structure. *Cultures of Science*, *1*(1), 25–37. https://doi.org/10.1177/209660831800100104

Corresponding author: Musringudin
Email: musringudin@uhamka.ac.id

Musringudin - Exploring the Scientific Culture of Elementary School Teachers in Jakarta

ORIGINALITY REPORT

12%	10%	9%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	iafor.org Internet Source	4%
2	Submitted to Hellenic Open University Student Paper	3%
3	repository.uhamka.ac.id Internet Source	1%
4	"Handbook of Teachers' Voices in the Global South", Springer Science and Business Media LLC, 2026 Publication	1%
5	pdf.eu-jer.com Internet Source	<1%
6	Oladunni, Daniyan Olatope. "Professional Preparation of Primary School Teachers for Inclusive Education in Nigeria", University of South Africa (South Africa) Publication	<1%
7	Ade Gafar Abdullah, Ida Hamidah, Siti Aisyah, Ari Arifin Danuwijaya, Galuh Yuliani, Heli S.H. Munawaroh. "Ideas for 21st Century Education", CRC Press, 2017 Publication	<1%
8	jurnal.uinsu.ac.id Internet Source	<1%
9	mejfm.com Internet Source	<1%

10	Nur Arifah Drajati, Kristian Adi Putra. "Teacher Education and Teacher Professional Development in the COVID-19 Turn", Routledge, 2022 Publication	<1 %
11	nationalblueribbonschools.ed.gov Internet Source	<1 %
12	www.atlantis-press.com Internet Source	<1 %
13	pmc.ncbi.nlm.nih.gov Internet Source	<1 %
14	thetalkingcupboard.com Internet Source	<1 %
15	scholar.lib.vt.edu Internet Source	<1 %
16	Budi Susetyo, Anita Lie. "Quality Indicators of Vocational Schools: Partial Least Squares-SEM for Small Sample", MethodsX, 2025 Publication	<1 %
17	Wickwire, Gina. "Exploring Elementary Teachers' Understanding and Implementation of Social and Emotional Learning: A Descriptive Study.", Grand Canyon University Publication	<1 %
18	livrepository.liverpool.ac.uk Internet Source	<1 %
19	Chorphaka Kromkhan, Nattapon Intarata, Kanyarat Cojorn, Prasart Nuangchalerm, Chanat Intakanok. "Exploring the Professional Competence of Pre-Service Teachers: A Case Study", Anatolian Journal of Education, 2026 Publication	<1 %

20	Karim Sadeghi. "Routledge Handbook of Technological Advances in Researching Language Learning", Routledge, 2024 Publication	<1 %
21	auojs.au.edu Internet Source	<1 %
22	ebin.pub Internet Source	<1 %
23	edukatif.org Internet Source	<1 %
24	prosiding.ikippgribojonegoro.ac.id Internet Source	<1 %
25	thewholeportion.com Internet Source	<1 %
26	www.jetir.org Internet Source	<1 %
27	www.scienceadvice.ca Internet Source	<1 %
28	Schansinger, Dean M.. "Differentiation of Self as a Predictor of Workplace Conflict Resolution Style and Perceived Conflict Resolution Effectiveness.", Alliant International University Publication	<1 %
29	Huerta, Maria C.. "Let Us Talk: Collaboration in Tier 2 of the Multi-Tiered Systems of Support.", California State University, Los Angeles Publication	<1 %

Exclude quotes	Off	Exclude matches	Off

Exclude bibliography On

Musringudin - Exploring the Scientific Culture of Elementary School Teachers in Jakarta

GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20