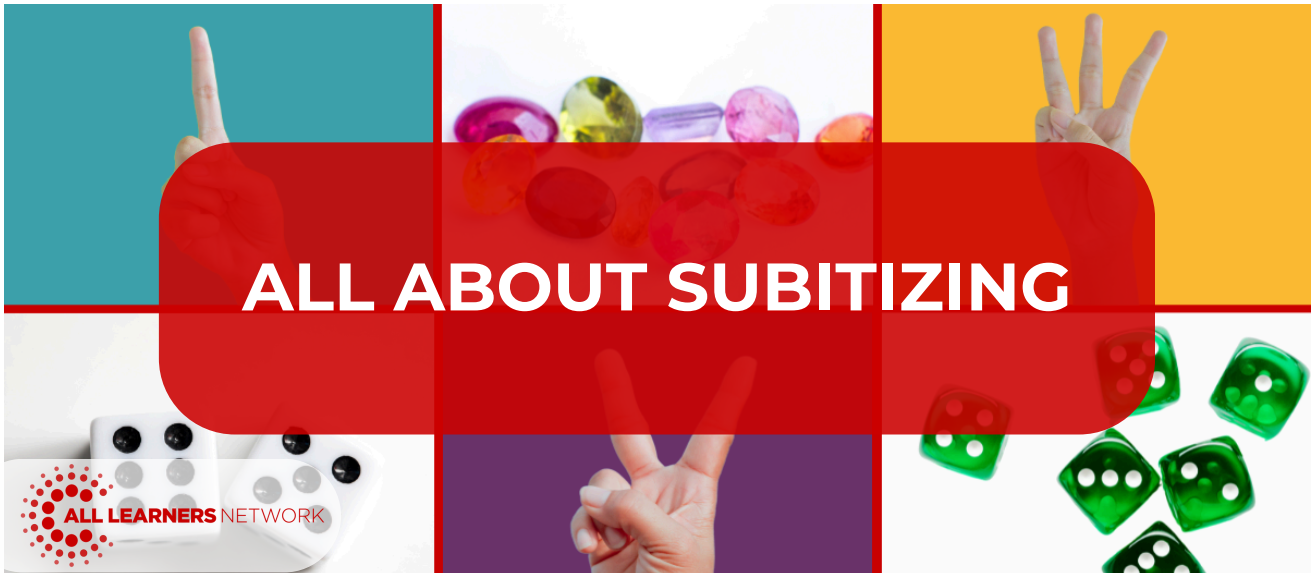

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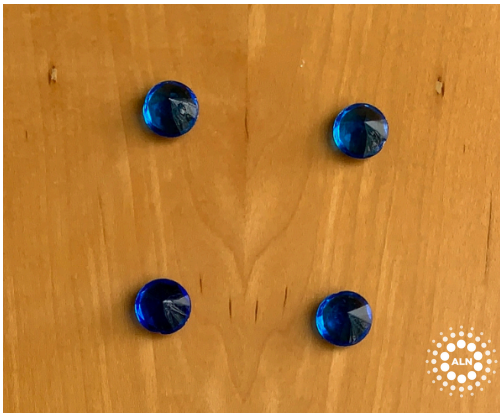
You are playing a game and you roll some dice. As soon as they land, do you find yourself counting how many dots are showing on each to determine how many spaces you should move? Or do you know the answer almost instantly?

For most of us, we can quickly look at the dice and know what number we rolled. This is because of a skill we developed as young children called subitizing.

The word subitizing comes from the Latin word “subitis”, which means “sudden”. In the context of math, subitizing is a cognitive process that allows our brain to see a small quantity of objects quickly, or suddenly, and know how many there are without having to count one by one. For example, you place four gems in front of your student and ask them to tell you how many gems there are. If they respond with a correct answer without counting out each gem they have subitized.



This image along with other similar images are available on our All Learners Online platform.

WHEN DOES IT DEVELOP AND WHY IS IT IMPORTANT

Subitizing initially develops spontaneously in very young children. Research has been done that reports babies subitizing as early as six months old. Math education scholar Douglas Clements describes this research in his article titled “Subitizing: What is it? Why Teach it? Teaching Children Mathematics”. Many researchers also believe that subitizing precedes children’s ability to count, thereby highlighting the importance of this foundational skill (Klahr and Wallace, 1976; Schaeffer, Eggleston, and Scott, 1974).

While subitizing begins as a natural process, we need to ensure that we continue to provide opportunities for students to subitize as they enter our math classrooms. This continued support will be especially useful because, while subitizing is an essential skill to have on its own, it can also support the development of other skills including cardinality, hierarchical inclusion, number conservation, and part-part-total understanding.

TWO TYPES OF SUBITIZING

As students continue to develop their skills they move through different phases of subitizing.

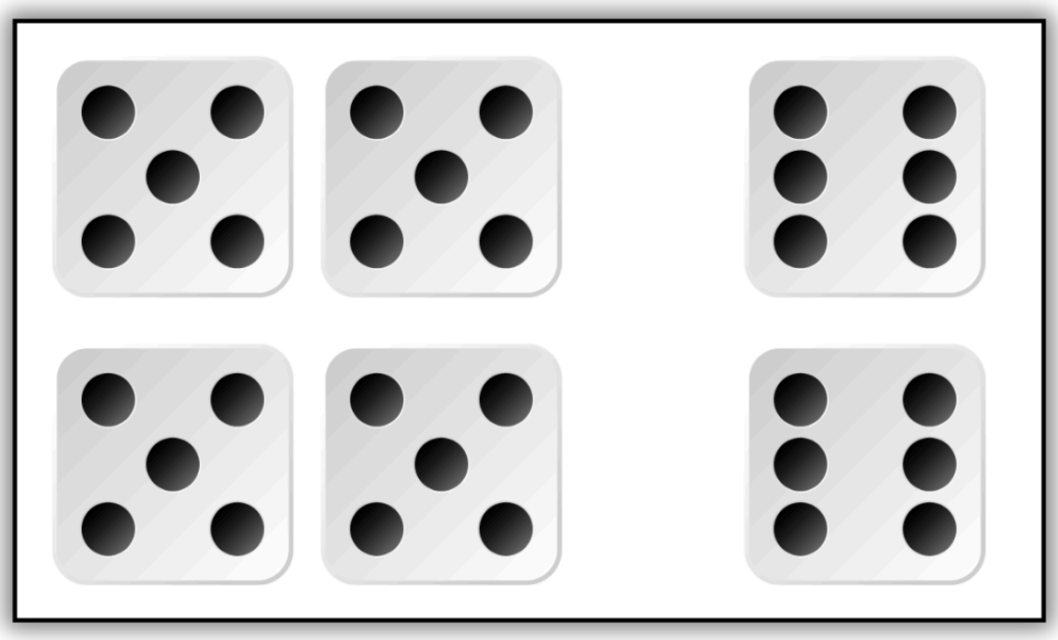
The first phase is called perceptual subitizing. Douglas Clement describes this as when a student instantly recognizes a very small amount, usually within four or five. An example of perceptual subitizing was described earlier, when a student was shown 4 gems and quickly named the quantity “four”.

The second phase is conceptual subitizing. This is when a student quickly identifies the quantity of smaller groups and combines them to name the total. Students see a total number of objects by organizing the objects mentally into smaller groups and then combining them. For example, when shown a collection of 8 gems, one student may see a group of 3 gems and another group of 5 gems and combine them to see 8 gems; another student might see two groups of 4 gems and know 4 and 4 is 8, and still another might see groups of four groups of 2 gems and skip count 2, 4, 6, 8. . Given frequent opportunities to discuss the ways they see a variety of quantities, arranged in a variety of ways, students develop a deep understanding of part-part-total relationships.

Although subitizing is a critical part of early numeracy development and there is a heavy emphasis on building it in early grades, opportunities to practice should continue in later grades also. Students expand subitizing to larger quantities (i.e. double- and triple-digit numbers) and different numbers (i.e. fractions) while exploring different models.

The quantities and arrangements of images can help students build and expand their

both place value and multiplicative thinking. By looking at equal groups in structured arrangements students can develop the ability to recognize patterns to find the total quantity. For example, if a student looks at the image below, they might see this grouping of dice and be able to quickly name, “I see four groups of five - that’s 20, and two groups of 6, that’s 12. There are 32 dots all together!”.



HOW TO ENCOURAGE DEVELOPMENT

Similar to concepts like number sense and computational fluency, subitizing is a skill that can be developed during the Launch portion of your math block. During Launch, you can use a variety of different images to help students discuss “how they see” quantities. We encourage you to change the type of visual that you are using in order to get students comfortable subitizing in various contexts. Images might include finger patterns, ten frames, or perhaps an image of randomly placed dots. All of these will benefit the students in developing their ability to subitize.

Where can you find images to help with this? Many math programs include images that can be used for subitizing opportunities. They are sometimes called Quick Images or Quick Looks that are already connected to your grade level curriculum. These resources often use bead racks, ten frames, dot arrangements, and finger patterns to help students have a familiar model for certain patterns.

Do you have dice, gems, or school supplies in your classroom? If so, you can also create your own images! As you start thinking about subitizing you begin to notice visual patterns all around you. So keep an eye out and take a picture of a pattern that catches your eye. Once you do you are set for another Launch!

References

Clements, D. H. (1999). Subitizing: What Is It? Why Teach It? Teaching Children Mathematics, 5(7), 400–405. https://doi.org/10.5951/tcm.5.7.0400

Klein, A., & Starkey, P. (1988). Universals in the development of early arithmetic cognition. New Directions for Child and Adolescent Development, 1988(41), 5–26. https://doi.org/10.1002/cd.23219884103

What Now? Scan the QR code and scroll to the bottom of the post for links to next steps

1. Sign up for an All Learners Online membership to check out all of our Launch resources.
2. Explore the All Learners Lesson Structure.
3. Bring All Learners Network (ALN) into your school or district for embedded professional development.