

DMT INSIGHTS

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NUMBER LINES VS. 100S CHARTS: WHICH TOOL BOOSTS MATH SKILLS BEST?

Elementary teachers are crucial in establishing the foundation for students' mathematical understanding. While both number lines and 100s charts have their place in early math education, research strongly supports using number lines as a more effective tool for developing fundamental math concepts. This overview examines the advantages of number lines over 100s charts and their impact on various aspects of mathematical learning.

Building Stronger Number Sense

Number lines help children develop a more robust number sense by visually representing numbers in a continuous, linear format. This allows students to see relationships between numbers more clearly, fostering a deeper understanding of concepts like greater than, less than, and equal to (Heuvel-Panhuizen, 2008). The linear representation of numbers on a number line provides insights into different aspects of mathematical thinking, such as understanding the unit and how to partition space to represent units. Research has shown that number line acuity predicts higher achievement in children's arithmetic. The ability to make accurate placements on a number line may be interpreted as a child's capacity to map between symbolic numbers and non-symbolic quantities, which is a crucial skill in developing number sense (Schneider et al., 2018).

Enhancing Place Value Understanding

Unlike the 100s chart, which can sometimes obscure place value concepts, number lines make it easier for young learners to grasp the idea that numbers increase in value as they move to the right. This visual representation helps reinforce the concept of tens and ones more intuitively (Hawes et al., 2021). While 100s charts are often used to support place value understanding, there is limited empirical evidence to suggest that one configuration of numbers in the chart works better than another for specific aspects of mathematics learning. In contrast, number lines provide a clear and consistent representation of place value, allowing children to see how numbers increase in magnitude along the line (Osana et al., 2023).

Supporting Addition and Subtraction

Number lines are excellent tools for teaching addition and subtraction. Students can physically "jump" along the line, making these operations more concrete and easier to understand. This kinesthetic approach is particularly beneficial for young learners. Research has demonstrated that embodied number line interventions, such as walking along a physical line on the floor, can have stronger effects on mathematical improvement compared to conventional number

line training. In a study comparing tablet-based number line training with a physical walking intervention, the embodied condition showed more significant improvements in single-digit addition skills (Link et al., 2013).

Introducing the Concept of Zero

One of the most significant advantages of number lines over 100s charts is the inclusion of zero. Number lines naturally incorporate zero as a starting point, helping students understand its crucial role in our number system. This exposure to zero is vital for developing a complete understanding of numbers and operations (Siegler & Braithwaite, 2017). On a number line, students can visually see that zero represents the absence of quantity and serves as the dividing point between positive and negative numbers. In contrast, 100s charts typically start at 1 and omit zero entirely, potentially leading to a gap in students' understanding of this fundamental concept.

Introducing Fractions Early

While fractions are not a focus in early grades, number lines provide a natural introduction to the concept. By partitioning the space between whole numbers, you can begin to lay the groundwork for understanding fractions as iterations of smaller units to compose one (Gravemeijer, 2020). Research has shown that using number lines to teach fractions can be particularly effective. For example, a study on struggling fifth graders demonstrated that number line-based interventions improved students' understanding of fractions. This early exposure to fractional concepts on a number line can help prepare students for more advanced mathematical ideas in later grades (Schumacher et al., 2018).

Preparing for Future Math Concepts

Using number lines in early grades prepares students for more advanced mathematical concepts they will encounter in later grades. The skills developed through number line use, such as estimation and understanding continuous number relationships, provide a strong foundation for future learning (Siegler & Braithwaite, 2017). Number lines also support children's initial understanding of ratio, proportion, and scaling. As students progress in their mathematical education, the mental number line they construct develops in complexity, serving them well through university mathematics and beyond (Schneider et al., 2018).

Avoiding Common Misconceptions

The 100s chart, while useful for certain tasks, can lead to misconceptions about number relationships due to its grid structure. On the other hand, number lines provide a more accurate representation of how numbers relate to each other, helping to prevent these misunderstandings (Hawes et al., 2021). For instance, the spatial configuration of numbers in a 100s chart can sometimes lead to confusion about the relationships between numbers. A study comparing different types of hundreds charts found that the configuration of numbers (top-down vs. bottom-up) affected children's ability to solve subtraction problems and understand place value (Osana et al., 2023).

Flexibility and Scalability

Number lines offer greater flexibility and scalability compared to 100s charts. They can be easily extended to represent larger numbers, negative numbers, and even irrational numbers, making them a versatile tool that grows with students' mathematical understanding (Gravemeijer, 2020). This scalability allows teachers to use number lines consistently throughout a student's mathematical education, from early number sense development to more advanced concepts in higher grades. The consistent use of this tool can provide a sense of continuity and familiarity as students progress in their mathematical journey.

Conclusion

While the 100s chart still has its place in the classroom, particularly for teaching counting and recognizing patterns, the number line should be the primary tool for developing core mathematical understanding in first grade and beyond. The linear representation of numbers, the inclusion of zero, the support for operations and fractions, and the preparation for future mathematical concepts make number lines a superior choice for building a strong mathematical foundation. By emphasizing number lines in teaching, educators can set their students up for greater success in their mathematical journey. The versatility and effectiveness of number lines in developing number sense, supporting operations, and introducing more advanced concepts make them an invaluable tool in early mathematics education.

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Social Media

Surprisingly, this research reveals the power of number lines in developing strong mathematical foundations for young learners. Our latest overview explores how number lines outperform 100s charts in critical areas like place value

understanding, introducing zero, and supporting operations. Number lines bridge concrete experiences with abstract concepts, fostering deeper mathematical understanding and problem-solving skills. This research connects cognitive science with classroom applications, empowering educators to build a solid foundation for advanced math concepts. Discover how this simple yet effective tool can transform your math instruction and set students up for long-term success!

#NumberLines #100sChart #MathEducation #NumberSense #K2Math #MathFoundations #STEM #EarlyLearning
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