ABDIMAS: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang
Vol.10(4) November 2025, xxx-xxx
p-ISSN: 2721-138X e-ISSN: 2548-7159
http://jurnal.unmer.ac.id/index.php/jpkm

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Empowering junior high school math teachers through CRT-based videoscribe materials to enhance teaching quality

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ARTICLE INFO:

Received: 2025-09-15
Revised: 2025-10-22
Accepted: 2025-11-07
Published: 2025-11-30

Keywords:

Culturally responsive teaching, Empowerment enhancement, Videoscribe

ABSTRACT

The limited involvement of local cultural contexts in mathematics learning results in a lack of connection between the learning material and students' daily lives. The partner in this community service program are members od the Mathematics Subject Teachers' Forum (MGMP) of Junior High Schools in the Central Region of Bogor Regenc. The objectives of this Community Service Program (PKM) activity are: (1) Improving the understanding and competency of mathematics teachers in the Central Region of Bogor Regency regarding the creation of CRT-based teaching materials using Videoscribe, through training, independent projects, mentoring, and sharing of good practices; (2) Increasing teacher productivity in creating interactive CRT-based teaching materials using Videoscribe; (3) Encouraging the implementation of CRT-based teaching materials using Videoscribe; (4)Improving the quality of mathematics learning. The community service methods include training, mentoring and evaluation, independent practice, and implementation. The result of this service is an increase in the level of empowerment of partners in understanding the CRT learning model with a post-test score of e"75. 100 percent of partners are able to create CRT teaching materials with the help of videoscribe, and 75 percent apply it in class. and 50 percent share good practices of training materials with colleagues at their respective schools

How to cite: Kurniasi, E. R., Hermawati, M., Nurrahmah, A., Ramadhani, A., & Taqiyan, Z. A. (2025). Empowering junior high school math teachers through CRT-based videoscribe materials to enhance teaching quality. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang, 10*(4), xxx-xxx. https://doi.org/10.26905/abdimas.v10i3.16117

1. INTRODUCTION

The limited integration of local cultural contexts in mathematics learning has resulted in weak connections between instructional content and students' everyday lives. Research indicates that contextualization should improve students' mathematical abilities and learning motivation (Kurniasi et al., 2025; Mahmudi et al., 2024). Culturally Responsive Teaching (CRT), an instructional model that incorporates local cultural contexts into mathematics learning, offers a solution to this issue (Fathonah et al., 2023; Wardana & Ariyanto, 2024).

The partner in this community engagement program is the Mathematics Subject Teacher Forum (MGMP) for junior high schools in the Central Region of Bogor Regency. Its members consist of junior

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high school mathematics teachers across Cibinong, Sukaraja, Babakan Madang, and Citeureup Districts. Bogor Regency is one of the regencies in West Java Province. According to official information from the West Java Education Office, there are 93 public and private junior high schools in the Central Region of Bogor Regency, with a total of 155 mathematics teachers. The MGMP serves as a highly potential forum that enables teachers to share experiences to improve their competencies, ultimately enhancing classroom learning quality. Within the MGMP, both senior and novice teachers learn from one another.

Based on an interview with the chair of the MGMP for junior high school mathematics in the Central Region of Bogor Regency, Aan Yustiwan, S.Pd., the partner faces several issues, including limited teacher competence in designing learning materials, especially digital-based ones. Teachers have also not integrated culturally responsive teaching models into mathematics instruction. Although webinars on developing digital teaching materials were offered between 2021 and 2024, these sessions lacked hands-on mentoring. As a result, teachers only listened to the material without practicing it. Additionally, the diverse cultural backgrounds of students in the classroom have not been utilized optimally because teachers are unfamiliar with culturally responsive teaching (CRT). In fact, this diversity can serve as a contextual resource for understanding mathematics. The lack of teacher competence has led to monotonous, non-contextual classroom instruction that does not take advantage of technological advancements.

Figure 1. Interviews with mathematics teacher partners and classroom observations

Figure 1 shows an interview with a mathematics teacher from SMP Citra Nusa Cibinong, Bogor Regency, as well as a classroom observation conducted in February 2025. During the observation, the teacher was teaching statistics using a textbook. In the interview, the teacher explained that they used several textbooks as learning resources but had not yet developed their own teaching materials, especially those incorporating technology.

According to the chair of the MGMP for junior high school mathematics in the Central Region of Bogor Regency, mentoring on developing culturally based teaching materials has never been conducted. Similarly, no mentoring has been provided on creating technology-assisted teaching materials using Videoscribe. Teachers also have not published the teaching materials they produce. Field analysis is also presented in Figure 2. When the teacher taught the topic of Probability, no learning media such as worksheets (LKPD) or interactive tools were used. The teaching material relied solely on textbooks. This reflects the classroom conditions at SMPN 3 Citeureup, Bogor Regency.

Based on the 2024 Education Report Card for Bogor Regency, the indicator of Learning Quality is still categorized as moderate (Badan Standar, Kurikulum, dan Asesmen Pendidikan, 2024). The recommendations emphasize the need to encourage learning activities that apply two-way communication between teachers and students. Therefore, improving teachers' competencies in designing interactive

media based on local culture becomes essential. One effort that supports this recommendation is the development of interactive learning media. Previous studies have shown that Videoscribe can make learning more interactive (Mona et al., 2024), and Culturally Responsive Teaching (CRT) can serve as a contextual basis for learning media that enhances students' thinking skills (Kurniasi et al., 2025).

Figure 2. Learning conditions in the classroom for probability subject

Based on field analysis and information from the partner institution, several problems were identified among mathematics teachers in the Central Region of Bogor Regency: (1) Limited competence in developing teaching materials using culturally responsive teaching (CRT); (2) Low productivity in creating interactive learning materials; (3) The absence of comprehensive culturally based mathematics teaching materials accessible to teachers; and (4) The lack of CRT implementation relevant to the local cultural context of Bogor Regency.

This community service program aims to improve: (1) Teachers' understanding and competence in designing CRT-based worksheets (LKPD-CRT) assisted by Videoscribe; (2) Teachers' productivity in developing interactive learning materials; (3) The implementation of CRT relevant to local culture in the classroom; and (4) The overall quality of mathematics instruction to be more interactive and contextual. This program is carried out based on the needs of the partner institution. An empowerment approach was chosen because teachers are the primary actors who will implement the learning process. In the future, teachers are expected to fully develop creative mathematics instruction through innovative models and teaching materials.

2. METHODS

The method for implementing the empowerment program to enhance the competencies of junior high school mathematics teachers in Bogor Regency in developing Culturally Responsive Teaching (CRT) learning materials assisted by Videoscribe is divided into three stages. The process is outlined in Figure 3.

Procedures

The procedures in this community service activity are: (1) Preparation: the team prepares the module, pre-test and post-test instruments, sample CRT-LKPDs, and conducts a site survey; (2) Training: training on understanding CRT and Videoscribe, as well as the development of CRT-based LKPDs and learning videos using Videoscribe by participants; (3) Mentoring by the team and validation of the LKPD content and learning videos; (4) Implementation of the learning media in the classroom; (5) Sharing best practices by participants with fellow teachers at their schools; (6) Sustainability planning (compilation of ISBN-registered LKPDs).

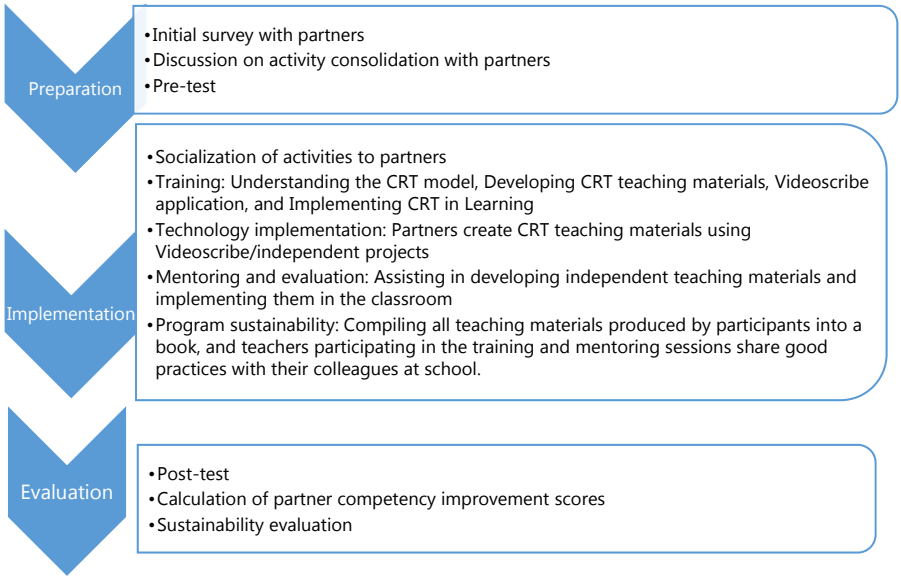

Figure 3. Implementation process

Location, Participants, and Instruments

The training activity lasted for 3 days, followed by one week of monitoring and validation by the team, one week of implementation at the participants' respective schools, and one week of sharing best practices. The three training sessions were held at SMPN 2 Cibinong and at each participant's school. The target number of participants was 25, but 23 teachers attended.

The pre-test and post-test instruments were used to measure participants' understanding, consisting of 24 items assessing their comprehension of CRT material (CRT concepts, principles/ components, implementation strategies, reflective practice, and classroom application). The scoring scale ranged from 0 to 100. The competency threshold for participants was set at a minimum score of 75.

Analysis and Success Indicators

Data analysis was carried out by calculating the mean pre-test and post-test scores, followed by determining the difference between the two mean scores. Participants' achievement scores were required to be e"75. The success indicators are: (1) Improved participant competency, indicated by post-test scores of e"75; (2) At least 85 percent of participants produced CRT-based teaching materials using the Videoscribe application; (3) At least 75 percent of participants implemented the CRT model along with the CRT materials they developed; (4) At least 50 percent of participants shared their best practices with colleagues at their schools.

3. RESULTS AND DISCUSSION

Results

The first stage of this community service program was the preparation phase, which involved conducting a survey and coordinating discussions with the partner, the Middle Region MGMP Mathematics Group of Bogor Regency. In this stage, the team outlined the activity sequence, which

included training, the development of CRT-based teaching materials supported by Videoscribe, classroom implementation, and sharing best practices. The number of participants was agreed to be 25 junior high school mathematics teachers, but 23 attended. Participants were then given a pre-test to assess their understanding of the CRT learning model and CRT-based teaching materials.

The second stage consisted of the training activities: understanding the CRT model, developing CRT-based materials, learning the Videoscribe application, applying CRT in instruction, and using technology. The partner teachers created CRT-based teaching materials supported by Videoscribe as an independent project. Mentoring and evaluation were also provided during the independent development of materials and their classroom implementation.

For program sustainability, all teaching materials produced by participants were compiled into a book. Teachers who took part in the training and mentoring were also encouraged to share their best practices with colleagues at their respective schools.

The training activities, the development of teaching materials/independent projects, and the mentoring sessions were conducted over three days. During these activities, participants received materials and engaged in the tasks listed in Table 1.

Table 1. Training activity meeting schedule

1st Meeting	
Activities	Understanding and Theory of the CRT Learning Model CRT Teaching Materials in Mathematics Learning Increasing Productivity in Creating Digital Teaching Materials (Videoscribe)
Objectives	Provide participants with an understanding of the CRT Learning Model Theory Provide participants with an understanding of the function of teaching materials in learning Participants are more productive in compiling CRT teaching materials using Videoscribe
2nd Meeting	
Activities	Creating CRT Teaching Materials Revising Teacher-Created Teaching Materials
Objectives	Participants create more creative teaching materials using the CRT model Evaluating and revising the CRT teaching materials prepared by participants
3rd Meeting	
Activities	Tutorial: Creating Teaching Materials in Videoscribe Teacher Team uploads teaching materials into Videoscribe Filing the Created Teaching Materials
Objectives	Guide participants in understanding the tools in Videoscribe and how to use them to create teaching materials, thereby increasing their variety. Participants can practice independently in compiling CRT teaching materials previously produced in Word format into videos. Complete and evaluate the results of the Videoscribe participants' creations to ensure they align with the CRT flow and are more creative. They also review the mathematics content within the materials.

The materials provided to participants were aligned with the CRT-based LKPD developed by the community service team through prior research activities. Likewise, the instructional model presented to participants was the learning model previously developed by the team based on earlier studies (Kurniasi

et al., 2025). An example LKPD was presented on the topic of Measures of Central Tendency (Statistics) for Grade VIII, using cultural contexts from Betawi, Javanese, Minang/Padang, and Sundanese traditions. The cultural elements included regional dishes, local snacks, traditional arts, and traditional games.

After receiving the theoretical foundation and training materials, participants began developing their own CRT-based teaching materials. First, they were divided into groups based on their teaching levels. Participants then selected the mathematics topic they wished to develop. The chosen topics included Probability, Integers, Solid Geometry, Circles, Direct Proportion, and Simplifying Algebraic Expressions.

Once the LKPD drafts were completed, participants reviewed their work and underwent a joint evaluation session. The evaluation covered mathematical content, the CRT flow, and the cultural contextualization. Figure 4 is the documentation of the material development process and the joint evaluation session.

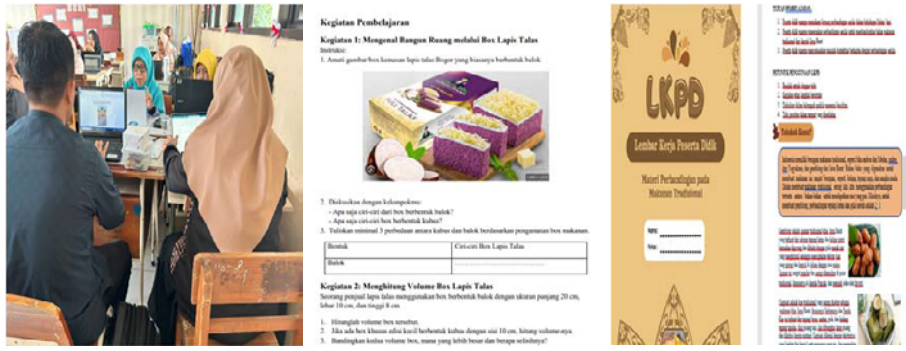

Figure 4. Group activities and CRT LKPD results

Figure 1 shows the activities on the third day of the training at SMPN 2 Cibinong. It illustrates the group work process of producing CRT-based LKPD. The LKPD presented are two of the products created by the training participants, which use Sundanese culture in the context of traditional snacks. The LKPD produced include Integers with the cultural context of the traditional game Engklek, Direct Proportion with the cultural context of traditional Sundanese snacks, Circles with the cultural context of the Bedug, Solid Geometry with the cultural context of Bogor's traditional lapis talas, Probability with the cultural context of the congklak game, and Simplifying Algebraic Expressions with the cultural context of ketupat sayur. Creating these CRT-based LKPD is the first step in the participants' independent project as part of the effort to improve partner productivity.

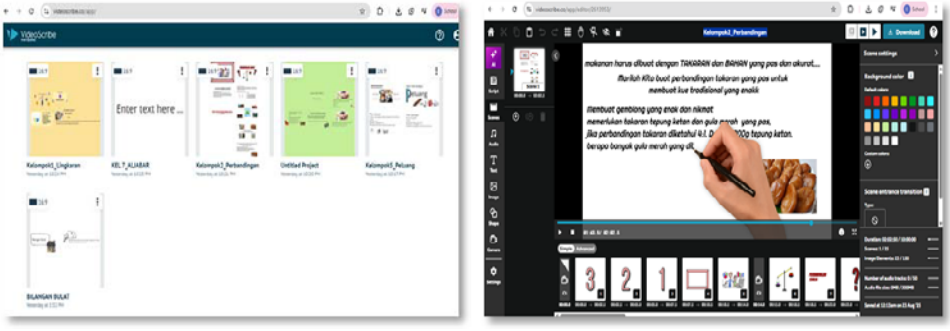

Figure 5. Participants' results of making videos with Videoscribe

After preparing the CRT-based LKPD, participants were given a tutorial on inserting the LKPD into Videoscribe. Several examples of the videos produced by participants are illustrated in Figure 5.

Figure 5 shows the learning videos created by participants using Videoscribe. These were produced on the third day of the training. The participants successfully converted seven mathematics topics into Videoscribe format. After receiving the tutorial, they worked independently. In the videos, participants included the same cultural elements used in the LKPD, with more innovative features such as moving visuals and audio. Figure 2 illustrates the effort to improve partner competence in creating interactive learning materials.

After participants completed their learning materials, the materials were validated by the team to prevent conceptual errors. Once validated, the materials were used in the classroom for teaching practice with students. The following is documentation of the teaching practice activities using CRT-based materials and Videoscribe.

Figure 6. Practical activities in class

In Figure 6, the activity shown is classroom teaching practice. The teacher is one of the mathematics teachers at SMPN 2 Cibinong. She taught the topic of Three-Dimensional Shapes using culturally contextual learning media, namely the traditional cake *Lapis Talas Bogor* and its packaging. Students were divided into groups and discussed the material using the cultural context. They actively participated in group discussions and presented their work in front of the class.

After completing the classroom teaching practice using the learning materials, the participants (teachers) conducted a good-practice sharing session with their colleagues at school. In this activity, the teachers explained what Culturally Responsive Teaching is and how to apply it in the LKPD, as well as provided a Videoscribe tutorial. The following is documentation of the activity. Both the classroom teaching practice and the good-practice sharing were supervised by the service team.

Figure 7. Good practice sharing activity

Figure 7 shows the good-practice sharing activity. Teachers explained to their colleagues at their respective schools how to use Videoscribe. The activity in Figure 7 took place at SMP Al Mizan. The teachers also explained to their colleagues what the CRT model is and how to develop CRT-based LKPD. In CRT, cultural elements are used as contextual features and are adjusted to the cultural backgrounds of the students in the classroom.

The next stage involved collecting and organizing the LKPD developed by the teachers. These materials will then be submitted to a publisher and registered for an ISBN. After printing and duplication, they will be distributed free of charge to junior high schools in the Central Region of Bogor Regency so that CRT-based LKPD can be used by teachers as an alternative learning resource for mathematics.

Statistical Calculation of Pre-Test and Post-Test Results

To measure participants' understanding of CRT and the development of CRT-based teaching materials, the team administered a pre-test and post-test. The indicators included understanding the basic concepts of CRT, explaining the principles and components of CRT, identifying CRT implementation strategies, reflecting on CRT practices, and applying CRT in the classroom. There were 23 participating teachers. The results are presented in Figure 8.

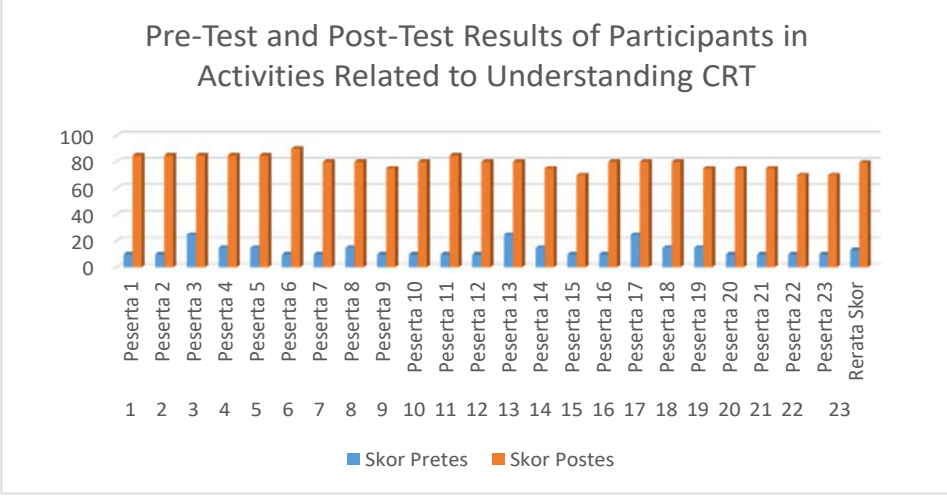

Figure 8. Pre-test and post-test results of participants in activities related to understanding CRT

Based on Figure 5, 22 out of 23 participants scored 75 or higher on the post-test. More than 90 percent of the participating teachers improved their understanding of the CRT model, which meets one of the program's success indicators. Figure 8 also shows that the average post-test score was higher than the pre-test score. The average pre-test score was 13.26 and the average post-test score was 79.35. The difference between the two averages was 66.09.

Discussion

Community service activities for teachers, especially mathematics teachers, are highly important because teachers are the backbone of education. The context of mathematics learning needs to be improved so that mathematics becomes enjoyable. One way to achieve this is by integrating learning

models, teaching materials, and assessments with cultural elements. In this community service program, the first stage involved training teachers to understand the CRT model and CRT-based teaching materials. CRT serves as an effort to make mathematics more engaging. This initiative aligns with studies and community programs showing that cultural elements and traditional games make mathematics more enjoyable (Kurniasi et al., 2023; Suhendri & Ningsih, 2023; Muhammad et al., 2023).

In addition, the use of Videoscribe introduced to participants made the teaching materials more appealing. Digital teaching materials help create a more enjoyable learning environment (Purwoko et al., 2020; Shodiq et al., 2021). CRT and Videoscribe are effective in the cultural context of West Java because the CRT approach provides space for local culture to be embedded as contextualization in mathematics instruction. Videoscribe, as a tool for creating instructional videos, supports the easy visualization of local cultural icons such as traditional foods and games as interactive visuals in the videos. Students can better recognize Lapis Bogor cake as an example of a rectangular prism because they encounter it in their daily lives. They are also familiar with the "Rebo Wekasan" tradition practiced at their school, which makes mathematics feel closer to their everyday experiences.

Training is the initial step in instilling the concept of CRT in teachers. The training activities aim to improve teachers' competence and understanding, as well as to motivate them to continue learning. Developing teaching materials is an essential responsibility for teachers as part of their professional growth (Lathiifah et al., 2019). Training in creating teaching materials has been proven to increase teachers' understanding and productivity (Chamidi et al., 2023). However, training must produce tangible outputs and hands-on practice, because what matters most in teaching materials is the teacher's ability to create and implement them in the classroom. These activities work together, and with training accompanied by direct material creation and classroom application, teachers' knowledge and competence increased.

Next is the activity of sharing good practices with colleagues. Sharing good practices is an effort to exchange ideas and strengthen collaboration among teachers to enhance capacity and competence. This activity is intended to support teachers' continuous learning needs (Prasetyono et al., 2024). Through good practice sharing, participants not only pass on their newly acquired knowledge to colleagues but also gain opportunities to learn and adopt new strategies (Rukmana et al., 2024; Rohimat et al., 2023).

This good practice sharing component is what differentiates this program from similar training activities. In many other programs, activities usually end at developing and implementing materials in class (Madang et al., 2024; Syam et al., 2024). In our community service program, the process continues to the stage of sharing good practices as part of sustaining knowledge transfer. Moving forward, we will also print the teacher-developed teaching materials, register them with ISBN, and distribute them to other schools that were not able to participate in the training.

4. CONCLUSION AND RECOMMENDATIONS

The program improved the competencies of 23 Mathematics MGMP teachers who participated in the training in designing and implementing CRT-based LKPD supported by Videoscribe through training, an independent project, mentoring, implementation, and the sharing of good practices. The average CRT understanding score increased from 13.3 to 79.3 (87 percent $\geq$ 75; 65 percent $\geq$ 80). All groups produced CRT-based LKPD with local cultural themes and their accompanying videos, 75 percent implemented them in class, and 50 percent shared good practices. These results show that the CRT approach and the use of Videoscribe as a tool for creating learning videos are effective in strengthening contextual mathematics learning. The sustainability of the program may require continued support for the Mathematics MGMP in disseminating the media produced by the training participants. It is also

possible to measure students' mathematics learning outcomes after teachers apply CRT and learning videos based on the cultural context of West Java.

The activity of sharing good practices among fellow teachers needs to be strengthened in the future. Although the program's success indicators have already been achieved, the good practice sharing sessions should ideally be accompanied by the Central Region Junior High School Mathematics MGMP of Bogor Regency, aiming to reach 75 percent of the program participants. In addition, the development of these teaching materials supports the effort to promote joyful learning, making it worth considering expansion to other regions in Bogor Regency. An open repository of ISBN-registered CRT-based LKPD and videos will be developed so that participants and Mathematics teachers in the partner region can access them. Collaboration with teachers will also be carried out to measure students' learning outcomes after they apply the CRT-based LKPD and learning videos. It is also possible to expand the program to other regions in Bogor Regency with similar initiatives.

ACKNOWLEDGEMENT

The team would like to thank the Directorate of Research and Community Service of the Ministry of Higher Education, Science, and Technology for the competitive Community Service grant under the Community Partnership scheme. This program has been highly beneficial in improving the competencies of mathematics teachers, particularly in the Central Region of Bogor Regency. Community service serves as a realization of the Tridharma of lecturers.

The team also expresses gratitude to the Research and Community Service Institute of Indraprasta PGRI University Jakarta for facilitating permits and certificate administration for the program participants. Appreciation is also extended to our program partner, the Junior High School Mathematics MGMP of the Central Region of Bogor Regency, for providing the venue, participant invitations, and smart TV equipment to support the training activities.

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