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Enhancing the Enthusiasm of Blind Students through Set Operation Learning Using Fruits Context: A Lesson Study

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Abstract. This research aims to enhance the enthusiasm of blind students in learning set operations using the lesson study approach within the context of fruits. This research is motivated by the challenges of presenting the abstract concept of set operations to blind students, who often require media and teaching methods tailored to their conditions. Lesson study, as a collaborative cycle among teachers, is expected to facilitate the development of effective learning strategies. Meanwhile, fruits were chosen as the context because of their characteristics that are close to students' daily lives and easily accessible through the sense of touch. This research method uses design research adapted to the stages of lesson study: Plan, Do, See, and Redesign. Data collection techniques using observation of student activities and documentation. Data analysis was conducted using descriptive qualitative methods to understand how the use of fruits context in lesson study can enhance the enthusiasm and understanding of blind students in learning set operations. The research results are expected to contribute to the development of inclusive mathematics education for blind students, as well as provide practical recommendations for teachers in implementing lesson study and using learning media that meet the needs of the students.

Keywords: Blind Students; Lesson Study; Realistic Mathematics Education; Set Operation; Students' Enthusiasm

Abstrak. Penelitian ini bertujuan untuk meningkatkan antusiasme siswa tunanetra dalam pembelajaran operasi himpunan menggunakan pendekatan lesson study dengan konteks buah-buahan. Penelitian ini dilatarbelakangi oleh tantangan dalam menyajikan konsep abstrak operasi himpunan kepada siswa tunanetra, yang seringkali membutuhkan media dan metode pembelajaran yang disesuaikan kondisi mereka. Lesson study, sebagai sebuah siklus kolaboratif antara guru, diharapkan dapat memfasilitasi pengembangan strategi pembelajaran yang efektif. Sementara, buah-buahan dipilih sebagai konteks karena karakteristiknya yang dekat dengan kehidupan sehari-hari siswa dan mudah diakses melalui indera peraba. Metode Penelitian ini menggunakan penelitian desain yang disesuaikan dengan tahapan dalam lesson study: Plan, Do, See, and Redesign. Teknik pengumpulan data dilakukan melalui observasi aktivitas siswa dan dokumentasi. Analisis data dilakukan dengan metode deskriptif kualitatif untuk memahami bagaimana penggunaan konteks buah-buahan dalam lesson study dapat meningkatkan antusiasme dan pemahaman siswa tunanetra dalam mempelajari operasi himpunan. Hasil penelitian diharapkan dapat memberikan kontribusi bagi pengembangan pembelajaran matematika siswa inklusif, khususnya bagi siswa tunanetra, serta memberikan rekomendasi praktis bagi guru dalam menerapkan lesson study dan menggunakan media pembelajaran yang sesuai kebutuhan siswa.

Kata kunci: Antusiasme Siswa; Lesson Study; Operasi Himpunan; PMRI; Siswa Tunanetra

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INTRODUCTION

Every human being has a willpower, determination and, aspirations in life. To achieve this desire, the person will certainly make efforts by maximizing himself in order to achieve what he wants by optimizing these potentials (Hasneli & Riska, 2019). Similarly, blind children possess the capacity and need for self-actualization, even though they experience sensory limitations that require different learning approaches (Setiarani et al., 2018). Therefore, teachers and schools must provide meaningful and inclusive learning opportunities that allow students with visual impairments to optimize their strengths and actively participate in classroom learning (Messiou & Ainscow, 2020).

The Merdeka Belajar Curriculum (Independent Learning Curriculum) was introduced as one of the key components in efforts to reform and restore education in Indonesia. This curriculum is designed to be more flexible, centered on essential materials, and focused on building character and competence. In line with that, the design of the Merdeka Belajar Curriculum for Special Schools (Sekolah Luar Biasa) is also outlined in the appendix of the Minister of Education Decree Number 56 of 2022 concerning curriculum implementation guidelines. This curriculum encourages adaptive and differentiated instruction that considers students' diverse abilities, including those with special needs.

The existence of the Merdeka Belajar Curriculum also brings new challenges for educators, especially in special schools, to design and adapt learning that involves collaboration between teachers across various fields. One effective way to realize such collaboration is through the implementation of Lesson Study (LS) for students with special needs, including blind children (Kholik et al., 2022). Lesson Study is an activity carried out by classroom teachers who not only teach but also analyze how students learn and how their lessons can be improved (Nuraida & Putri, 2018). This approach encourages teachers to work collectively in planning, observing, and reflecting on lessons, which leads to continual professional development and improved teaching practices (Kusumah & Nurhasanah, 2017).

Lesson study follows a systematic cycle in which teachers collaborate in planning, conducting, observing, and reflecting on learning activities. This collaborative process allows teachers to examine their strengths and weaknesses during teaching and aims to bring about positive changes in instructional quality. The integration of assistive technology such as JAWS can further support accessibility and engagement for blind students. Lesson study, which was first developed in Japan, has proven to be a suitable model for enhancing teaching quality and professional growth (Kanellopoulou & Darra, 2019). According to Octriana et al. (2019), lesson study embodies collaborative learning based on the principles of mutual learning and collegiality that help build a sustainable learning community among teachers.

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Meanwhile, in the research by Agustina & Putri (2020), it is explained that lesson study is a system of professional development for teachers through collaborative learning assessment with the principle of collegiality for mutual learning to build a learning community and to improve the quality of learning, and it is expected to create dynamics of interaction among teachers so that creativity and motivation can be built sustainably. This explanation in line with the impact of lesson study, where one of the outcomes is that learning becomes more focused because teachers plan lessons collaboratively and consider student responses, resulting in learning that is more aligned with student needs (Rusiyanti et al., 2021). In addition, Lesson Study encourages teachers to design lessons that anticipate students' responses, thereby promoting instructional alignment with learners' needs (Lewis, 2020).

The collaborative learning process also aims to train students to be able to discuss with others in order to exchange ideas and express their thoughts as well as build a clear understanding (Sato, 2014). Through such a learning process, students are expected to be brave enough to express their ideas and learn from each other to achieve a common understanding (Nuraida & Putri, 2018). Lesson study has four stages, namely Plan-Do-See-Redesign. The *plan* stage, is the stage where teachers collaboratively produce a learning device design, the *do* stage is the stage of learning implementation, the *see* stage aims to observe the strengths and weaknesses in the implementation of learning and finally, and the *redesign* stage in the form of activities to improve the shortcomings of the learning process that has been implemented (Sumarni et al., 2021). This continuous cycle strengthens both teaching practices and students' engagement.

In this study, lesson study is integrated with the principles of Realistic Mathematics Education (RME) to optimize students' mathematical understanding through real-world contexts. During the implementation of lesson study, students in their respective groups were given sharing task in the student worksheet, which contained mathematical problems related to everyday life or contextual problems aligned with the concept of RME to measure students' basic knowledge of the learning material provided by the teacher, with a difficulty level categorized as not difficult. After that, students individually worked on Jumping Task questions in the Student Worksheet with a difficulty level categorized as difficult but still using the realistic mathematics education approach (Asari, 2017; Rahayu & Putri, 2021). This integration between Lesson Study and RME aims to help teachers design contextual and meaningful mathematics learning experiences that promote student reflection and active participation.

The goal of the lesson study that integrates (RME) approach is to comprehensively improve the quality of mathematics learning by focusing on students' conceptual understanding through real contexts. Additionally, the integration of Lesson Study and RME aims to make teachers more reflective and collaborative, and to produce students with a strong understanding of mathematics,

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capable of critical thinking, and possessing a positive disposition towards mathematics (Nuraida & Putri, 2019). As notes by Octriana et al. (2019) concluded that lesson study as a collaborative and cyclic approach has proven effective in improving the quality of classroom learning. Through the stages of planning, implementation, observation, and repeated reflection, teachers can gradually improve and enhance their teaching practices. Similarly, Rini (2021) found that the implementation of lesson study shows an improvement in student learning outcomes. This is due to higher quality and more effective learning as a result of the lesson study process. Lesson study can encourage the formation of a learning community among teachers (Agustin & Putri, 2020).

Moreover, through continuous collaboration and discussion, teachers can support each other and build a positive learning culture in schools. In the research by Fauziah et al. (2020), lesson study also contributes to the professional development of teachers. The process of collaboration with colleagues in planning, implementing, and reflecting on learning allows teachers to learn from each other, share knowledge, and enhance their competencies. In line with the research by Nuraida & Putri (2018), which show that lesson study can help teachers in the preparation of learning processes in collaboration between teachers and make it easier for students who are mostly. It is difficult to ask questions so that students can more easily understand mathematical concepts. As well as a system of teacher professional development through collaborative learning assessment and with the principle of collegiality learning from each other to build a learning community and improve the quality of learning, it can create dynamics of interaction between teachers so that creativity and motivation are built continuously.

Although many studies have confirmed the effectiveness of Lesson Study and RME in improving mathematics learning, in-depth research focusing specifically on their application for blind students remains limited. Most research on lesson study and RME tends to focus on regular students, leaving a gap in understanding how the unique characteristics of blind learners—such as the need for tactile and auditory representations—affect mathematization and conceptual understanding within Lesson Study frameworks. Consequently, there is still a lack of insight into the most effective teaching strategies, instructional designs, and contextual adaptations that can support meaningful mathematics learning for visually impaired students.

Therefore, this study aims to bridge that gap by developing an RME-based Lesson Study implementation model that accommodates the needs and learning potentials of blind students in mathematics. Specifically, the research seeks to enhance the enthusiasm and conceptual understanding of blind students in learning set operations through the use of a concrete fruit context relevant to their sensory experiences. This contextual and collaborative approach is expected to facilitate a deeper understanding of abstract set concepts while fostering inclusivity and engagement among blind learners.

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METHOD

The method used in this research was a design research with validation studies type. This method was chosen to develop and validate theories about the learning process (Plomp, 2007). The study was conducted at a special needs school in Jambi, Indonesia, involving four blind students, one classroom teacher, one model teacher, and six observers. The research instrument used was a student worksheet containing jumping and sharing tasks. The collected data was analyzed using descriptive qualitative analysis.

This validation study consisted of three stages: preparing for the experiment, teaching experiment, and conducting retrospective analysis (Gravemeijer & Cobb, 2006). This study also utilized a lesson study framework consisting of three stages: plan, do, and see. In its implementation, the validation study and lesson study stages are interrelated and conducted in parallel, as shown in Figure 1.

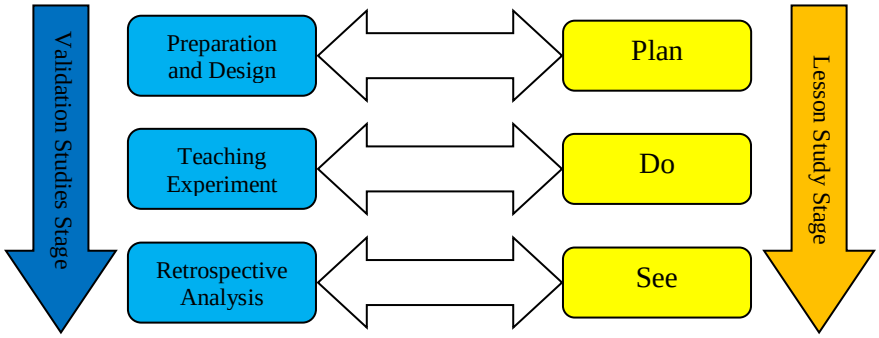

Figure 1. Linking between Validation Studies Stages and Lesson Study Stages

First, in the preparation and design phase, researchers design a hypothetical learning trajectory (HLT) based on learning theory, previous classroom experiences, and the local context. The primary focus of this phase is identifying learning objectives, designing student activities and predicting student responses, and formulating how the teacher will support the learning process. It is relate with plan in lesson study. The plan phase involves collaboration between the teacher and researcher to design an open-ended lesson (research lesson), including determining the learning objectives to be achieved, selecting appropriate materials and methods, and designing the learning scenario (including predicting student responses).

Second, the teaching experiment phase involves implementing the learning design in a real classroom (with students and teachers). The researcher acts as an observer and collaborative partner with the teacher to collect data (videos, transcripts, observation notes), observe how students respond to activities, and observe how student-teacher interactions support conceptual understanding. In the other side, in do stage, the designed lesson is then implemented by one teacher, while the other observes. Observations focused on student responses and activities, not just

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teacher performance. Furthermore, systematic data collection (videos, observation sheets, field notes) was conducted.

Lastly, in the Retrospective Analysis phase, researchers conduct an in-depth analysis of the data collected during the experiment by comparing the predictions in the HLT with the classroom reality, identifying learning patterns, barriers, and the development of student understanding, and refining the design and HLT. The see stage in lesson plan also was a collective post-implementation reflection, with the teaching teacher providing an initial reflection, the observation team providing input based on concrete evidence, and the researcher adding theoretical reflection.

RESULTS AND DISCUSSION

Plan Stage (Planning)

At this stage, the lesson study team—comprising teachers, observers, and facilitators—collaborates to carefully design the mathematics lesson that will later be implemented and observed. This planning phase also aligns with the preparation and design phase of design research (Gravemeijer & Cobb, 2006), where the focus lies in identifying learning goals, predicting student thinking, and constructing a hypothetical learning trajectory. Planning activities are carried out collaboratively between researchers and teachers. This collaboration reflects the core of Lesson Study philosophy, emphasizing shared responsibility and collective reflection in lesson design (Fernandez & Yoshida, 2012). Figure 2 represents this collaboration in a focus group discussion.

Figure 2. Teachers and Researchers Discuss about Lesson Planning

Formulating Learning Objectives

The team formulates learning objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). These objectives must take into account the unique characteristics and needs of blind students. The planned lesson targets the topic of set operations using the fruit context, accessible via tactile experiences. The learning objectives formulated by the team in this activity are *blind students are expected to understand the concept of set operations and be able to*

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solve set operation problems in everyday life. The process of defining learning objectives in special education contexts must emphasize accessibility and multimodal engagement to ensure inclusivity (Browder et al., 2014).

Choosing Context and Learning Media

The team selects fruits as the primary context, considering their varied textures, aromas, and shapes that can be distinguished by blind students through touch and smell. This real-world context helps students connect with mathematical ideas in an accessible and meaningful way. To support learning, the team designs inclusive learning media, such as real fruits with distinct tactile features, braille-labeled cards, tactile diagrams representing sets and their intersections. These media serve both as referential models and as concrete representations to scaffold abstract reasoning. This aligns with previous studies highlighting the effectiveness of tactile and sensory-based learning materials in improving mathematical understanding among students with visual impairments (Kankhar & Mahender, 2025).

Preparing the Hypothetical Learning Trajectory

The resulting HLT from the discussion process between the researcher and the teacher of blind students about set operations is visualized through the iceberg model depicted on the iceberg in Figure 3. It rooted in Realistic Mathematics Education (RME), which describes how learners progress from informal to formal understanding. This model guides the lesson structure for blind students.

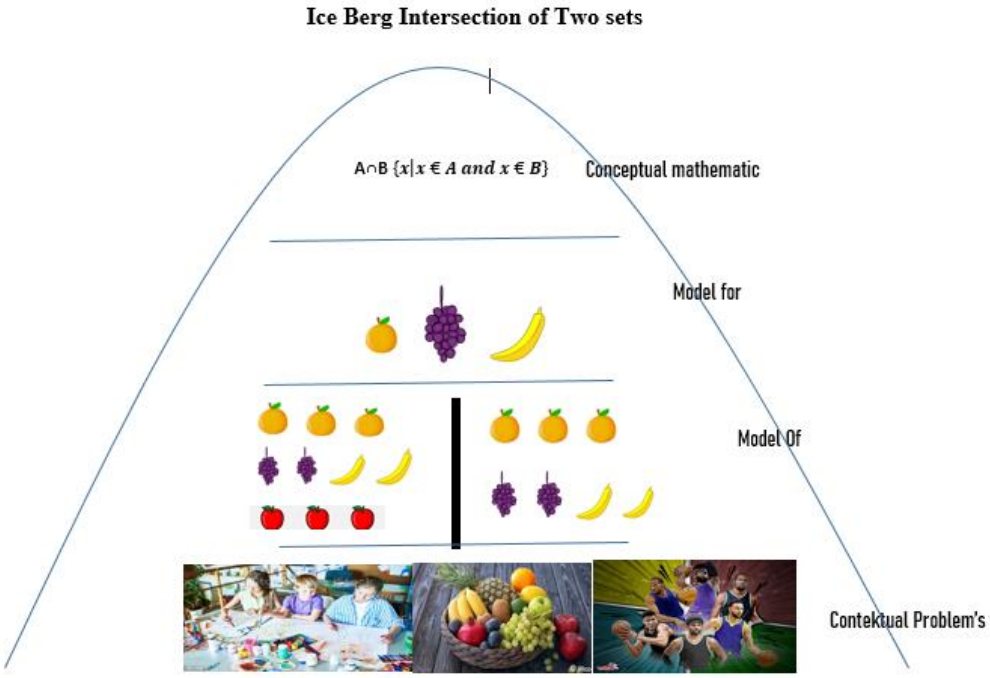

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Figure 3. Ice Berg of the Intersection of Two Sets

In learning mathematics using the RME approach, there are four levels described by the use of icebergs, namely situasional, referensial (model of), general (model for), and formal (Anggi et al. 2023). In situational level, blind students interact with real fruits to intuitively explore similarities and differences. Then in referential level, students using tactile aids to group and compare fruits, forming representations of sets and overlaps. While in general level, students begin to abstract and verbalize patterns and relationships using their own language and strategies. In the end, formal level, students connect tactile experiences to formal symbols and procedures in set theory (e.g., union, intersection) with teacher guidance. This process is consistent with Gravemeijer and Cobb's (2006) notion of hypothetical trajectories and with Freudenthal's (1991) view that mathematical understanding emerges from guided reinvention. The use of RME in inclusive education is also supported by Klingenberg et al. (), who highlight its role in making abstract mathematics accessible and meaningful for all learners, including those with visual impairments.

The sequence of activities for blind students from informal knowledge to formal knowledge begins with the students' direct experiences in understanding the context of fruits in real life. From this experience, blind students develop intuition and initial understanding of the concept of set operations through exploration and interaction with the context of the fruits used. Next, they began to express their own informal ideas and strategies to solve set operation problems using the context of fruits, so that they could use their own language and representations to articulate their understanding. This learning progression resonates with research showing that contextually grounded mathematics activities promote conceptual understanding and motivation among learners with special needs (Van den Heuvel-Panhuizen, 2020).

Through discussions and interactions with peers and teachers, blind students then compare and reflect on various strategies, identifying the strengths and weaknesses of each. This process helps them to generalize and abstract concepts from the initial context to broader situations. Next, the teacher guides students to connect their informal understanding with symbols, definitions, and formal procedures of set operations, so they can master formal knowledge with deep comprehension. So, the purpose of using the iceberg metaphor in mathematics education, particularly in the context of Realistic Mathematics Education (RME), is to emphasize the importance of developing a deep conceptual understanding before students are introduced to formal mathematics. This metaphor illustrates that formal mathematical knowledge (the part visible on the surface) must be supported by a strong conceptual understanding (the submerged part). In RME, teachers play a crucial role in helping students build this submerged part through the use of relevant contexts, exploratory activities, discussions, and informal strategies. Thus, students are not only

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able to memorize formulas and procedures, but also understand the meaning and application of mathematics in real life, thereby creating more meaningful and sustainable mathematics learning.

Preparing the Lesson Plan

The designed lesson plan includes learning steps aligned with RME stages, time allocation, teaching strategies that support blind students (e.g., using descriptive oral instructions, structured routines, and hands-on exploration). The lesson plan design emphasizes descriptive language, predictable structure, and access to tactile learning resources to ensure equitable learning experiences.

Determining Observers

The team assigns observer roles to capture classroom interactions and student thinking. In this case three mathematics education lecturers and four mathematics teachers act as observers, tasked with recording both teacher actions and blind students' responses during the lesson.

Stage Do (Execution)

The model teacher conducts the lesson according to the prepared lesson plan. The teacher ensures that all blind students are actively engaged in the learning process and understand the set operation concepts being taught. Meanwhile, the observer observe the activities of blind students during the learning process. The observer notes how blind students respond to the lessons, how they use learning media, and the interaction between students and teachers. Observers also take photos or videos to document the learning process.

Figure 4. The Model Teacher Conducts Lesson Study in the Classroom

At this stage, the model teacher arranging the students' seating in a U-shape according to the characteristics of lesson study. In the phase of contextual problem, the model teacher provides concrete experiences to blind students start with real experiences, such as holding and feeling the texture of various types of fruits on the students' table, like oranges, bananas, and grapes. While in the phase of "model of", the model teacher invites a discussion about the characteristics of fruits

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(e.g. color, taste, and texture) to help blind students build an initial understanding of the concept of "set" or "collection." Then, in the phase of “model for”, blind students began to informally represent sets of fruits, like grouping the fruits. They were asked to group the fruits based on the criteria of all fruits being red and all fruits being round. Also in this stage, students begin to understand the concept of "set members" and "subsets." This is a abstract “conceptual of mathematic”. At the end of session, the teacher gives a contextual problem related to set operations such as the intersection of two sets.

Figure 5. The Blind Students Learning about Set Operations Intersections

Figure 5 shows blind students two containers containing fruit to stimulate students to understand the concept of intersection of sets. Then students are given Problem 1 to solve collaboratively.

> **Problem 1.** *Tasya and Amel are two friends. They both really like fruits. There are two containers, and inside each container, there are fruits that they like. In Tasya's fruit basket, there are bananas, oranges, and grapes. Meanwhile, in Amel's fruit basket, there are bananas, oranges, grapes, and salacca. Are there any members of both fruit sets that are the same?*

Problem 1 is presented in PDF format, they are input by the teacher into the JAWS application on each student's device. The JAWS (Job Access with Speech) application is a screen reader program that allows blind or visually impaired users to access information on a computer or handphone using voice. Subsequently, the JAWS application automatically reads the questions aloud, making them audible and understandable for visually impaired students. The JAWS application enables users who are blind or have visual impairments to access information and interact with computers running the Windows operating system. Assistive technologies like JAWS play a crucial role in enhancing access to STEM learning for visually impaired students (Kelly, 2009).

To solve problem 1, blind students carry out several stages. First, blind students are given various types of different fruits, such as oranges, bananas, grapes, and salacca. They were then

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asked to work together to group the fruits based on the criteria of fruits that were present in both fruit containers, by feeling both fruit baskets. After the grouping process is complete, the blind students are guided to find the intersection of the two groups of fruits favored by Tasya and Amel based on Problem 1. Then, the blind students are taught by the model teacher about the concept of intersection, which is where the set members from A also belong to B. With the help of educational with hearing a videos provided during the learning process and activities using contextual media that can be directly touched by blind students, it is hoped that these students will discover the concept of sets and operations on sets. As a result of this activity, blinds students can gradually understand the concept of sets and operations on sets.

The teacher model also provides the student activity sheets that were previously designed together with the teacher during the planning stage, with several jumping task and sharing task. The sharing task is a math problem involving set operations that are still simple and conceptual, which can be done in pairs or groups with a moderate difficulty level. Meanwhile, the jumping task are more difficult than the previously given sharing task questions. The jumping task involve how to apply the concept of set operations in everyday life, and these questions are completed individually. These tasks contain the concept of set operations within the context of fruits. At this stage, it is also hoped that the learning objectives are achieved accurately according to the desired iceberg. In RME approach, an iceberg is used to illustrate the stages students go through in understanding mathematical concepts from concrete situations to formal abstraction (Putri & Nuraida, 2018).

This iceberg is used to describe the process of understanding learners from something real (everyday life) to the top of the iceberg where they are able to understand abstract mathematical symbols (Liando, 2022). At the first level, learners are familiarized with solving problems in everyday life, the second level is the use of props to explore the ability of learners to work mathematically, the third level is the creation of foundations (building stone) which is where Learner activities begin to lead to mathematical understanding, and the fourth level makes conclusions about the concept of Set. In addition, RME can instruction helps in facilitating Blind students' understanding of educational materials, thereby improving retention of the content learnt. The RME approach is also effective in transforming abstract concepts into practical and contextualised scenarios for students.

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Figure 6. Blind Students Solving Problems Presented in Student Worksheet

Figure 6 shows that blind students solving problems in student worksheet assisted by the JAWS application specifically designed for blind students. While collaborating with his friend, blind students work on worksheets for problems they are confused about, and the model teacher helps them solve the issues and during the lessons, visually impaired students are also very enthusiastic in participating in the learning. It can be said this study explored the enthusiasm of blind students in learning set operations using a RME approach with the context of fruits through a lesson study cycle.

The findings offer valuable insights into how RME combined with a familiar and engaging context can foster a positive learning experience for blind students in a traditionally challenging mathematical domain. However, the implementation of the RME approach contextualized with fruits appeared to significantly improve student engagement and comprehension (Putri & Zulkardi, 2019). The use of tangible manipulatives, such as real fruits or fruit replicas, allowed students to actively explore the concepts of sets, unions, intersections, and complements in a concrete and meaningful way. This hands-on experience seemed to bridge the gap between abstract mathematical ideas and the students' lived experiences, making the learning process more accessible and relatable. This resonates with the principles of RME, which emphasize the importance of connecting mathematics to real-world contexts (Putri & Nuraida, 2019).

Stage See (Reflection)

After the learning session is over, the lesson study team meets to reflect. Some activities carried out at this stage include each observer sharing their notes and observations about the learning conducted by the model teacher in set operations for visually impaired students. The team openly discusses various aspects of the learning process, including the strategies used, the responses of visually impaired students during the lesson, and the materials taught. During the discussion, the observers focused on the activities and understanding of the visually impaired students, particularly how they used their sense of touch to interact with concrete media to grasp the concept of set

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operations. The observers discussed what needs to be improved and enhanced for future lesson studies.

> *Student A, whom he observed at the beginning of the lesson, was just silent and listening to the teacher. After the model teacher guided with contextual media using fruit, he immediately smiled as if he understood what he was going to do.* – Teacher A

Figure 7. Model Teachers and Observers Engage in Reflection Activities

The collaborative nature of the lesson study cycle also played a crucial role in the success of the intervention. The teachers involved in the lesson study team worked together to plan, implement, observe, and reflect on the lessons. This collaborative process allowed them to share their expertise, learn from each other's experiences, and refine their teaching strategies to better meet the needs of the blind students. The shared reflection sessions were particularly valuable, providing a platform for the teachers to discuss their observations, analyze student responses, and identify areas for improvement. This highlights the benefits of collaborative professional development for enhancing teacher effectiveness in inclusive classrooms (Rahayu & Putri, 2021).

CONCLUSION

The use of concrete contexts relevant to blind students sensory experiences has a significantly positive impact. The application of fruit contexts has proven to be able to stimulate interest, enthusiasm, and active participation among blind students in understanding the abstract concept of set operations. Tactile and sensory activities related to fruits facilitate the conceptual understanding of blind students in a more meaningful way compared to traditional teaching methods that might rely more on visualization. The use lesson study provides an organized structure for teachers to collaborate and develop effective learning. Everyday contexts, such as the use of fruits in learning set operations, serve as a bridge between abstract mathematical concepts and the real world familiar to blind students. By using relevant contexts, students can more easily understand and visualize mathematical concepts, thereby increasing their enthusiasm for learning. In addition, lesson study helps create engaging and interactive learning, thereby increasing the enthusiasm of

blind students in studying set operations. This research also provides a comprehensive overview of the effectiveness of using lesson study with a fruit context to enhance the enthusiasm and understanding of blind students in learning set operations. This research is expected to contribute to the development of inclusive mathematics education, particularly for blind students, as well as provide practical recommendations for teachers in implementing lesson study and using appropriate learning media.

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REFERENCES

Anggi, R. P., Hennilawati, & Nurbaiti. (2023). Penerapan Pendekatan Matematika Realistik (PMR) Untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas IV SD Negeri 200212 Padangsidimpuan. JURNAL JIPDAS (Jurnal Ilmiah Pendidikan Dasar), 3(2), 346–354. https://doi.org/10.37081/jipdas.v3i2.538

Agustina, A., & Putri, R. I. I. (2020). Calculation of electric account as learning context based on project based learning (PBL) and lesson study for learning community (LSLC). *Journal of Physics: Conference Series*, *1657*(1). https://doi.org/10.1088/17426596/1657/1/012063.

Asari, S. (2017). Sharing And Jumping Task In Collaborative Teaching And Learning Process. *DIDAKTIKA : Jurnal Pemikiran Pendidikan*, *23*(2), 184. https://doi.org/10.30587/didaktika.v23i2.28.

Browder, D. M., Spooner, F., Ahlgrim-Delzell, L., Harris, A. A., & Wakeman, S. Y. (2014). A meta-analysis on teaching mathematics to students with significant cognitive disabilities. *Exceptional Children*, *80*(4), 423–446. https://doi.org/10.1177/001440290807400401

Fauziah, A., Putri, R. I. I., Zulkardi, & Somakim. (2020). Developing pmri learning environment through lesson study for pre-service primary school teacher. *Journal on Mathematics Education*, *11*(2), 193–208. https://doi.org/10.22342/jme.11.2.10914.193-208.

Fernandez, C., & Yoshida, M. (2012). *Lesson study: A Japanese approach to improving mathematics teaching and learning*. Routledge. https://doi.org/10.4324/9781410610867

Freudenthal, H. (1991). *Revisiting mathematics education: China lectures*. Kluwer Academic Publishers. https://doi.org/10.1007/0-306-47202-3

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. van den Akker, K. Gravemeijer, S. Mckenney, & N. Nieveen (Eds.). *Educational Design Research* (pp. 15-51). Routledge. https://doi.org/10.4324/9780203088364

Hasneli, H., & Riska, F. M. A. (2019). Gambaran Aktualisasi Diri Penyandang Tuna Netra (Studi pada Boy Sandi Penyanyi Minang). *Al-Qalb : Jurnal Psikologi Islam*, *9*(1), 32–40. https://doi.org/10.15548/alqalb.v9i1.851

Kanellopoulou, E.-M., & Darra, M. (2019). The Implementation of the Lesson Study in Basic Teacher Education: A Research Review. *Higher Education Studies*, *9*(3), 65. https://doi.org/10.5539/hes.v9n3p65.

Kankhar, M. A., & Mahender, C. N. (2025, May). A Comprehensive Study of Tactile Education System for Visual Impaired People. In *International Conference on Recent Advancements and Modernisations in Sustainable Intelligent Technologies and Applications (RAMSITA 2025)* (pp. 88-99). Atlantis Press. https://doi.org/10.2991/978-94-6463-716-8_8

Kelly, S. M. (2009). Use of assistive technology by students with visual impairments: Findings from a national survey. *Journal of Visual Impairment & Blindness*, *103*(8), 470-480. https://doi.org/10.1177/0145482X0910300805

Kholik, A., Bisri, H., Lathifah, Z. K., Kartakusumah, B., Maufur, M., & Prasetyo, T. (2022). Impelementasi Kurikulum Merdeka Belajar Kampus Merdeka (MBKM) Berdasarkan Persepsi Dosen dan Mahasiswa. *Jurnal Basicedu*, *6*(1), 738–748. https://doi.org/10.31004/basicedu.v6i1.2045

EDUMATIKA: *Jurnal Riset Pendidikan Matematika* *e-ISSN 2620-8911*
Volume 8, Issue 1, May 2025 *p-ISSN 2620-8903*

Klingenberg, O. G., Holkesvik, A. H., & Augestad, L. B. (2019). Research evidence for mathematics education for students with visual impairment: A systematic review. *Cogent Education*, *6*(1), 1626322. https://doi.org/10.1080/2331186X.2019.1626322

Kusumah, Y. S., & Nurhasanah, F. (2017). The endless long-term program of mathematics teacher professional development in Indonesia. *Professional Development of Mathematics Teachers, Mathematics Education-An Asian Perspective*, 33–45. https://doi.org/10.1007/978-981-10-2598-3_3

Lewis, C. (2020). Conclusion: How do we judge the success of lesson study adaptations?. In *Stepping up lesson study* (pp. 116-120). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9781003002536-12/conclusion-catherine-lewis

Liando, M. A. J. (2022). Peningkatan Hasil Belajar Matematika pada Materi Pecahan dengan Menggunakan Pendekatan Pendidikan Matematika Realistik (PMR) Pada Siswa Kelas IV SD Gmim Malola. EduTIK: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi, 2(2), 193–204

Messiou, K., & Ainscow, M. (2020). Inclusive Inquiry: Student–teacher dialogue as a means of promoting inclusion in schools. *British Educational Research Journal*, *46*(3), 670-687. https://doi.org/10.1002/berj.3602

Nuraida, E. M., & Putri, R. I. I. (2018). Implementasi lesson study dalam pembelajaran matematika materi perkalian dan pembagian bilangan bulat peserta didik kelas vii. *Seminar Nasional Pendidikan Matematika*, 42–47. https://seminar.uad.ac.id/index.php/sendikmad/article/view/1062

Nuraida, E. M., & Putri, R. I. I. (2019). the Context of Archipelago Traditional Cake To Explore Students' Understanding in Integers Division Class Vii. *Jurnal Pendidikan Matematika*, *14*(1), 91–100. https://doi.org/10.22342/jpm.14.1.7400.91-100

Octriana, I., Putri, R. I. I., & Nurjannah, N. (2019). Penalaran Matematis Siswa Dalam Pembelajaran Pola Bilangan Menggunakan Pmri Dan Lslc. *Jurnal Pendidikan Matematika*, *13*(2), 131–142. https://doi.org/10.22342/jpm.13.2.6714.131-142

Plomp, T. (2007). Educational Design Research. In T. Plomp & N. Nieveen (Eds). *An introduction to educational design research* (pp. 9-35). SLO. https://slo.nl/publish/pages/4474/educational-design-research-part-a.pdf

Putri, R. I. I., & Zulkardi, Z. (2019). Designing Jumping Task on Percent using PMRI and Collaborative Learning. *International Journal on Emerging Mathematics Education*, *3*(1), 105. https://doi.org/10.12928/ijeme.v3i1.12208

Rahayu, P. T., & Putri, R. I. I. (2021). The Data Package in Learning Mean Using LSLC and PMRI. *Jurnal Pendidikan Matematika*, *15*(1), 61–70. https://doi.org/10.22342/jpm.15.1.9431.61-70

Rusiyanti, R. H., Zulkardi, & Ilma, R. (2021). Literature Study on the Impact of Mathematics Learning Implementation with Lesson Study for Learning Community (LSLC). *Proceedings of the International Conference of Mathematics and Mathematics Education (I-CMME 2021)*, *597*, 246–250. https://doi.org/10.2991/assehr.k.211122.034

Sato, M. (2014). *Dialog dan Kolaborasi di Sekolah Menengah Pertama Praktek "Learning Community."* PELITA.

Setiarani, Suci & Suchyadi, Y. (2018). Pola Asuh Orang Tua Terhadap Anak Tunanetra Berprestasi Usia Sekolah Dasar. *Jurnal Pengajaran & Pendidikan Guru Sekolah Dasar*, *1*(1). DOI:10.33751/jppguseda.v1i01.866

Sumarni, S., Putri, R. I. I., & Andika, W. D. (2021). Project Based Learning (PBL) Based Lesson Study for Learning Community (LSLC) in kindergarten. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(2), 989–996. https://doi.org/10.31004/obsesi.v6i2.1637

Van den Heuvel-Panhuizen, M., & Drijvers, P. (2014). Realistic mathematics education. In S. Lerman (Ed.), *Encyclopedia of mathematics education* (pp. 521–525). Springer. https://doi.org/10.1007/978-3-030-15789-0