Proceedings of International Conference on Islamic Education and Science Development (ICONSIDE)
Fakultas Tarbiyah dan Keguruan, Universitas Islam Negeri Mataram, Indonesia
Mataram, 27 May 2023 *Available online at https://proceeding.uinmataram.ac.id/*

Professional Development of Indonesian Teachers: A Participatory Action Research (PAR) Study Investigating Teachers' Enhancement of Learning Practices, Implementation of Classroom Action Research (CAR), and Engagement in Scientific Publication

Cecep Maman Hermawan[1*], M. Syarif Sumantri, Arita Marini
Universitas Negeri Jakarta, Jl. Rawa Mangun Muka Raya No. 11, Jakarta Timur, Jakarta, Indonesia
cecepmamanhermawan_9919917008@mhs.unj.ac.id

ABSTRACT

Improving instructional practices is a crucial first step in teacher professional development. Participatory Action Research is a practical approach to teacher development. Classroom Action Research allows teachers to become researchers in their classrooms, improving the quality of education and enhancing their ability to analyze data and improve student learning outcomes. This study was conducted in two private secondary schools in Banten Province, Indonesia. Two teachers and their students were involved in the study. The first participant was a third-grade teacher who implemented improvements in her instructional practices through CAR using a cooperative learning model in mathematics. The second teacher used a direct instruction learning model in science. Each class had an observer who supervised the learning process. This study used observations, interviews, tests, and documents. The following conclusions were obtained: 1) The cooperative learning model increases student engagement and interaction, while direct instruction allows structured and focused teaching, which is very effective in conveying complex concepts; 2) the success of the learning model also depends heavily on adequate infrastructure support and effective classroom management. The limitations of learning media and unfriendly environmental conditions have hindered the learning process. 3) CAR allows teachers to find and address problems in their teaching practices systematically. In addition, participation in scientific publications improves teachers' competence as researchers and educational innovators, as well as disseminating research findings and practices; 4) Teachers face several problems in scientific writing and publication, including limitations in scientific writing, access to scientific journals, and increased training in scientific writing.

KEYWORDS: Classroom action research, enhancement of learning practices, participatory action research, scientific publication participation, teacher professional development.

INTRODUCTION

The teacher's professional development has undergone comprehensive scrutiny. Professional development for teachers is crucial for enhancing the quality of education. Suryani (2019) identified various educational challenges in Indonesia, such as regional disparities in educational

standards, resource scarcity, and the imperative to keep pace with technological advancements. Teachers must persistently enhance their abilities and expertise. Participatory Action Research (PAR) is a valuable approach to facilitating teachers' professional development. It enables them to actively engage in learning and research as participants and recipients of knowledge (Kemmis & McTaggart, 2007). PAR implementation will empower teachers to identify challenges, devise practical approaches, and assess their instructional methodologies, increasing their comprehension and insight into their actions. One practical application of PAR is Classroom Action Research (CAR), which enables teachers to implement and evaluate firsthand modifications in their teaching methods (Arikunto, 2010). Moreover, scholarly articles authored by teachers enhance their professional growth and the educational community by sharing knowledge and exemplary methods (Dewi & Supriyanto, 2018).

Enhancing learning methods is an essential first step in professional development for teachers. This study demonstrates that teachers in Indonesia are actively pursuing methods to incorporate novel and empirically supported approaches into their instructional practices. Moreover, teachers who actively participate in training programs or professional learning communities frequently demonstrate substantial enhancements in their teaching efficacy (Santos, 2019). However, issues such as insufficient assistance and time limitations persist. Enhancing learning processes necessitates sustained dedication and comprehensive backing from the government and educational institutions (Hadi, 2021).

For instance, Taiwan's design-based professional development program for novice mathematics teachers and teacher-researchers has gradually moved the focus of learning away from the material and toward the learner, where the teacher now assumes the role of a student. Altering the conventional content-focused learning model poses a significant difficulty. In their role as teacher-researchers, Novice teachers have the potential to influence the professional culture of future teachers. Teachers can demonstrate adaptability in the classroom by using diverse learning styles (Chen et al., 2017). However, Corte et al. (2012) conducted a study in the Netherlands that contradicts these findings. The study revealed that the professional development of teachers as researchers, with a specific focus on the learning process and learning outcomes, did not lead to any improvement in student learning or learning outcomes.

The relationship among teacher-researchers, principals, and students is highly robust and nurturing. Nonetheless, it may be imperative to adopt a student-centric approach to enhance the learning process and optimize student learning outcomes.

Ellis and Armstrong (2013) studied teachers' experiences as practitioner-researchers in New South Wales and Singapore. The study found that cultural characteristics, such as Kiasuism, minimizing testing in Singapore, and the norm of increasing teacher research grants and disseminating findings in New South Wales, played a significant role in driving practitioner-researcher growth. In Singaporean schools, cultural phenomena influence how teachers conduct their research roles. Kiasu, which refers to the fear of losing and the relentless pursuit of victory, enhances cultural and contextual sensitivity by promoting a more nuanced comprehension of the Singaporean environment. Moreover, research from various countries shows that practices that

foster teachers' professional growth shape school culture. The school management and the overall learning environment demonstrate this. It also involves fostering strong relationships among teachers, promoting reflection, and fostering collaborative partnerships. These collaborations encourage teachers to question and explore their teaching's theoretical and practical foundations. Furthermore, teachers who act as exemplars for their colleagues and actively participate in professional development gain a deeper understanding of instruction and cultivate confidence by observing concrete transformations in their students. It is important to note that teacher professional development is a dynamic process (Wibowo, 2022; Bilican et al., 2021; Sato, 2022).

However, English Language Teachers (ELT) believe incorporating action research (AR) benefits their professional growth. Due to their active participation in the investigation, their perspective on research and their responsibilities as teachers and researchers transform. When they participate in research activities, their interest in action research grows. Their level of consciousness heightens when they conduct a study of their classes and surroundings. Teachers' perceptions suggest they feel at ease when conducting action research. In-service action research is a cost-effective, impactful, and streamlined approach to professional development. To enhance their research, teachers read and thoroughly examine the material. Specific motivating factors are required to urge teachers who are already satisfied with their present circumstances to voice their opinions. Research encourages teachers to read scholarly literature, stay up-to-date, write, and make intellectual contributions by sharing knowledge backed by their experience and expertise (Hassen, 2016).

Implementing prepared action plans based on reflective analysis of student assessments can facilitate teacher professional development. It is believed that teachers need help in their professional growth, and current professional development initiatives conduct themselves haphazardly, merely transmitting material without considering the teachers' needs. Based on student observations, we should provide teachers with professional development opportunities tailored to their specific requirements. These observations can help identify areas for improvement, guide the planning of development activities to address teaching practices, and resolve any issues teachers may be facing in the classroom (Bozkus & Coskun, 2019). Maaranen et al. (2023) found that the professional growth of teachers is an independent and personal issue. These teachers with PhD qualifications also conduct research as part of their regular duties. Nevertheless, they possess a highly encouraging disposition towards professional growth, viewing it as necessitating organization or methodization, and are also prepared to allocate resources towards it.

The lesson study technique is commonly employed in Sweden to direct teacher professional development. According to Hrastinski (2021), this model is based on the premise that teachers should carefully design and monitor school educational activities. Studies suggest that digital tools provide new and unique opportunities for implementing lesson studies. The following six themes were identified for utilizing digital tools to enhance teacher professional development in lesson studies: analyzing classroom videos, examining external video resources, incorporating fictional animation with videos, coordinating digital lesson study activities, and promoting hybrid and digital teacher collaboration.

Educational researchers in various countries have extensively researched teacher professional development, from teachers improving their learning practices to teachers conducting action research. However, in the Indonesian context, studies on integrating teacher professional development, from improving their learning practices, conducting action research, and conducting scientific publications, are relatively limited in evidence-based literature. Only some studies examine the role of teachers' scientific publications as part of their professional development process. Therefore, this study aims to explore Indonesian teachers' professional development, starting with how teachers improve their learning practices through action research and continuing with collaborative publications in journals. The findings of this study will help provide the best recommendations to teachers and principals, as well as other stakeholders, on how teachers can play an active role as researchers and contributors of knowledge, not just as recipients of information, helping in the formation of their professional identity and career empowerment. By exploring the role of teachers' scientific publications, this study enhances the understanding of how knowledge is distributed and used in the educational community to facilitate the spread of best practices.

METHOD

Research Design

This study used a participatory action research (PAR) design to modify Stringer's (2007) action research model. Participatory action researchers aim to achieve extensive and inclusive participation in research by actively engaging with others as equal partners and involving participants as equal partners to safeguard their welfare. The action research model, known as the interactive spiral, effectively represents the action research process through its three components: observing, thinking, and acting. We gathered the data through observation, interviews, document examinations, and assessments of student learning outcomes. To ensure the research's credibility, we validated the data via triangulation, a rigorous process that involves cross-verifying data from multiple sources or methods.

Stringer's (2007) action research model adopted in this study starts from *the first. Seeing*. By collecting information, recording or noting it, expanding experiences, organizing information, and communicating, they build a picture to assist stakeholder groups, namely principals and teachers. The researcher invites participating teachers to see the problems in their respective classes and then build a picture of the classroom situation. The researcher directs participating teachers to build a picture of their classroom situation by recording, noting, organizing the information obtained, and then communicating it.

Second. Thinking. The process of interpretation and analysis aims to refine the gathered data, pinpoint aspects of teacher and student encounters, and empower participants to comprehend the impact of these issues on their lives and activities using a framework. It also entails scrutinizing critical experiences, enhancing the analysis with a framework, collaborating to create reports, and executing presentations and performances. The researcher asked teachers to collect information by

implementing CAR in their classes. The study aims to determine how teachers' implementation of CAR affects their performance and students' learning experiences in the classroom.

Third. Act. Planning, implementing, reviewing, and evaluating are the steps in solving problems. Teachers implement CAR using the Kemmis and McTaggart model, which consists of planning, acting, observing, and reflecting. As a researcher, the teacher will repeat the action in the second or third cycle. Achieving learning objectives determines the number of cycles.

Research Participants

We conducted our research in two private elementary schools in Banten Province, Indonesia, involving two classroom teachers and their students. The first teacher, a third-grade teacher, implemented a cooperative learning model in her mathematics classroom, specifically on fractions. The second teacher used a direct instruction learning model to focus on science and celestial bodies. To ensure the objectivity and thoroughness of our study, an observer played a crucial role by closely monitoring the teaching practices in each classroom.

Data Gathering

This study used observation, interviews, tests, and documents. We used the observation sheet instrument to record the actual behavior of teachers and students during the learning process. We prepared interview protocols for teachers and gave them nine open-ended questions. As participants in this study, we administered tests to students involving two classes; 31 students from the mathematics classroom engaged with the mathematical problem tool, while 32 students from the science classroom tackled the scientific problems. We collected documents containing evidence of student test results and prepared them for analysis.

Data Analysis

First, it starts with organizing the data. Researchers organize the data into several folders or computer files. Researchers collect various types of information during their research, necessitating a robust organizational system. This data analysis pattern is based on four stages of research, starting with planning, implementation, observation, and reflection in each research cycle. We then organize the table and figure patterns from each research cycle based on the type of observation data, documents, photos, and other visual materials. Second, transcribe the data. Text, such as field notes from observations or participant or informant voices from interviews, collects data. Computers must convert written and voice data into written documents for analysis using offline and online software programs. Finally, analyze. Qualitative computer programs facilitate storing, analyzing, sorting, and representing or visualizing data. In this scenario, manual analysis employs manual coding, while computer analysis enables effective and efficient data analysis (Creswell, 2015, pp. 475–6).

RESULT AND DISCUSSION

Results

The results of this study provide evidence of teacher professional development through the implementation of various learning improvement practices. A collaborative research journal

publishes the systematic implementation of this process through classroom action research. Planning, implementing, observing, and reflecting are steps in a series of actions intended to improve learning.

Teachers Improve Learning Practices by Conducting CAR
First Teacher Improves Mathematics Learning Practices Using Cooperative Learning Model

The researcher helped the teachers create a picture of the problems in their classrooms and instructed them to record, take notes, organize, and deliver information each cycle.

(1) Cycle One. Most students in the third grade of the participating elementary schools showed problems in understanding and solving math problems about simple fractions. By making plans, implementing, observing the learning process in the classroom, and reflecting—including preparing teaching materials and assessment tools—the teachers improved their teaching practices. The teachers used the presentation and explanation teaching model in this cycle one action.

The data from cycle one showed that 14 students, or 43.75% of students, had achieved the learning objectives, and the remaining 18 students, or 56.25% of students, still needed to achieve them. Observer observations revealed that the learning process appeared less appealing to students; most students appeared unfocused during the learning process, while others were occupied with their activities or engaging in typical children's chats despite the teacher's systematic efforts to convey the material. Even the teacher repeatedly reminded students to focus. Therefore, the initial cycle reveals that less than half of the students failed to meet the learning objectives; this could be due to the teacher's adoption of a learning model that does not align with the student's needs and interests. Another factor to consider is the classroom arrangement, where the teacher has yet to perform optimally. For this reason, teachers need to improve teaching practices in the next cycle.

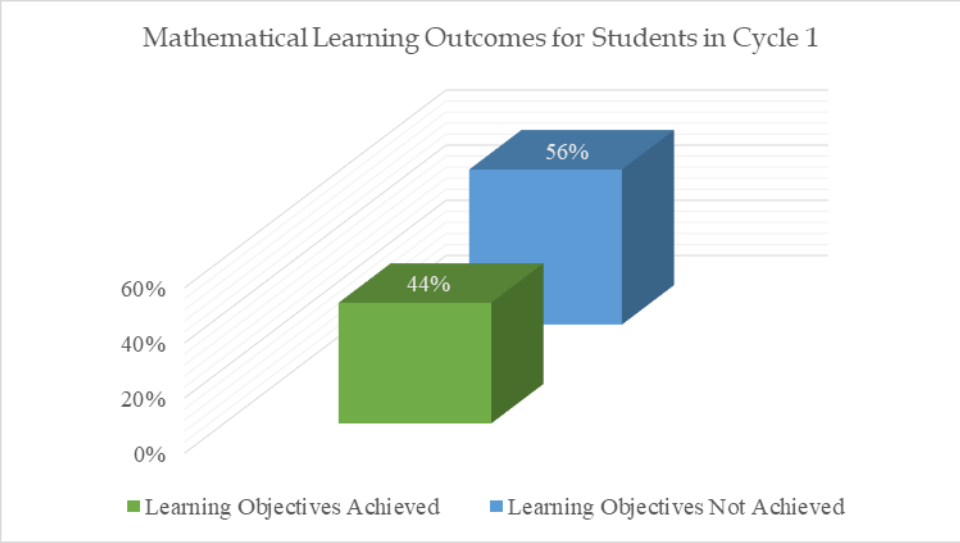

Figure 1. Mathematical Learning Outcomes of Students in Cycle 1

(2) Cycle Two. In the second cycle, the teacher tried to improve his teaching using a cooperative learning model. It uses the same stages of the Kemmis and McTaggart model, which include planning, action, observation, and reflection. There are six phases to this cooperative model. First, the teacher explains the need for students to learn fractions; second, the teacher presents information about fractions and provides examples of simple fractions; third, the teacher organizes students into several study groups, where they solve problems; fourth, the teacher accompanies the study group work; fifth, the teacher tests the fraction material; students are required to take the test; the teacher checks the student's work and provides responses and feedback; sixth, the teacher provides recognition and appreciation based on the results of the work and group discussions. Figure 1 above shows that students who have achieved learning objectives are lower than those who have yet to achieve learning objectives.

Meanwhile, based on data from cycle two, 24 students, or 75%, have achieved learning objectives. In comparison, the remaining eight students, or 25%, still need to achieve the observation results, which show that teachers have adopted a complete cooperative learning model based on its phase. However, the inability to train students to work in groups, the limited availability of media for group work, the need for teachers to guide students with learning difficulties, and the need to conclude have prevented the full potential of group work. Meanwhile, the strengths possessed by teachers during teaching include teachers using learning resources, learning methods appropriate, classroom arrangements looking good, teaching aids used appropriately, communication with students established, and indicators and materials made for learning planning from the applicable curriculum; teachers have also studied the material in advance so that teachers master the material being taught. We must take corrective actions in cycle three because eight students still needed to achieve their learning objectives.

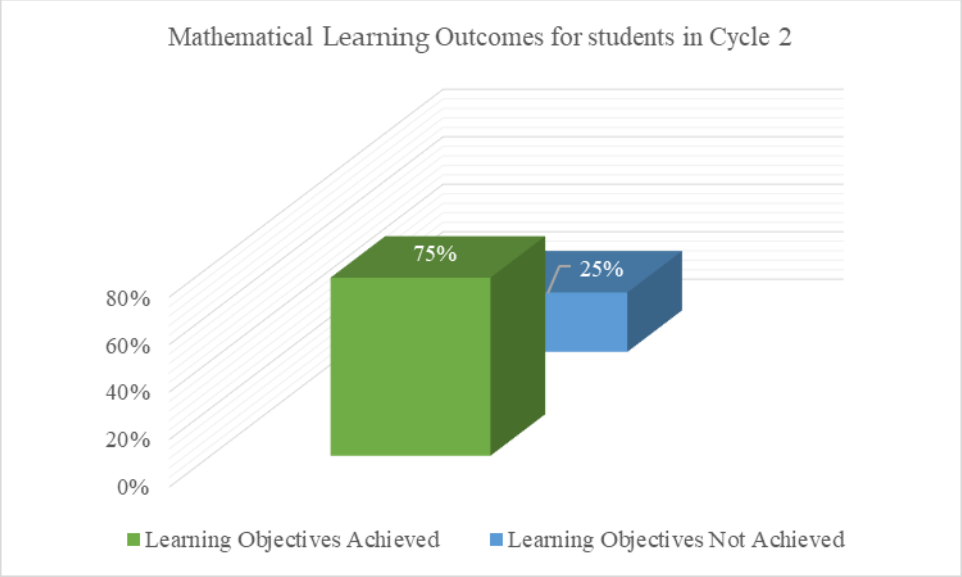

Figure 2. Mathematical Learning Outcomes of Students in Cycle 2

(3) Cycle Three. The cooperative learning model remains in use during this third cycle. The Kemmis and McTaggart models also follow the same four steps. The cooperative model in cycle

three consists of six phases. First, the teacher begins by explaining the significance of studying fractions, emphasizing that they represent parts of a whole and can be applied in practical situations. The teacher introduces students to simple fractions like 1/2, 1/4, 1/3, and 1/6. Second, the teacher illustrates the concept of fractions by demonstrating how to divide objects like sponge cake or melon before consuming them. Third, the teacher arranges the students into study groups and instructs them to engage in discussions and complete worksheets using the educational tools they have brought. Fourth, the teacher supervises the teamwork during the study session, monitors the student's progress, and guides those who encounter challenges while working on the worksheets. Fifth, the teacher tests the student's understanding of the fraction material and provides feedback on their performance. Sixth, the teacher acknowledges and commends the students for their diligent efforts. In Figure 2, students who successfully achieve the learning objectives demonstrate improvement because their performance exceeds that of those who still need to accomplish them.

In cycle three, the data indicates that 90.63% of students, or 29, have successfully fulfilled the learning objectives. The remaining 9.37%, or three students, have yet to reach these targets. The observation results indicate that the teacher effectively implements the cooperative learning model, following the stages of learning planning. Furthermore, the teacher scaffolds using concrete and contextual media, such as cakes and fruit. The teacher has also used computers and the internet to facilitate the search for references, instructional materials, media, and procedures, as well as experiment with alternative learning tactics. Ultimately, the teacher engages in re-teaching by employing strategies such as modifying the content, streamlining learning objectives, and simplifying test questions. Subsequently, the teacher conducts drills tailored explicitly for the three students.

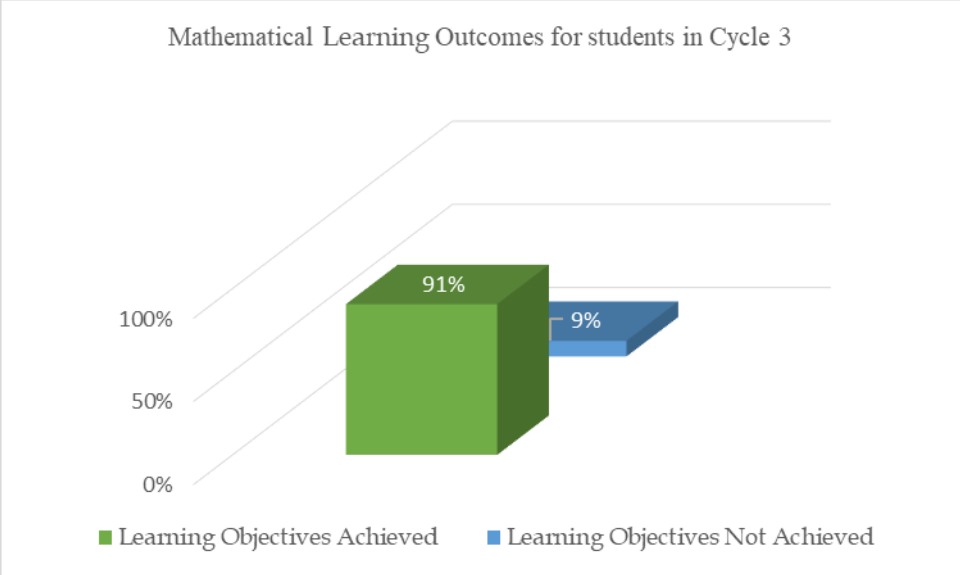

Figure 3. Mathematical Learning Outcomes of Students in Cycle 3

Figure 3 illustrates a steady improvement in student achievement, reaching its peak in the final cycle. In the third grade of elementary school, three children still need to meet the criteria for fulfilling the learning objectives for basic fractions in mathematics.

The Second Teacher Improves Science Learning Practices Using the Direct Instruction Model

Subsequently, the researcher invited the second teacher to participate in the study to improve their students' learning results, refine their teaching methodologies, and foster their professional growth. In cycle 1, the teacher initiated classroom action research using the presentation and explanation teaching model.

(1) Cycle One. In this science lesson, the grade 1 teacher challenged high-achieving students to control their participation in learning activities. Subsequently, the teacher enhanced her pedagogical techniques by formulating strategies, executing them, monitoring the educational process in the classroom, and culminating with introspection. Like the last research teacher, the second teacher devised a comprehensive learning plan, created observation sheets to document student and teacher activity throughout learning sessions, curated learning materials and resources, conducted evaluations, and developed worksheets.

In cycle one, the data indicated that 12 students successfully met the learning objectives, accounting for 38.70% of the total. Conversely, the remaining 19 students, comprising 61.29% of the total, still need to accomplish the learning objectives. Meanwhile, observer observations indicated that several students lacked enthusiasm for learning, while others appeared to engage in daydreaming or exhibited reduced interest when completing assignments. However, some students appeared attentive and eager. During this initial phase, we observed that over half of the classroom needed to achieve the learning goals, with high-achieving students primarily driving student engagement in educational tasks.

This could be due to the teaching model's unsuitability for achieving science learning objectives when presenting and explaining information. Another discernible element is the teacher's inadequate classroom management conditioning. Consequently, teachers must conduct further studies to improve the quality of instruction and learning in cycle 2. In addition, teachers should strive to replace the current teaching approach, particularly the direct instruction model, with a more appropriate alternative.

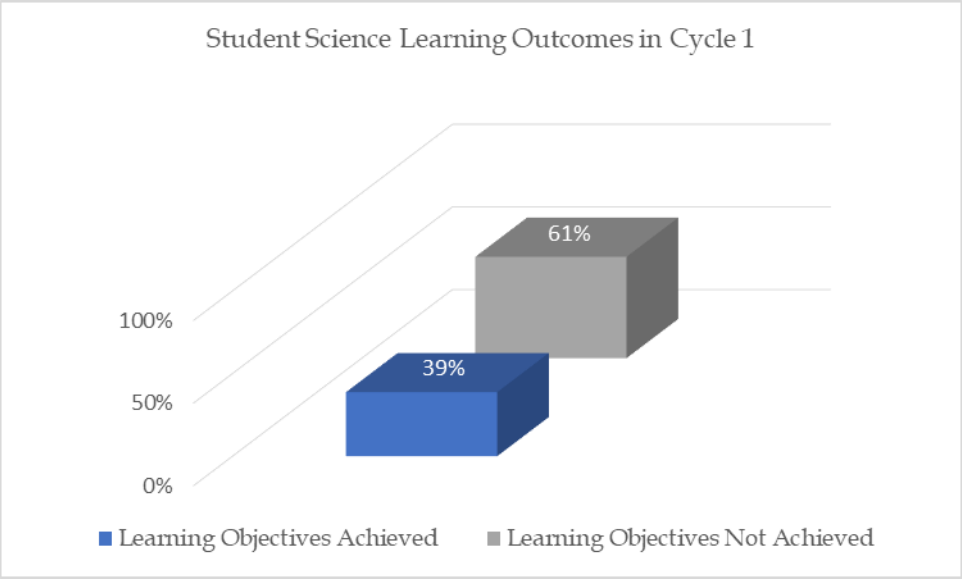

Figure 4. Students' Science Learning Outcomes in Cycle 1

(2) Cycle Two. The teacher employs the direct instruction teaching approach, which follows the same stages as the Kemmis and McTaggart model: planning, action, observation, and reflection. This direct instruction model consists of five steps. First, the teacher begins by stating the learning objectives, which include defining celestial bodies, distinguishing them from non-celestial bodies, identifying celestial bodies that appear during the day and at night, and describing the shapes of the moon. Second, the teacher presents information in a structured and sequential manner, covering celestial bodies during the day and moon phases. Third, the teacher helps students match pictures with corresponding statements. Fourth, the teacher assesses students' understanding and provides feedback. Fifth, the teacher encourages further practice at home by having students draw celestial bodies based on their observations. The figure above, labeled Figure 4, illustrates that the number of students who have not met the learning objectives is greater than the number of students who have successfully attained them.

In cycle two, the results indicated that 21 students successfully attained the learning objectives, accounting for 67.74% of the total. Conversely, the remaining ten students, making up 32.26% of the total, still needed to accomplish the learning objectives. The findings indicate that most students exhibit a strong inclination toward learning and are highly attentive to the teacher's explanations. However, some students continue to display disruptive behavior and lack concentration. In contrast, others prefer to play alone, and one student appears despondent after receiving reprimands from their parents on their way to school. The observation results also highlighted the classroom's excessively high temperatures, causing students to feel uncomfortable, jostle for seats away from direct sunlight, and display signs of distress. The classroom's position on the second level exposes it to intense sunshine from morning to midday, resulting in high temperatures. The absence of curtains in the classroom allows for the direct exposure of students to the maximum amount of sunshine, resulting in the children visibly perspiring. This significantly disrupts the comfort and focus of students during the learning process.

Cycle two highlights several areas for improvement in the upcoming cycle. First, the direct instruction model makes the teacher the center of learning, so the success of this learning depends on the teacher. Unpreparedness on the part of the teacher can quickly distract students, thereby hindering their learning process. Learning can become less conducive as a result; second, the diagnosis of hyperactive students leads to disruptive behavior, necessitating increased effort to focus on learning, such as through the use of engaging visual power points and audio media; third, the hot and glaring classroom environment necessitates the use of curtains or window blinds to alleviate the discomfort; and fourth, inefficient use of time results in students feeling that their time is still inadequate. Cycle three mandates the implementation of corrective actions.

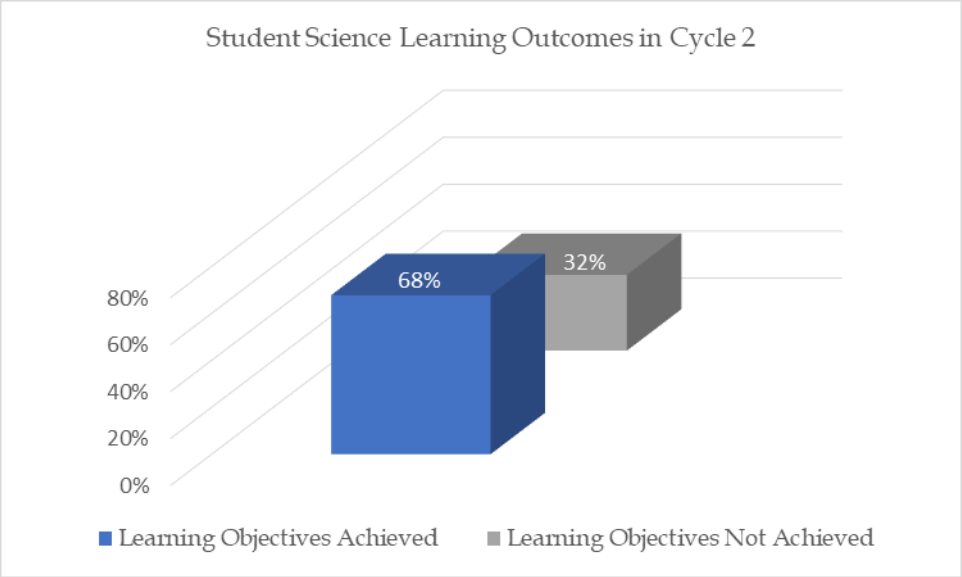

Figure 5. Students' Science Learning Outcomes in Cycle 2

(3) Cycle Three. This third cycle continues to adopt the direct instruction model. We continue to use the same four stages of the Kemmis and McTaggart models. Here are the five phases of the direct instruction model. First, the teacher outlines the learning objectives and establishes a conducive learning environment. Second, the teacher employs a PowerPoint to showcase knowledge and engage students in a clapping activity, explicitly demonstrating the moon phase with their hands. Third, the teacher encourages students to demonstrate the moon phase with their hands through guided practice. Fourth, the teacher assesses students' comprehension and provides feedback, encouraging them to work on assignments that involve matching pictures of celestial bodies during the day and night. In figure 5, more than half of the students in the classroom have achieved the learning objectives.

The data from cycle three shows that 93.55%, or 29 students, have achieved the learning objectives, while the remaining 6.45%, or two students, still need to achieve them. The observations reveal increased students' self-confidence and activeness as they learn happily and enthusiastically. Students previously classified as hyperactive are now focused on and enthusiastic about participating in the learning process. The teacher maximizes the use of learning

media, and they complete their tasks on time. Therefore, the teacher's adopted direct instruction learning model successfully addresses students' learning needs, ultimately achieving the expected learning objectives. However, the need for further differentiation for students who still need to meet objectives indicates our ongoing commitment to meet all students' needs. The teacher re-taught the two students who failed to meet their learning objectives, simplifying the objectives and test questions and differentiating the processes and products.

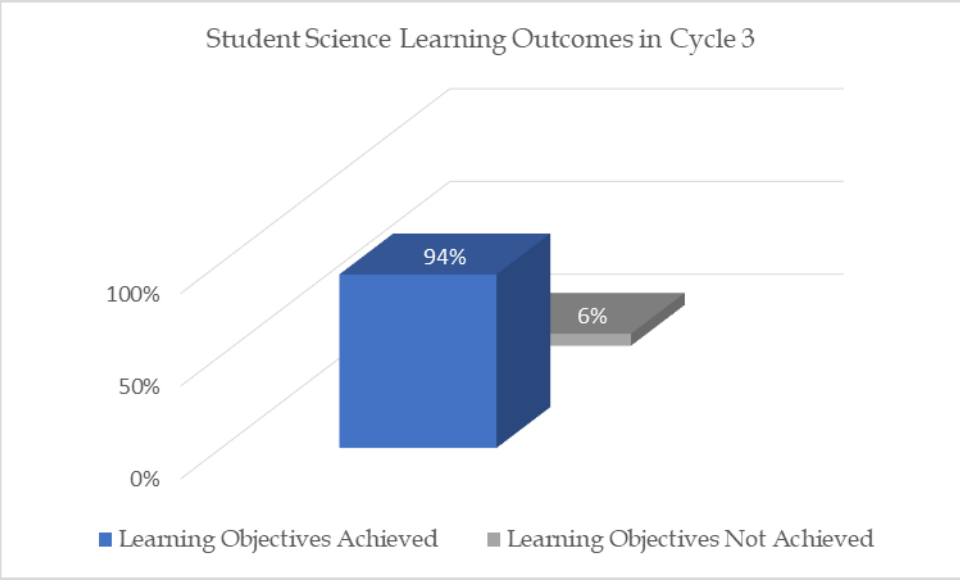

Figure 6. Students' Science Learning Outcomes in Cycle 3

Figure 6 illustrates a positive student learning objective achievement trend, with most students meeting the criteria. However, it is essential to note that two students have yet to fully grasp celestial bodies and their characteristics. These students need help defining celestial bodies, distinguishing them from non-celestial bodies, identifying visible celestial bodies during the day and night, and describing the shapes of the moon.

Discussion

Teachers Conduct Scientific Publications

Various studies have highlighted the role of participatory action research (PAR) as an effort to facilitate the improvement of teacher professionalism, but the role of collaboration stops there. This study aims to investigate Indonesian teachers' professional development to the point of collaborating in journals. Researchers help teachers become active contributors to learning improvement practices by conducting classroom action research (CAR) and scientific publications. Teachers' scientific publications enhance their professional development, enrich the education community with knowledge, and share good practices.

Teachers who have implemented learning practices through a series of CAR procedures then compile a report of the results as a paper for scientific publication. Researchers train teachers to compile papers based on the intended journal's systematics and templates. It is relatively easy for

teachers to write a paper for a journal using their CAR reports. Teachers only need to summarize their CAR reports on a template. The problem lies with the paper's quality. Only national journals not indexed by the Science and Technology Index (SINTA) can accept the resulting paper. This is because teacher papers have several things that could be improved. Our findings reveal the following:

First, very few teachers are willing to cite research journals. Instead, they prefer the simple method of copying the results of other students' CAR reports from Google, with books as the primary source of references.
Second, it is difficult for teachers to create papers with sound introduction stages, especially in the research gap or novel of the study, because to get a good research gap or novel of the study, teachers must first compile a general statement and a specific statement from articles in journals by previous researchers. This task is highly challenging and unachievable for teachers, particularly those in the field. Moreover, teachers must combine this work with their teaching duties, administration, classroom management, and other non-academic responsibilities—academic tasks. Even so, teachers can easily compile the study's purpose, objectives, and significance. Similarly, in literature reviews, books dominate citations.

Third, regarding methodology, the research findings show uniformity, with almost all teachers only adopting one model, namely the Kemmis & McTaggart model. Despite receiving knowledge and various references suggesting alternatives to the Kemmis & McTaggart model, teachers refuse to adopt other models. Despite this, teachers can accurately articulate the stages of the Kemmis & McTaggart model.

Fourth, on results and discussion. Teachers are adept at writing results, but they need help with it. Teachers find it challenging to write discussions because they must connect their research results with previous researchers' theories, findings, and results, requiring them to cite journal articles based on their research findings. Articles are based on research findings. This presents a significant challenge for teachers.

Fifth, teachers excel at concluding. However, the complexity of creating references using the References Manager application is a significant issue. For teachers, the manual method of writing references, which involves copy-and-paste, is more accessible.

This finding highlights the importance of planning, acting, observing, and reflecting in the CAR cycle to significantly improve learning. The discussion of the results begins with the following:

First Teacher: Improving Mathematics Learning Practices with Cooperative Learning Model

In the first cycle, the teacher used the presenting and explaining model, which proved less effective in attracting students' interest and achieving learning objectives. The data showed that only 43.75% of students achieved learning objectives, while 56.25% had not achieved them. Reflection revealed that the learning model used did not meet students' needs and interests.

In the second cycle, the teacher switched to a more interactive cooperative learning model involving students in group work. The results showed a significant increase, with 75% of students achieving learning objectives. However, there were still some areas for improvement, including students not accustomed to working in groups and limited learning resources.

In the third cycle, the teacher continued to use the cooperative learning model, making adjustments based on previous cycle reflections. The utilization of tangible mediums such as cakes and fruit, together with the intelligent implementation of technology, significantly contributed to the attainment of learning objectives, resulting in a 90.63% success rate. This impressive result demonstrates the potential of a more contextual and interactive approach, in line with previous research showing that cooperative learning can increase student participation and deepen conceptual understanding (Johnson & Johnson, 2019).

However, thorough preparation and adequate media support are required to implement this model. Although the second cycle improved, group work and limited learning media remained obstacles. In addition to the method, the cooperative learning model's success depends on facilities and the teacher's classroom management.

Second Teacher: Improving Science Learning Practices with the Direct Instruction Model

In the first cycle, the teacher used the presentation and explanation model for science learning. The results showed that only 38.70% of students achieved the learning objectives, with many uninterested and lacking focus. This reflection acknowledges our challenges and the need for improved classroom management, validating teachers' experiences.

In the second cycle, the teacher adopted a more structured and gradual direct instruction model. The results showed an increase, with 67.74% of students achieving learning objectives. However, some students continued to experience discomfort due to uncomfortable classroom conditions and hyperactive peers.

The teacher continued to use the direct instruction model in the third cycle, with adjustments such as using more interesting visual and audio media and a more comfortable classroom environment. The results showed a significant increase, with 93.55% of students achieving learning objectives. This shows that a well-adapted direct instruction model and a supportive learning environment can improve student engagement and learning outcomes. Research has demonstrated the effectiveness of the structured and gradual direct instruction model in assisting students in comprehending complex material (Rosenshine, 2012).

However, this model also has challenges, such as the reliance on teachers as the center of learning and the need for effective classroom management. Despite the improvement in the second cycle, the uncomfortable classroom environment continued to disturb some students. This shows the importance of a conducive learning environment in supporting an effective learning model.

Teachers' Challenges in Scientific Publication

This study highlights the difficulties faced by teachers in Indonesia in navigating the scientific publication process, from paper preparation to acceptance in journals. The findings reveal several critical issues affecting teacher publications' quality and effectiveness.

First, citation and use of sources. Findings show that teachers use more accessible sources, such as books or the internet, than scientific journals. This often leads to low-quality citations and a need for more depth in scientific analysis. According to Smith (2015), adequate citation of scientific journals is critical to building credible arguments and supporting research conclusions with solid evidence. Lack of this skill can limit teachers' ability to contribute to scientific discourse effectively.

Second, write scientific papers. The difficulties in composing the introduction section, particularly in defining research gaps and novelty, reflect a more significant challenge in understanding robust research methodology. Johnson and Johnson (2019) stated that identifying research gaps is crucial and requires a deep understanding of the existing literature. Lack of time and support to conduct literature research contributes to this difficulty.

Third, methodological models are adopted. The dominance of the Kemmis & McTaggart model by teachers, as described in the study, indicates a tendency to follow familiar approaches rather than exploring new alternatives that may be more appropriate to their specific context. Bilican et al. (2021) suggest that diversifying methodological approaches can enhance the richness and relevance of research findings, a concept that teacher research practice should prioritize.

Fourth, write the discussion section. The lack of ability to integrate findings with existing literature often leads to difficulty in writing the discussion section. As explained by Ellis and Armstrong (2013), this requires analytical and synthesis skills that rely not only on theoretical knowledge but also on scientific argumentation skills.

Fifth, aspect involves references and the utilization of reference managers. Failure to use reference manager applications effectively demonstrates a lack of technical skills required for modern research. Santos (2019) emphasizes the importance of mastering technological tools in research to improve the efficiency and accuracy of source documentation.

CONCLUSION

This study has investigated how to enhance teacher professional development in Indonesia through improved instructional practices, implementing Classroom Action Research (CAR), and participation in scientific publications. This study highlights the importance of adaptive and responsive learning models, which not only support teacher professional growth but also directly impact student learning outcomes.

Significant findings from this effort include 1) the learning model's efficacy. The results reveal that using cooperative learning and direct instruction strategies dramatically increases students' comprehension and performance of learning goals. In practice, the cooperative learning model

increases student engagement and interaction, while direct instruction facilitates structured and focused teaching, which effectively conveys complex concepts; 2) the importance of infrastructure support and classroom management. The success of the learning model also depends heavily on adequate infrastructure support and effective classroom management. Constraints such as limited learning media and non-conducive environmental conditions have hindered the learning process, emphasizing the need for adequate facilities and practical classroom management strategies; 3) the contribution of classroom action research and scientific publication. Classroom Action Research (CAR) allows teachers to identify and address problems in their teaching practices systematically. Furthermore, participation in scientific publications helps disseminate research results and good practices and strengthens teachers' professional competence as researchers and educational innovators; 4) challenges in scientific publication. Teachers need help with scientific writing and publication, including limitations in scientific writing skills and access to scientific journals. Increased training in scientific writing and broader access to research literature will support teachers in overcoming these barriers; 5) collaboration as a key to success. Interaction and collaboration between teachers, researchers, and educational institutions have proven crucial in supporting research and publication initiatives. This cooperative method enhances the research process and improves the educational opportunities for all the engaged parties.

Therefore, this study validates that teacher professional development is an efficient approach to raising the quality of education using active engagement in scientific publications, application of action research, and constant improvement of learning strategies. Educational institutions and government policies must continuously support innovation and continuous learning among teachers to achieve maximum results. This conclusion underlines the need for a holistic and integrated approach to teacher professional development that addresses individual needs and the institutional context and infrastructure that support it.

REFERENCES

Arikunto, S. (2010). *Prosedur Penelitian: Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.

Bilican, K., Senler, B., & Karisan, D. (2021). Fostering teacher educators' professional development through collaborative action research. *International Journal of Progressive Education, 17*(2), 459-472.

Bozkuşa, K., & Bayrak, C. (2019). The application of the dynamic teacher professional development through experimental action research. *International Electronic Journal of Elementary Education, 11*, (4), 335-352. https://doi.org/10.26822/iejee.2019450792

Chen, J. C., Lin, F. L., & Yang, K. L. (2018). A novice mathematics teacher educator–researcher's evolution of tools designed for in-service mathematics teachers' professional development. *Journal of Mathematics Teacher Education*, *21*(5), 517–539. https://doi.org/10.1007/s10857-017-9396-9

Corte, M. V. de, de Brok, P., Kamp, M., & Bergen, T. (2013). Teacher research in Dutch professional development schools: Perceptions of the actual and preferred situation in terms of the context, process and outcomes of research. *European Journal of Teacher Education*, *36*(1), 3–23. https://doi.org/10.1080/02619768.2012.662639

Creswell, J. W. (2015). *Riset Pendidikan: Perencanaan, Pelaksanaan, dan Evaluasi Riset Kualitatif dan Kuantitatif.* Yogyakarta: Pustaka Pelajar.

Dewi, N. R., & Supriyanto, A. (2018). Pengaruh publikasi ilmiah terhadap pengembangan profesional guru. *Jurnal Pendidikan dan Pembelajaran, 7*(2), 1-12.

Ellis, N. J., & Armstrong, A. C. (2014). How context shapes practitioner research and professional learning in schools in Singapore and NSW. *Compare*, *44*(3), 435–454. https://doi.org/10.1080/03057925.2013.767674

Hadi, S. (2021). **Pengembangan profesionalisme guru di Indonesia: tantangan dan peluang**. *Jurnal Pendidikan dan Pengajaran, 14*(2), 145-160.

Hassen, R. (2016). Female teachers' professional development through action research practice. *Journal of Education and Practice, 7*(22), 6-18.

Hrastinski, S. (2021). Digital tools to support teacher professional development in lesson studies: A systematic literature review. *International Journal for Lesson and Learning Studies*, *10*(2), 138-149.

Johnson, D. W., & Johnson, R. T. (2019). **Cooperative learning: The foundation for active learning**. *Journal on Excellence in College Teaching, 30*(1), 77-100.

Kemmis, S., & McTaggart, R. (2007). *Participatory action research: Communicative action and the public sphere*. Sage.

Maaranen, K., Stenberg, K., Sintonen, S., Kynäslahti, H., Jyrhämä, R., & Byman, R. (2023). University faculty leaders' views of teacher educators' professional development. *Journal of Education for Teaching: International Research and Pedagogy, 49*(1), 21-36. https://doi.org/10.1080/02607476.2022.2045865

Rosenshine, B. (2012). **Principles of instruction: Research-based strategies that all teachers should know**. *American Educator, 36*(1), 12-39.

Santos, M. (2019). **Komunitas belajar profesional dan perbaikan praktik pembelajaran**. *Jurnal Internasional Pendidikan, 25*(3), 211-225.

Sato, K., Mutoh, N., & Kleinsasser, R. C. (2019). Longitudinal research on EFL teacher professional development in (Japanese) contexts: Collaborative action research projects. *Language Teaching Research, 00*(0), 1–27.

Smith, L. (2015). The effectiveness of action research in teacher professional development. *Teacher Development*, *19*(2), 222-237.

Stringer, E. T. (2007). *Action research* (3rd ed.). Thousand Oaks, CA: Sage. *Subject guide to books in print.* (1957–). New York: R. R. Bowker.

Suryani, A. (2019). Tantangan pengembangan profesional guru di Indonesia. *Jurnal Pendidikan Indonesia*, *8*(1), 54-63.

Wibowo, D. (2022). The role of school culture in teacher professional development for peace education: The case of Sukma Bangsa School Pidie in post-conflict Aceh, Indonesia. *Journal of Peace Education, 19*(2), 182-204.