International Journal of STEM Education for Sustainability, Vol.5, No.1, 2025, pp. 81-95
e-ISSN 2798-5091. DOI. 10.52889/ijses.v5i1.508

Inclusive Education and the Identification of Slow Learners in Mathematics: A Survey Study of Mathematics Teachers' Awareness and Support Needs

Submitted 15 October 2024 Revised 8 December 2024 Accepted 14 December 2024

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Abstract

Inclusive education has emerged as a critical initiative in promoting equitable learning opportunities for all students, including those with special needs. One of the central challenges in implementing inclusive education lies in identifying and supporting slow learners, particularly in mathematics, where learning difficulties often remain undetected or are misdiagnosed. This study investigates the awareness, experiences and support needs of senior secondary school (SMA/MA/SMK) mathematics teachers in Indonesia regarding inclusive education. The focus of the research is to discover and address the needs of slow learners. A survey was conducted of 173 mathematics teachers from various regions across the country to find out what they know about inclusive education, how they interact with students with special needs, and methods for identifying students who are slow learners in the classroom. The results show that although many teachers understand the importance of inclusive education, formal programs for inclusive education are still limited in many schools. Most teachers can identify various difficulties that students may face. Teachers also say that diagnostic tools are needed to help identify students who are experiencing math difficulties. They emphasized that relying on subjective observations without adequate resources is a very difficult problem. This study shows that the development of specific diagnostic tools is essential to support and identify slow learners early on. In line with Sustainable Development Goal 4 (SDG4), which aims to ensure that all students receive an equitable and inclusive education, regardless of their difficulties, this research supports the broader goal of achieving equitable quality education. To support inclusive education, raising awareness, increasing access to diagnostic tools, and targeted pedagogical support are all important steps. This is especially true for teaching mathematics.

Keywords: Diagnostic Tools, Inclusive Education, Mathematics Teachers, Slow Learners, Support Needs

INTRODUCTION

Inclusive education has become the foundation for building an education system that is fair and accessible to all students, including those with special needs. The basic principle of inclusive education is to ensure that every student, without exception, has equal access to quality education in a supportive environment (UNESCO, 2021). Students who are slow learners should receive special attention among various types of students with special needs because they often face difficulties following lessons in class (Hasibuan *et al*., 2020), especially in complex mathematics subjects (Chauhan, 2011; Hasibuan *et al*., 2022; Metikasari *et al*., 2019b; Sovia & Herman, 2019a; Tran *et al*., 2019).

Commitment to Sustainable Development Goal (SDG) 4, which emphasizes ensuring quality education for all students, encourages inclusive education throughout the world (Boeren, 2019; Johnstone *et al*., 2020). One of the main components of SDG 4, Target 4.7 (4a), focuses on creating and developing child-friendly educational facilities that meet the needs of students with disabilities and are gender sensitive, as well as providing safe learning environments.

Inclusive education is still not implemented well in schools, although teacher awareness of the importance of this is increasing (Hasibuan *et al*., 2023; Rianty *et al*., 2017; Suharjo & Zakir, 2021). Many teachers do not understand students with special needs (Sheehy & Budiyanto, 2015), especially children who are slow learners, who may exist in every school (Vasudevan, 2017). In addition, educational institutions often do not have the necessary resources to identify students who show signs of learning difficulties (Hasibuan *et al*., 2023), especially students who fall into the category of slow learners. Identifying students who are slow learners is a major challenge in inclusive education because they will not receive appropriate support and intervention (Khaira & Herman, 2020; Nguyen *et al*., 2015; Vasudevan, 2017). Many children who are slow learners are not identified because there are no appropriate diagnostic tools, so they miss out on the support they need during the learning process.

According to a literature review, not much research has been conducted on inclusive education in Indonesia regarding the problem of children slow to learn mathematics. This especially applies to scientific articles published in accredited national journals (Fitriani & Prahmana, 2021). Given the fact that many schools have students who are slow learners, this subject requires significant attention from mathematics education research. Previous research has emphasized that early diagnosis is very important for identifying slow learners (Imran *et al*., 2023; Joseph & Abraham, 2023; Nguyen *et al*., 2015), but teachers in Indonesia do not have many diagnostic tools (Hasibuan *et al*., 2023). High school students are expected to have mastered basic math concepts before moving on to more complex material, so a lack of resources can hinder providing appropriate interventions for students experiencing math difficulties, which can ultimately impact their academic performance.

The aim of this research is to address this discrepancy by looking at the extent to which mathematics teachers in high schools are aware of inclusive education and identifying their need for tools to help detect students who are slow learners. This research also focuses on how these teachers see various kinds of students with special needs and how they find students who are slow learners in their mathematics education. The survey method was used to determine teachers' perspectives on inclusive education and their recognition of children who are slow learners. The survey is expected to provide a deeper understanding of how prepared teachers feel to face the challenges of identifying slow learners. Moreover, the study will assess teachers' needs for diagnostic test instruments that can assist in identifying students showing signs of slow learning, particularly in mathematics.

The novelty of this research lies in its focus on combining the issue of educational inclusivity with the practical needs of teachers in identifying slow learners. This study contributes to the potential development of effective diagnostic tools and highlights the importance of training teachers to maximize the use of such tools as an initial step in identifying slow learners in their classrooms. The findings of this research are expected to drive more systematic efforts to improve the quality of inclusive education, particularly in mathematics instruction in Indonesian schools, based on the real-world conditions experienced by high school mathematics teachers in the country.

METHOD

This study employed a quantitative research method, gathering data through a survey conducted via the Google Forms platform in June 2024. The survey comprised two main sections: one focused on respondent demographics and the other on research-related questions. The first section collected information about the respondents' schools and teaching experience. The second section explored teachers' awareness of various categories of students with special needs in Indonesia. It examined the actual conditions of inclusive education in their respective schools, focusing on how teachers identify slow learners in their classrooms.

This main section consists of two tick box questions, which allow participants to select multiple answers from the available options, and seven multiple choice questions, which require participants to select only one option. Using a random sample and involving respondents with varying levels of experience, the target population for this questionnaire was high school mathematics teachers at the high school level, with no age restrictions. The results provide valuable insights. Although these figures do not fully describe all provinces in Indonesia, they are representative enough for this research.

As suggested by Borsboom *et al*. (2004), consultation with an expert panel was used for the questionnaire validation process. Two rounds of assessment provide feedback. Initially, the survey was evaluated by a team of education experts from two universities. Then, a second survey was conducted with mathematics teachers from one school. This ensures that the questions match the readership goals of Indonesian mathematics teachers.

The data analysis process followed several key stages. Initially, irrelevant data were filtered out. Next, the findings were systematically organized and presented using graphical representations. Finally, conclusions were drawn and subsequently verified based on the analyzed data. The information derived from this analysis is expected to provide insights into teachers' perceptions of implementing inclusive education at the high school level, particularly regarding students with special needs, including slow learners. It also aims to

determine whether future research should focus on developing tools that can serve as diagnostic instruments for the early identification of students exhibiting signs of slow learning in mathematics. These steps ensure a comprehensive and reliable approach to extracting meaningful conclusions from the collected data, reinforcing the research findings' relevance and practical application.

RESULTS AND DISCUSSION

As many as 173 high school mathematics teachers from public and private institutions participated as respondents in this study. These respondents are high school mathematics teachers distributed across various regions in nine provinces of Indonesia: DKI Jakarta, West Java, Banten, Daerah Istimewa Yogyakarta, Central Java, Riau Islands, North Sumatra, South Sumatra, and East Kalimantan. The respondents possess a range of teaching experiences, as detailed in Table 1. The data reflects a broad spectrum of experience, from teachers just beginning their careers to those with several decades of teaching practice. This variation indicates the respondents' diverse perspectives and understandings of mathematics instruction. Notably, 60.2% of the teachers have more than 10 years of teaching experience, signifying that over half of the respondents have substantial expertise in education. This provides a robust foundation for analyzing teachers' perceptions regarding the implementation of inclusive education in mathematics classrooms and their awareness of various types of students with special needs, particularly slow learners.

Table 1. Teaching Experience of Respondents

Number of Years	Percentage
< 5 years	12.1%
5-10 years	27.7%
11-15 years	26.1%
16-20 years	10.4%
21-25 years	9.8%
26-30 years	8.1%
> 30 years	5.8%

The first question in this survey aims to identify the level of respondents' knowledge regarding inclusive education. Understanding whether teachers are familiar with inclusive education is crucial, given their role in supporting its successful implementation in schools. Figure 1 presents the percentage of respondents who indicated they were aware of inclusive education versus those who were not. This suggests that most teachers know about inclusive education, although a small minority still require further clarification. The high percentage of teachers who are aware of inclusive education reflects efforts to broaden their understanding of the educational needs of students with special needs across various schools.

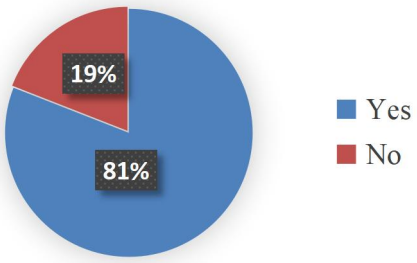

Figure 1. Teachers' Knowledge of Inclusive Education

Beyond gauging teachers' awareness, it is equally important to understand whether their institutions offer inclusive education. This is a critical indicator in assessing the real-world implementation of inclusive education. Figure 2 illustrates the percentage of respondents who work in institutions that have adopted inclusive education, those who have not, and those who are unsure about their school's status. The data indicate that, despite widespread teacher knowledge of inclusive education, its implementation at the school level remains uneven, revealing a gap between awareness and practice.

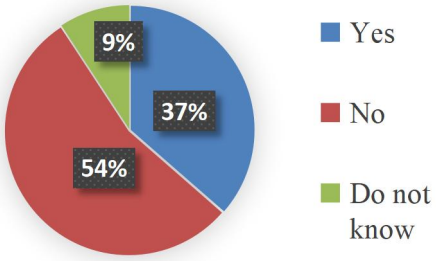

Figure 2. Institutions Implementing Inclusive Education

The third question seeks to determine whether teachers are aware of the diversity of students with special needs. This knowledge is essential, as the more diverse the needs teachers recognize, the better their chances of providing appropriate educational support. Figure 3 depicts the responses regarding teachers' understanding of various types of special needs students. A relatively high percentage indicates that most teachers are familiar with special needs diversity in schools. However, there is still space to improve knowledge among a minority of teachers who are less familiar with these categories.

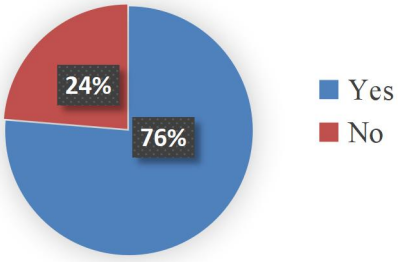

Figure 3. Teachers' Knowledge of the Diversity of Special Needs

The fourth question asked respondents to identify specific categories of special needs students they were familiar with to obtain a more detailed picture. Understanding these categories is crucial for providing more accurate and targeted support. Figure 4 shows the distribution of special needs categories known by the respondents. The data reveal that the most widely recognized categories among mathematics teachers are students with learning difficulties (76.9%), slow learners (73.4%), visual impairments (63.6%), hearing impairments (64.2%), and autism (65.9%). These percentages show that most teachers have a strong grasp of these needs, though their understanding of other categories, such as intellectual disabilities (38.7%), is relatively lower. This finding highlights a knowledge gap regarding certain special needs categories, with more attention seemingly given to more commonly encountered needs, such as slow learners.

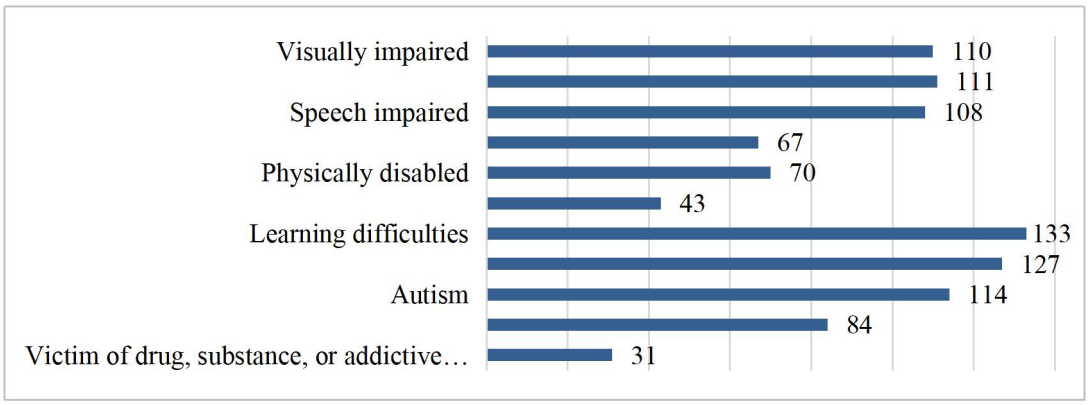

Figure 4. Categories of Special Needs Known by Mathematics Teachers

The fifth question aims to determine whether the teachers currently teach students who fall into any special needs category. This information is essential for evaluating the extent to which teachers are directly involved in inclusive education in their classrooms. Figure 5 shows that, although some teachers have taught students with special needs, most have not had direct experience or are unaware of it. This suggests a need for better identification of special needs students in schools.

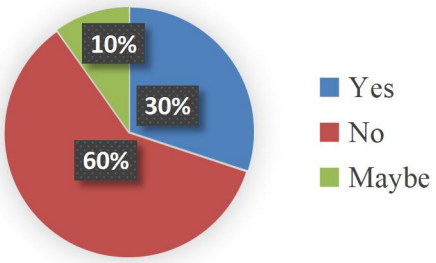

Figure 5. Teachers' Knowledge of the Presence of Special Needs Students in Their Classrooms

The sixth question focuses on students professionally diagnosed as slow learners. Teachers who teach students officially diagnosed as slow learners are confirmed to be working with students who require more adaptive and individualized teaching approaches. Figure 6 illustrates the percentage of teachers currently teaching students with this diagnosis. The data reveal that, although slow learners are widely recognized, not all have been professionally diagnosed.

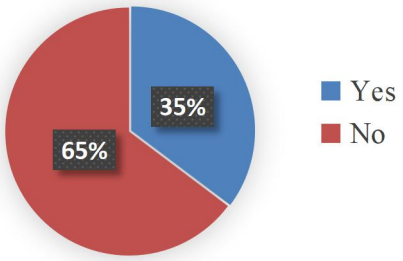

Figure 6. Teachers' Knowledge of Professionally Diagnosed Slow Learners in Their Classrooms

The seventh question investigates whether teachers suspect any students in their classrooms may be slow learners, particularly in mathematics. Early suspicion is crucial for timely and appropriate interventions. Figure 7 shows the responses from mathematics teachers, revealing that many face challenges in teaching suspected slow learners, particularly in mathematics, which requires additional attention and support.

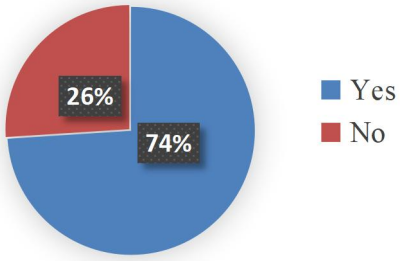

Figure 7. Teachers' Suspicions of Slow Learners in Mathematics Classrooms

For respondents who answered “Yes” to question seven, the eighth question asked them to identify the reasons underlying their suspicion of slow learners. As many as 131 respondents answered this question. Figure 8 presents the most commonly reported reasons. The data reveal that only a small percentage (25.2%) of teachers cited IQ scores as the basis for their suspicion. However, literature frequently states that slow learners typically have an IQ range of 70-90 (Kaznowski, 2004; Krishnakumar *et al*., 2011; Malik *et al*., 2012). This indicates that teachers do not use IQ scores for initial screening of slow learners in mathematics classrooms.

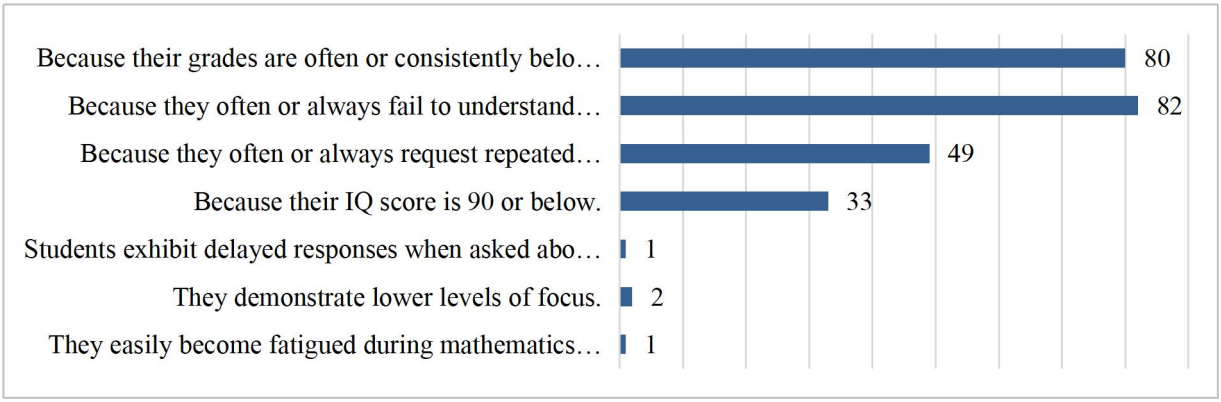

Figure 8. Indicators Used by Teachers to Identify Slow Learners in Their Classrooms

The final question in the survey addresses teachers' need for diagnostic tools that can assist them in identifying slow learners in mathematics. Figure 9 illustrates the distribution of respondents' answers. The overwhelmingly high percentage reinforces the importance of tools that can provide more objective and accurate diagnoses, ensuring that educational interventions are appropriately targeted.

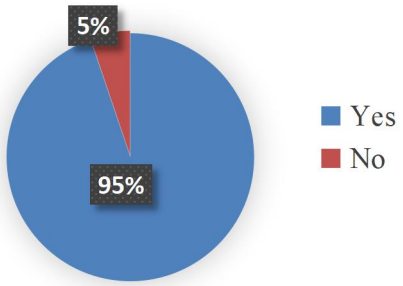

Figure 9. Teachers' Need for Diagnostic Tools to Identify Slow Learners in Mathematics

The findings from this study underscore that while high school mathematics teachers in Indonesia are generally aware of inclusive education and familiar with the various categories of students with special needs, implementing inclusive education in mathematics instruction remains an area requiring significant improvement. Teachers' awareness is an essential first step, demonstrating their readiness to engage in inclusive practices (Forlin & Chambers, 2011). However, awareness alone is not enough to build effective classroom methods, especially to meet the special needs of children who are slow learners. This challenge is especially relevant in mathematics classrooms because children who are slow learners often require teaching approaches that go beyond conventional approaches. Responsive teaching strategies in mathematics education are very important, according to Aziz *et al*. (2015) and Hasibuan *et al*. (2020). This is in line with the idea that understanding how children learn to process mathematical information slowly is critical to improving their academic outcomes (Farooq & Aslam, 2017; Khaira & Herman, 2020). Teachers must move from their theoretical knowledge of inclusive education to practices that can help their students.

Although teachers in this study demonstrated the ability to identify early signs of slow learning in children through observation, they often had difficulty identifying such students systematically and accurately. Many of them ignore students who may not have obvious learning problems because they rely more on subjective observations rather than structured diagnostic tools. Given these limitations, evidence-based methods should be used to help teachers understand specific mathematics content areas in which students experience difficulty, such as basic concepts or procedural fluency.

These results are confirmed by previous research (Hasibuan *et al*., 2022; Metikasari *et al*., 2019a; Novitasari *et al*., 2018; Sovia & Herman, 2019b) which shows that children who are slow learners face persistent difficulties in understand abstract mathematical concepts. Applying mathematical reasoning, understanding relationships between concepts, and interpreting mathematical symbols are some examples of these difficulties. If there is no structured identification process, teachers may have difficulty properly identifying student needs, which may result in a lack of targeted interventions. In inclusive education, teachers must recognize and implement adaptive teaching strategies that are adapted to the needs of slow learners (Borah, 2013; Khaira & Herman, 2020). A student-centered learning approach is an example of an approach that can help students understand slow learners (Aprinastuti *et al*., 2020; Fithriyana & Hidayah, 2019; Hartini *et al*., 2017; Juleha *et al*., 2020; Nyaaba *et al*., 2024). Apart from that, the use of technology can also help students who are slow learners (Hassan & Mahmud, 2018; Rajkumar *et al*., 2017).

These findings suggest that teaching strategies must be adapted to meet the needs of children who are slow learners in mathematics classes. By using approaches that prioritize active student engagement, such as student-centered learning, teachers can go beyond traditional approaches and help students understand and apply math concepts. Additionally, the use of technology such as digital assessments, adaptive platforms, and interactive simulations can enable personalized learning experiences, allowing teachers to track student progress and address learning gaps. However, to implement this strategy successfully, thorough teacher training and adequate access to resources are required. This emphasizes the importance of systematic support to improve inclusive practices.

The findings of this study show that, although inclusion principles exist in education policy, they are still not implemented effectively. Many schools, especially those without formal inclusive education programs, face difficulties creating equitable learning environments for all students (Rasmitadila & Tambunan, 2018; Sunardi *et al*., 2011). Teachers in these schools often do not have enough training, do not have enough resources,

and do not have the institutional support necessary to implement fully inclusive practices. These gaps suggest that targeted professional development programs are needed to equip teachers with the skills and knowledge necessary to effectively help diverse students.

This research found that Sustainable Development Goal (SDG) 4 emphasizes how important it is to get inclusive, fair and quality education. Goal 4.7 supports safe and inclusive learning environments that meet the needs of diverse students. Despite the fact that the teachers in this study highly valued the idea of inclusive education, the limitations of these practices underscore the differences between policy and practice. To address these disparities, teacher training programs must be completely transformed and prioritized to implement inclusive education in mathematics classrooms.

The main finding of this research is that there is an urgent need for reliable diagnostic tools to help teachers spot students who are slow in mathematics. Many teachers rely on subjective observations, which, although insightful, are not as consistent and accurate as structured diagnostic instruments. Effective tools must be created to identify early signs of learning difficulties and comprehensively assess students' mathematical abilities across multiple domains. These tools will allow teachers to build targeted interventions to address student difficulties by finding specific areas (Leighton & Gierl, 2007). This will result in improved learning outcomes for students who are slow learners.

The broader goals of inclusive education, particularly in creating learning plans tailored to each student's needs, are aligned with the development and integration of diagnostic tools. Research supports the benefits of these tools in increasing the accuracy of student assessments and enabling differentiated instruction (Deepa & Priya, 2018; Nguyen *et al*., 2015). However, for successful implementation, the curriculum must be adapted to the national mathematics curriculum. This will ensure that the curriculum becomes an important part of the teaching process. To meet the diverse needs of slow learners, curriculum reform that incorporates inclusive practices and gives teachers the flexibility to adapt their strategies is essential.

The development of mathematical cognitive diagnostic tools is the cornerstone of a multi-faceted approach to fostering a culture of inclusion in the education system. These tools are essential to help teachers discover the specific learning needs of slow learners and create effective interventions. It is critical that educators, policymakers, and researchers work together to unite theoretical research with practical applications. The development of this diagnostic tool can be adapted to SDG 4, especially with an emphasis on inclusive, equitable and quality education. By doing so, stakeholders have the ability to create transformative learning environments that meet the diverse needs of all students (Rad *et al*., 2022). Every

student who faces cognitive problems will have an equal opportunity to succeed in mathematics if there is a sustained and strategic commitment to developing reliable, evidence-based diagnostic tools. Ultimately, this will lead to education systems around the world becoming more equitable and inclusive.

CONCLUSION

This study shows that the majority of mathematics teachers at the secondary education level (SMA/SMK/MA) in Indonesia are very aware of inclusive education and understand students with various special needs, including students who are slow learners. However, there is still little effort made to implement inclusive education, especially when it comes to mathematics. Many teachers say that diagnostic tools are essential to help them spot slow learners. The current identification process is largely based on subjective observation, although teachers are aware of signs that children are slow learners, such as consistently low grades, difficulty understanding material after one explanation, and the need for repeated teaching. This method risks being inappropriate if there are no adequate supporting tools.

SUGGESTIONS

Valid and reliable diagnostic assessment tools are needed to help teachers spot students who are slow learners in mathematics. These tools should be able to detect early signs of difficulty in understanding basic mathematical concepts and provide a comprehensive picture of students' abilities in various mathematical domains. Additional research is needed to determine how effective the use of diagnostic tools is to identify children who are slow learners in mathematics. Studies like this can also concentrate on creating the best strategies to help slow learners achieve the expected competencies.

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