Implementation of Mathematics Teaching Module Based on Reflective Pedagogy Paradigm (RPP) at Taruna Nusantara High School

Rizky Anwari[1*], *Angelin Ica* Pramesti[1], and *Eko Budi* Santoso[1]

[1] Sanata Dharma University, Yogyakarta, Indonesia

Abstract. This study aims to explore the application of teaching modules based on the Reflective Pedagogy Paradigm (PPR) in learning mathematics, especially on the topic of geometric sequence at Taruna Nusantara High School. The focus of the research is to assess the academic and character aspects of students based on the 4C components (Competence, Conscience, Compassion and Commitment). This is a qualitative approach with Problem Based Learning (PBL) model. The research subjects are 33 X grade students who took part in learning geometric sequence through PPR teaching modules. Data were collected using cognitive diagnostic tests, observation of the learning process, 4C assessment, and reflections form. The results of the study showed that the application of PPR teaching modules not only contributed to the improvement of students' understanding on the topic of geometry sequence, but also effective in assessing students' character development in accordance with 4C. The average score for the competence aspect reached 78.74, while for the conscience, compassion and commitment aspects obtained an average score of 8.03, 8.25 and 8.16 respectively. This finding indicates that character education implemented at Taruna Nusantara High School can run well through the integration of PPR in the mathematics learning process.

1 Introduction

A quality education not only emphasizes the development of students' competencies, but must also pay attention to the development of their characters. In line with the vision of Taruna Nusantara High School which is to produce national leaders with quality and character, the education implemented in this institution should focus on two main aspects, namely student competence and character. To achieve these goals, a learning approach that integrates character education in the process is required. Currently at Taruna Nusantara High School, character education is implemented through special exercises such as marching, leadership lessons, state defense, scheduled projects such as: General Sudirman's footsteps, Environmental Care Community Exercises, and others. While in learning character education is still not implemented and measured clearly. Taruna Nusantara High School teachers currently face challenges in conducting student character assessments, especially in the 3C aspects (Conscience, Compassion, and Commitment), because so far character assessments

* Corresponding author: rizky.anwari93@gmail.com

are often only based on guidelines provided by the government. The guidelines do not contain clear details of what should be achieved and how the assessment rubric.

Learning that integrates character education has the potential to maximize the development of all dimensions of students, including cognitive, social-emotional, physical, creativity, and spiritual domains [1]. The Merdeka Curriculum currently implemented by schools also emphasizes the development of a holistic education through the Pancasila student profile. The Pancasila student profile has the aim of shaping student character in accordance with the values in Pancasila such as social, spiritual, and moral values. This is in line with the thinking in the Reflection Pedagogy Paradigm (RPP), which states that to form learners into fully developed individuals, it is necessary to pay attention to cognitive, psychological, physical, emotional, affective, moral, social, and spiritual aspects. [2]. Character education is very important for improving the quality of human resources (HR) in Indonesia. Indonesia really needs quality human resources so that the implementation of development programs runs well and the country can progress [3], [4], [5], [6]. As a form of follow-up to the importance of character education and school needs, teachers can create a teaching module that can facilitate the development of competence and character development of students and contain rubrics that can assess 4C (Competence, Conscience, Compassion, and Commitment), namely RPP-style modules [7], [8], [9], [10]. The teaching module can integrate various learning models and also aspects of the Reflection Pedagogy Paradigm such as the spirit that accompanies PPR, PPR Principles, PPR-style assessment, and the PPR cycle.

In this study, the term “Reflective Pedagogy Paradigm (PPR)” has the same meaning with “Ignatian Pedagogy Paradigm (IPP).” The term “Reflective Pedagogy Paradigm (PPR)” is considered more inclusive. Although the concepts of “Ignatian Pedagogy Paradigm” already inclusive and can be used in general education, but the term “Ignatian” is not well known for many people. Since the heart of IPP is reflection, then the word “reflective” is used.

The RPP cycle according to Suparno includes context, experience, reflection, action, and evaluation [2]. Context is related to all factors that support or hinder the learning process such as students, environment and school. Experience can be defined as feeling or appreciating something deeply. Reflection is a process carried out by learners so as to make the learning experience their own (appropriation), obtaining meaning and meaning from the learning experience for themselves and others. Action is an activity that contains attitudes, priorities, commitments, habits, values, ideals, internal growth of people so that they act for others. The process of discovering a context is commonly known as context mining. The term 'action' refers to internal human growth based on experience that has also been reflected as its external manifestation. Action is both related to oneself and related to what one will do outside oneself. Evaluation as a cycle in RPP is to form a human being with a whole personality, intellectually competent, willing to always develop, religious, and full of love and determination to do justice in sincere service to fellow human beings. Meanwhile, evaluation as an assessment can be carried out after providing experience to students by conducting general assessments. The following is an overview of the RPP cycle.

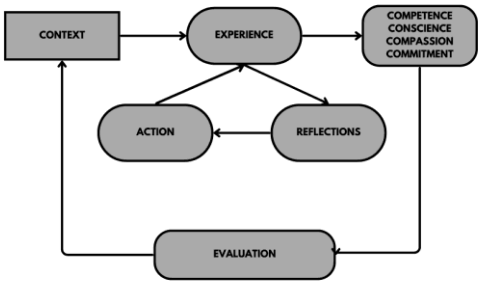

Fig 1. RPP cycle

There are several researchers who have implemented PPR teaching modules such as those conducted by Pradita, namely the implementation of PPR with the topic of pollution at SMA Seminari Mertoyudan [11], then research conducted by Nanga on how the implementation of PPR in trigonometry classes to review the 3C aspects [12], Hartana's research on the application of PPR strategies to improve learning outcomes and motivation to learn science in elementary school students. [13], Melisa's research on the implementation of PPR to develop number theory learning outcomes [14], Pratini's research on the implementation of the reflective pedagogy paradigm in mathematics learning to improve students' competence, conscience, and compassion [15], and Kristanto's research on the implementation of PPR in computer-based algebra and trigonometry courses to improve collaboration and communication between students [16]. The difference between this research and previous research is that the subjects chosen are students who attend semi-military schools that have different character education from schools in general. In addition, the selected learning is geometric sequences.

Based on this background, this study aims to determine the implementation of PPR-style teaching modules in learning mathematics geometry sequence material to help assess student character education at Taruna Nusantara High School.

2 Methods

This is a qualitative study involving 33 grade X students at Taruna Nusantara High School. In this study, mathematics learning will be implemented focusing on the topic of geometric sequence using the Problem Based Learning (PBL) model that integrates the reflective pedagogy paradigm. This study aims to present a description and evaluation of the implementation of learning using the PBL model based on the reflective pedagogy paradigm. The data obtained in this study include cognitive diagnostics, observation of the learning process, learning outcomes, and reflections from students. The following is a cognitive diagnostic test instrument used in this study.

Table 1. Cognitive diagnostic test instrument

No	Question
1	Given two consecutive numbers in a sequence, how do you determine the ratio between them?
2	Given a sequence of numbers 2, 4, 8, 16, ... can students determine the next number? Explain how to find it.
3	Do you understand how to determine the nth term in a geometric sequence?
4	Can students clearly distinguish between geometric and arithmetic lines?

5	If you know that a geometric sequence has a first term of 3 and a ratio of 2, can you determine the 4th term of the sequence?

The following is the 3C (Conscience, Compassion, Commitment) assessment instrument in this study.

Table 2. 3C assessment instrument

Assessment	Aspec
Conscience	Integrity
	Responsibility
	Honesty
	Discipline
Compassion	Leadership
	Cooperation
	Caring
	Patience
Commitment	Critical Thinking
	Creative
	Mutual Cooperation

The reflective questions used in this study integrate the 4C components presented in the following table

Table 3. Reflection Guidelines

4C Component	Questions
Competence	1. What are the main concepts you learned about geometric sequences today? What are the main differences you found between geometric sequences and arithmetic sequences? Give an example 2. What challenges or difficulties did you face when learning and solving geometric line problems? How did you overcome them?
Conscience	3. Do you feel confident that you can calculate the nth term or the sum of the first terms of a geometric sequence? Explain the steps you took to solve the problem.
Compassion	4. How do you help a friend in your group who has difficulty understanding the concept of geometric sequences?
Commitment	5. What have you learned about yourself while studying geometry lines? Is there any attitude or way of learning that you want to improve in the future?

3 Results and Descriptions

Learning Implementation Description

In this study, the classroom learning was conducted for 90 minutes or the equivalent of two lesson hours on the topic of geometric sequence. In this meeting, students will learn how to determine the ratio and the n^{th} term in a geometric sequence. The method used is Problem-Based Learning (PBL) which emphasizes a constructivistic approach. Through this approach,

learners will be guided to build their knowledge independently, especially regarding the concept of geometric sequence s. The learning objectives are formulated based on the four dimensions of 4C as follows.

- **Competence**: Learners are expected to be able to solve various problems related to geometric sequences, including the ability to determine the n^{th} term in a geometric sequence appropriately.
- **Conscience**: Learners are expected to understand the importance of the concept of geometric sequence in everyday life. In addition, they are expected to show integrity in completing tasks, a sense of responsibility in the learning process, honesty in problem solving, and discipline in following each stage of the work.
- **Compassion**: Learners are expected to show leadership in the group, cooperate effectively in solving problems related to geometric sequences, and have concern for the opinions and difficulties experienced by their peers. They should also be patient in dealing with differences in understanding and be ready to help group members who need support.
- **Commitment**: Learners are expected to show commitment to complete the project given in PBL learning by thinking critically, creatively, and working together in mutual cooperation in finding solutions to problems related to geometry sequences.

3.1 Context

Learning begins by exploring the students' context. Context mining is important to find out how the condition of students before learning. The process of extracting this context is done by using a cognitive diagnostic test that contains questions that can explore the basic understanding of students related to geometric sequence material. The results of this cognitive diagnostic test will provide an overview of how the level of understanding of students before proceeding to the next stage of learning. The following graph shows the results of the cognitive diagnostic test conducted.

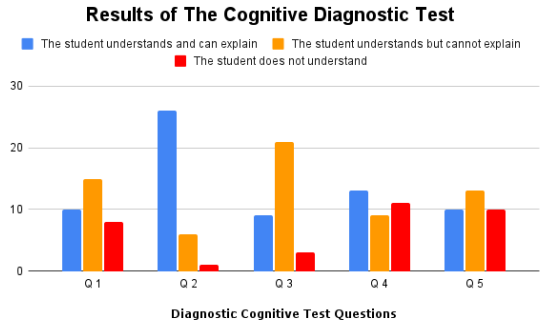

Fig 2. Results of the cognitive diagnostic test

The Figure 2 shows different results for each question asked. In questions number 1 and number 3, it can be seen that the number of students who understand the material but have difficulty explaining is less than the number of students who claim to understand but cannot explain the concept. Conversely, in question number 2, the number of students who not only understood but could also explain was more than those who only understood but could not express their understanding. In question number 4, the number of students who did not understand was slightly more than the students who understood and could explain, but the number was less than the students who understood but could not explain clearly. Whereas in question 5, the number of students who did not understand was the same as the number of

students who understood and could explain, although the number of students who understood but could not explain was slightly higher.

3.2 Experience

In the first stage of Problem Based Learning (PBL), the teacher focuses students' attention on the issue that needs to be solved. The teacher asks questions related to the geometric sequence such as the division of bacteria or the decay of radioactive substances every once in a while. The PPR spirit of a positive world and finding God in everything is seen when the teacher explains that both phenomena occur by God's will. Next, the teacher organizes students to learn. Students are divided into small groups of two, and each group is given a Learner Worksheet (LKPD) to help them write the solution to the problem given. During the group discussion process, the teacher's task is to assist students in the learning process and also guide students who have difficulty in finding solutions to the problems given. The spirit of RPP which is Cura Personalist can be seen in the teacher accompanying and guiding students during the discussion.

Group discussion activities in this lesson are designed to provide direct experience to students in understanding the concept of geometric sequences. Through the activity of working on LKPD in groups, students not only gain a deep understanding of the concept, but also engage in an active and fun learning experience. This process encourages students to construct their own knowledge, thus strengthening the understanding of geometric sequences in a more applicable and interesting way. During the student discussion process there are several PPR spirits that can be seen, namely the magical spirit and discernment. Magical spirit exists when students are serious in solving the problems given. While discernment is seen when students determine the solution strategy and determine the solution of the problem given.

Fig 3. Group Discussion

3.3 Reflection

In the early stages of learning, when exploring the context, students are asked to reflect on their understanding of geometric sequences that they have learned at the previous level of education, namely in Junior High School (SMP). Through group discussions, students are given the opportunity to reflect on how they solve the problems contained in the LKPD, by

utilizing the available information and knowledge they have mastered. In addition, students can also evaluate the extent of their contribution to the success of the group in solving the problem.

At the end of the learning session, each student is given a sheet to write their self-reflection. This reflection includes a number of questions related to their experience while learning the geometry sequence material. These reflective questions also integrate the 4C components.

In the competence aspect, the results of students' reflections showed that they were able to understand the main concept of geometric sequences by comparing it with the concept of arithmetic sequences. In the conscience aspect, the reflection results show that students understand the material well, which reflects their integrity and responsibility in the learning process. In the compassion aspect, the reflection results show that students can understand the concept of geometric sequences and know the best way to explain the concept to their friends. This reflects a leadership attitude, where they strive to complete their own understanding, as well as a caring attitude, where they think of the best way to convey their knowledge to their friends. In the commitment aspect, the reflection results show that students have an awareness to improve their learning and practice, which reflects their determination to be lifelong learners.

3.4 Action

After the group discussion, the teacher selects a number of students to be representatives in presenting the results of the discussion and the solutions they find related to the problems faced. In the Problem Based Learning (PBL) framework, this activity is included in the development and presentation of work. Several group representatives then presented the results of their thinking in front of the class. Through this presentation, students not only explain the concepts they have learned, such as the concept of geometric sequences, but also train their ability to convey ideas in a clear and systematic way.

During the presentation process, students are faced with the challenge to not only understand the material well, but also to convey that knowledge in a way that their peers can understand. This requires them to communicate effectively, consider their audience, and adjust their delivery so that the message is truly understood. The ability to convey ideas clearly and persuasively is essential, both in academic contexts and in everyday life. These presentation skills also equip students with the ability to influence others, build confidence, and manage pressure that may arise when speaking in public. Thus, this activity not only develops students' communication skills, but also prepares them for professional challenges, such as project presentations, work meetings, or even leading a team in more complex situations.

After students have gained the knowledge and experience to work on problems related to geometric sequences, students are asked to use their knowledge to work on problems individually. In this situation, the spirit of PPR that emerges is repetition, the spirit of repetition arises when students repeat what they learned before to deepen and strengthen their skills in solving future problems.

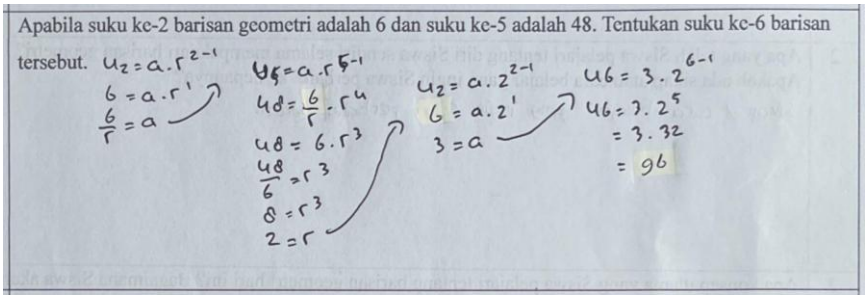

Fig 4. Sample student answer

3.5 Evaluation

Assessment in this reflective pedagogy is based on four main aspects, namely the 4C: Competence, Conscience, Compassion and Commitment. Competence assessment is presented in the following figure.

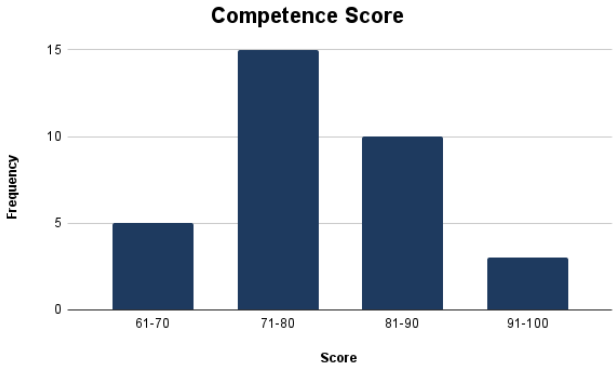

Fig 5. Competency assessment results

Figure 5 shows that the score for competence has an average of 78.74. The Minimum Completion Criteria (MCQ) is 70, so the number of students who passed is 84.85% and the number of students who did not pass is 15.15%. The assessment for the conscience aspect is presented in the following figure.

Fig 6. Conscience assessment results

Figure 6 shows that the score for the conscience aspect reached an average of 8.03. This shows that the students' character contained in the components of the conscience aspect is good. The assessment for the compassion aspect is presented in the following figure.

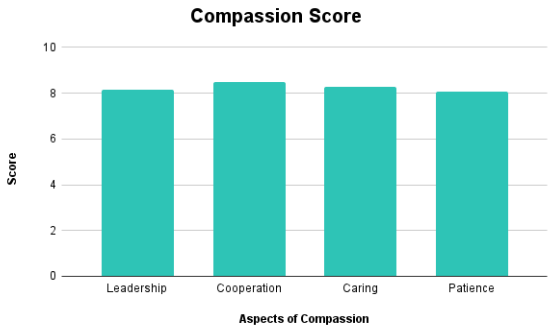

Fig 7. Compassion assessment results

Figure 7 shows that the score for the compassion aspect reached an average of 8.25. This shows that the student character contained in the components of the compassion aspect is good. The assessment for the commitment aspect is presented in the following figure.

Fig 8. Commitment assessment results

Figure 8 shows that the score for the commitment aspect reached an average of 8.16. This shows that the student character contained in the components of the commitment aspect is good. Based on the assessment results from the aspects of conscience, compassion and commitment all show good results. The assessment indicates that so far the character education in the semi-military style Taruna Nusantara High School can shape student character well. The character education has been well implemented and can be maintained.

4 Conclusion

Based on the results of the analysis and discussion, it can be concluded that the mathematics teaching module with the PPR approach is effectively used to assess the implementation of character education based on the 3Cs at Taruna Nusantara High School, in accordance with the stated research objectives. The data obtained showed that the average score for the competence aspect of students reached 78.74, the average score for the conscience aspect of students was 8.03, the average score for the compassion aspect of students was 8.25, and the average score for the commitment aspect of students was 8.16. The reflection activity carried out is an interesting experience for students because they rarely or never do it. Reflection makes students realize what they have gained, how they gained it and what to do in the future. This encourages students to be fully present for every activity they do. In addition, reflection also shows the affective side of students where students who already understand the material can develop a step-by-step plan that they will do to teach their friends who cannot yet.

References

1. L. Rosita, “Peran Pendidikan Berbasis Karakter Dalam Pencapaian Tujuan Pembelajaran di Sekolah,” *Jurnal Ilmu Politik Dan Komunikasi*, Vol. 8, Jun. 2018.
2. P. Suparno, *Pembelajaran Di Perguruan Tinggi Bergaya Paradigma Pedagogi Refleksi (Ppr)*. Yogyakarta: Universitas Sanata Dharma, 2015.
3. D. Sahroni, “Pentingnya Pendidikan Karakter Dalam Pembelajaran,” Vol. **1**, No. 1, Pp. 115–124, 2017, [Online]. Available: Http://Pasca.Um.Ac.Id/Conferences/Index.Php/Snbk
4. S. Ngamanken, “Pentingnya Pendidikan Karakter,” 2014.

5. I. Widiastuti, J. Muhsam, And P. A. Cakranegara, "Analisis Pentingnya Pembangunan Pendidikan Karakter Siswa Dalam Mengembangkan Kualitas Sumber Daya Manusia di Smp Muhammadiyah Surakarta," *Aksara: Jurnal Ilmu Pendidikan Nonformal*, Vol. **7**, No. 2, P. 255, May 2021, Doi: 10.37905/Aksara.7.2.255-262.2021.
6. S. Suwartini, "Pendidikan Karakter Dan Pembangunan Sumber Daya Manusia Keberlanjutan," *Trihayu: Jurnal Pendidikan Ke-Sd-An*, Vol. **4**, Pp. 220–234, Sep. 2017.
7. P. Karakter, Dan Kelayakan Bahan Dalam Pembelajaran Sastra, And D. Nugraha, "Article in Jp-Bsi (Jurnal Pendidikan Bahasa Dan Sastra Indonesia," 2020, Doi: 10.26737/Jp-Bsi.V5i2.1843.
8. Musyawir, "Pembelajaran Inovatif Untuk Menanamkan Nilai-Nilai Karakter Pada Siswa Sekolah Dasar (Sd) Di Namlea Kabupaten Buru (Studi Meta-Sintesis)," Vol. **1**, No. 2, 2022.
9. B. I. Printina, Y. Kusmayadi, And E. Nurholis, "Paradigma Pedagogi Reflektif Terintegrasi Flipped Classroom Pada Materi Majapahit Mempersatukan Nusantara Menggunakan Media Pembelajaran Peta Timbul," *Jurnal Artefak*, Vol. **11**, No. 2, P. 181, Sep. 2024, Doi: 10.25157/Ja.V11i2.14309.
10. J. Naingalis, D. Juanto, S. Telaumbanua, K. S. Mangero, And D. Sianipar, "Pembentukan Karakter Mahasiswa Kristen Melalui Pengabdian Kepada Masyarakat Berbasis Teologi Kristen Dan Pedagogi-Reflektif," *Da'at : Jurnal Teologi Kristen*, 2022, Doi: 10.14710/Humanika.17.1.
11. A. P. Pradita, "Seminar Nasional Pendidikan Sains) 2022 'Dinamika Pembelajaran Sains Dalam Kurikulum Merdeka' Surakarta," *Prosiding Snps (Seminar Nasional Pendidikan Sains) 2022*, 2022.
12. Y. M. Nanga, "Implementasi Paradigma Pedagogi Reflektif (Ppr) Dalam Kelas Trigonometri Dengan Meninjau Competence, Conscience, Dan Compassion," *Jurnal Ilmiah Vokasi*, 2023.
13. A. Hartana, P. Setyosari, And D. Kuswandi, "Penerapan Strategi Pembelajaran Paradigma Pedagogi Ignatian (Reflektif) Terhadap Peningkatan Hasil Belajar Dan Motivasi Berprestasi Belajar Ilmu Pengetahuan Alam (Ipa) Siswa Kelas V Sekolah Dasar," *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, Apr. 2016.
14. M. M. Melissa, "Implementasi Paradigma Pedagogi Reflektif Untuk Mengembangkan Hasil Belajar Teori Bilangan," *Seminar Nasional "Pembelajaran Matematika Menghadapi Era Revolusi Industri 4.0*, Nov. 2019, [Online]. Available: Https://Www.Researchgate.Net/Publication/337940164
15. H. S. Pratini, "Implementasi Paradigma Pedagogi Reflektif Dalam Pembelajaran Matematika Untuk Meningkatkan Competence, Conscience, Dan Compassionmahasiswa," *Elementary School*, 2016.
16. Y. Dwi Kristanto, "Implementasi Pedagogi Ignasian Dalam Pembelajaran Mata Kuliah Aljabar Dan Trigonometri Berbasis Computer-Based Math Untuk Meningkatkan Kolaborasi Dan Komunikasi Antarmahasiswa," *In Book: Risalah Implementasi Model-Model Pembelajaran Berbasis Pedagogi Ignasian*, Vol. **3**, Pp. 6–13, 2017, [Online]. Available: Https://Www.Researchgate.Net/Publication/322618217