Here are a few resources for learning more about mathematical learning disabilities and supporting students who need instruction at a numeracy level (GLE <2). We hope to find and develop even more resources in the future.

## Mathematical Learning Disabilities

Many students at a numeracy level have learning challenges, which may include (but not be limited to) Developmental Dyscalculia.

Developmental Dyscalculia (DD) is a name for a type of “specific learning disorder with impairment in mathematics.” [DSM-V](https://www.psychiatry.org/psychiatrists/practice/dsm/about-dsm) criteria for DD includes:

* persistence despite intervention efforts
* math skills are below grade level and interfere with life functioning
* difficulties started at school age
* difficulties are not due to sensory impairments, language barriers, etc.

People with DD show four areas of number related deficiencies:

1. number sense
2. fact retrieval
3. calculation
4. mathematical reasoning

In addition, multiple research studies have suggested a correlation between mathematical learning disabilities and difficulties with working memory.

## Suggestions for supporting adult numeracy students

1. Since numeracy students are working on math skills at NRS level 1 (CCRSAE level A), the MAPT for Math is not an appropriate assessment. Use the TABE-L (11/12) Mathematics instead.
2. Whenever possible, offer separate tutoring or classes for numeracy level students with a teacher or tutor who has experience teaching elementary mathematics and/or special education.
3. Identify students’ long- and short-term goals. Find specific math skills at the numeracy level to target that could help them with those goals (for example, counting money).
4. Use curriculum that is designed to teach skills at CCRSAE level A. This will probably require adapting curriculum designed for children grades K-1.
5. Be sensitive to the formatting and design of worksheets and materials. Limited text and lots of white space is helpful; cartoons and decorations made for children are not.
6. Work to build conceptual understanding of basic concepts, such as number order, magnitude, and base ten, using a variety of physical, visual, or virtual manipulatives. Some students will respond better to certain manipulatives than others. Monitor their understanding and try something new if it is not working.
7. Provide a lot of scaffolding to support limited working memory:
* Chunk tasks into small steps.
* Allow students to use physical manipulatives, visuals, fingers, or paper as needed.
* Work towards “overlearning” certain basic skills to develop more automaticity and fewer demands on working memory (for example, counting forward and backwards, skip counting, building two-digit numbers with tens and ones, comparing numbers, writing mathematical notation).
* Have predictable classroom routines.
1. Students with mathematical learning disabilities may not develop fluency with fact retrieval without explicit, targeted intervention. At the moment, the only interventions have been designed for children, but may be effective for some numeracy level adults. We are currently piloting some interventions for helping adult students improve fluency with single digit addition and subtraction facts. [Contact us](https://www.sabes.org/node/add/contact/38) if you are interested in learning more or in piloting this program with your students.
2. Simple math and card games can be great for numeracy level students. They can lower anxiety, build community, and support the development of numeracy skills. Some resources for games:
* **Math for Love**: has a ton of openers and games that are appropriate for this level (as well as some for CCRSAE level B and C)
<https://mathforlove.com/>

There is also a video/document resource that compiles math games for GLE preK-2 available for purchase ($20)

<https://mathforlove.com/product/mathematical-games-minicourse-prek-grade-2/>

* **Tiny Polka Dot**: commercially available card set with a variety of appropriate games

<https://mathforlove.com/games/tiny-polka-dot/>

* **Mixing in Math**: has a section called “Games Galore” available for free download.

<https://www.terc.edu/terc_products/mixing-in-math-downloads/>

## Further Reading

**Kaufman, L., von Aster, M., Göbel, S.M., Marksteiner, J., & Klein, E. (2020). Developmental Dyscalculia in Adults: Current Issues and Open Questions for Future Research, *Lernen und Lernstörungen*, *9*(2), 126-137.**

Access here: <https://doi.org/10.1024/2235-0977/a000294>

**Summary:**

This is a literature review from 2020 about Developmental Dyscalculia in adults. The article describes specific ways DD can affect mathematical functioning in adults. One of the characteristics that might be most noticeable in adult students is difficulty with fact retrieval, combined with working memory deficits, which means that the backup strategies used to get around fact retrieval are often labor intensive and inaccurate.

At the conclusion of the article, the authors point out that no controlled and systemic intervention studies were reported for adults with DD (p. 134).

There is an obvious need to have research studies to test what types of interventions might be effective for adults with DD. Until these studies are done, we are using studies done on children with DD as a starting point.

**Fuchs, L.S., Fuchs, D., Powell, S.R., Seethaler, P.M., Cirino, P.T. & Fletcher, J.M. (2008). Intensive Intervention for Students with Mathematics Disabilities: Seven Principles of Effective Practice, *Learn Disabil Q*., *31*(2), 79-92.**

Access here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2547080/>

**Summary:**

Describes two intervention studies done with children, one to address number combinations (single digit addition/subtraction facts) and the other to address story problem types.

## Disability Screening Resources

**[Basic Disability Screenings for Adult Education Program Use](https://www.sabes.org/content/basic-disability-screenings-adult-education-program-use)**

Resource from ACLS

<https://www.sabes.org/content/basic-disability-screenings-adult-education-program-use>

**[What Does Dyscalculia Look Like in Adults?](https://www.additudemag.com/dyscalculia-in-adults-symptoms-signs-and-statistics/)**
Article has a list of indictors of DD in adults

<https://www.additudemag.com/dyscalculia-in-adults-symptoms-signs-and-statistics/>

[**Dyscalculia Test for Adults: Screening for Signs of Learning Disabilities**](https://www.additudemag.com/self-test-for-dyscalculia-in-adults/)

Meant to be taken by the person being screened

<https://www.additudemag.com/self-test-for-dyscalculia-in-adults/>