



Mathematics Course Waivers – Trends and Best Practice

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Mathematics Course Waiver – The Basics

□ What is a Math Course Waiver?

The waiving of a general education (GE) mathematics class requirement and substitution of this with another class. Often mathematics and foreign language are grouped together as a requirement, and thus exemptions are often given for both mathematics and foreign language requirements.

Basics, Cont.

□ Why?

Exemptions would be given based on a documented disability that significantly interferes with the student's ability to complete a mathematics course. Generally, this would be limited to a diagnosis of Mathematics Disorder (315.1 per the DSM-IV-TR)

Mathematics Disorder (315.1)

- Criteria for diagnosis:
 - Math ability (as measured by individually administered standardized tests of mathematical calculation or reasoning) falling substantially below that expected for an individual's age, measured intelligence, and education.

- 📖 “substantially below” is usually defined as at least a one standard deviation discrepancy between intelligence and achievement (15 point difference between standard scores) but “Average Person Model” is often used as well. Discrepancy model used often in secondary education, while APM used in many post-secondary settings.

Mathematics Disorder

□ Diagnostic Features:

-deficits may be seen in different skill areas:

- Linguistic skills: such as understanding or naming mathematical terms, operations, or concepts, and decoding written problems into mathematical symbols
- Perceptual skills: recognizing or reading numerical symbols or arithmetic signs, and clustering objects into groups
- Attention skills: copying numbers or figures correctly, remembering to add in “carried” numbers, and observing operational signs
- Mathematical skills: following sequences of mathematical steps, counting objects, and learning multiplication tables

Mathematics Disorder

- Course: MD is seldom diagnosed before first grade (due to fact that insufficient schooling in math has occurred to this point). Usually diagnosis is apparent by 3rd or 4th grade. With high IQ, intelligence may compensate for math deficits and diagnosis may not be given until 5th grade or later.
- Prevalence: 1% of school age children; 20% of all diagnosed learning disorders are Mathematics Disorder in isolation

Appropriate Documentation

- It is important to have appropriate documentation to support the diagnosis.
- The intellectual measure should be comprehensive (such as a WAIS-III, Stanford-Binet, or Woodcock-Johnson Cognitive Battery) – short forms (WASI) may not give you an accurate IQ measure
- Achievement measures also need to be comprehensive. For example, use the Woodcock-Johnson Achievement Battery (measures calculation, fluency, math applications, and quantitative concepts) versus using the Math subtest from the Wide Range Achievement Test, 4th Edition (WRAT-IV) which only tests how many problems you can do in a certain time-limit.

Considerations in Diagnosis

- Math Anxiety: there is no diagnosis of “Math Anxiety” per se. Although a student may qualify as having a Specific Phobia related to math.

-Research has shown that in basic college level math scenarios math anxiety interferes with fluency (how quickly you complete math problems) but not with the number of errors.

Cates & Rhymer: “Examining the Relationship Between Mathematics Anxiety and Mathematics Performance: An Instructional Hierarchy Perspective.” (2003)



Considerations

There are also social factors that may bring students into your office with complaints of mathematics deficits.

- Specifically, math deficiencies are thought to be more socially acceptable than are deficiencies in reading and writing. This is because math is not seen as a generalized measure of intelligence in the same way that reading and writing are.
- Thus, it's easier on one's ego to self-refer for this than for other learning disorders.

Considerations

- Students often avoid math as much as possible in the post-secondary environment, and thus often do not look for course waivers until they are almost ready to graduate.
- **Take Home Point:** make sure your students are aware of any math substitution/waiver policy as soon as possible after matriculation to allow time for process to run its course.

Considerations

- Another important aspect is to look at prior attempts/grades in high school and college math classes:
- 📖 Are there previous failures or withdrawals? How many?
- 📖 Some schools will require a previous attempt at a GE math class before allowing a waiver or substitution.
- 📖 However, there are limits to this. A school can't require several failures in a math class before considering a waiver request. (Letter to Mt. San Antonio College [OCR San Francisco, 1997])
- 📖 You may also want to get a release and speak with current/former math instructors for their input.



The Substitution/Waiver Process

You've documented that your student has a Mathematics Disorder. Now what?

- Determine the student's major. You will never be granted a math waiver for an engineering, physics, math major, etc. since math is an essential element of these areas of study. Substitutions apply to liberal arts majors and the like.
- You have to determine what your school administration will permit you to do. This is the second decision point.
- If you believe a waiver is warranted, will your school allow for it?

Math Substitution/Waivers, Cont.

- Colleges have broad discretion as to what requirements are necessary to confer a degree. Thus, courts have generally found that whether a substitution is required in any area of study is a decision made at the university administrative level (*Guckenberger v. Boston University*). **BUT** the college must engage in a rational analysis and determine that substituting a course would lower academic rigor and/or fundamentally alter the course of study in a program before disallowing substitutions. (FYI-Guckenberger was a foreign language case)
- Court found “that a liberal arts curriculum cannot be fit into a cookie cutter mold” so a university has discretion on what it believes is essential.

Waivers/Substitutions, Cont.

- There is some question as to whether a university can preemptively decide that there will be no math waivers at all. The Office of Civil Rights and a cursory reading of disability law argue for a case-by-case analysis and no blanket preemption.
- However, there is so much deference given to a university/department to determine what is essential that it might be practically moot. Some universities have preemptive across-the-board denials for everyone except liberal arts majors.
- **The Best Practice** would be to review all cases on a case-by-case basis and reserve the right to waivers for the most extreme Mathematics Disorder cases, even if your school has a default policy of no waivers.



Recent Developments at BYU

- Our administration recently changed our default policy from one of waiver to a more remedial instructional model (to be discussed later).
- The concern expressed to our office was that students could graduate without any exposure to numeracy and this was deemed unacceptable.

Decision Guide

- If your college/university allows for math class waivers:
- 📖 then you need to work with either the student's department (or maybe the GE office) to determine what courses would be sufficient substitutes for the waived class.
- 📖 a best practice is to develop a list proactively so as to not re-invent the wheel.
- 📖 typical class substitutes have included “Anthropology of Money,” “Economics of Less Developed Regions,” etc. (This list is from B.U.)
- 📖 common theme is that classes will broach ‘math’ from a sociological approach

Decision Guide, Cont.

- If your university does NOT allow for math course waivers, you have two routes:
 - The Specialized or Remedial Class Route:
 - 📖 This approach is based on addressing the university's desire for students to receive instruction in numeracy to graduate.
 - 📖 It involves either the student's placement in (or the development of) a remedial or specialized math class.



Decision Guide

- Universities would be hard-pressed to deny a substitution of this type because their main concern, that students be exposed to math, is addressed.
- If your resources are sufficient, the best approach is a class section (perhaps given once yearly) that focuses on teaching math to students with Mathematics Disorder (and possibly other learning disorders).

The New BYU Model

- BYU is currently in the process of moving from a waiver to a specialized learning model with the following intermediary steps:
 - (1) We are currently planning a special section of MTH 110 (basic GE math) designed especially for students with disabilities (particularly LD) for a Fall 08 start-up.

Important: we (and other schools) must work with math professors who have special training and/or a desire to work with students with disabilities. We are in the process of soliciting professors now.

BYU Model, Cont.

- (2) In the interim, the University is allowing newly documented students* with MD to take MTH 091 through Independent Study (where they have a year to complete the course) and providing them with paid math tutors to use at their convenience until completion.

- (3) Advisement from the UAC is also important (e.g., make sure class and work loads are adjusted to compensate for extra effort needed to complete course successfully during semester when math is taken, referral to specialized tutors, etc.)

* Students who have already provided documentation are grandfathered in

Components of a Specialized LD Math Class

- If you must develop this class, or consult on an already-existing class, keep the following in mind:
 - Work with the math department – many DSPs have a specialized knowledge base regarding LDs, while most math faculty don't – share your knowledge for the best result for students.

Components, Cont.

- Instructors need to understand the six levels of mathematics learning mastery (Sharma, 1989):
 - 1) Intuitive Connections: relate new concepts with existing knowledge
 - 2) Concrete Modeling: look for concrete material with which to construct a model or show manifestation of the concept
 - 3) Pictorial/Representational: student draws to illustrate the concept.

Components, Cont.

- 4) Abstract or Symbolic: student translates the concept into mathematical notation, using number symbols, equations, etc.
- 5) Application: student applies the concept successfully to real-world situations, story problems, etc.
- 6) Communication: student can teach the concept to others or represent it on a test



The Recommended Sequence for Mathematics Instruction (Sharma, 1989)

- a) Explain the linguistic aspects of the concept.
- b) Introduce the general truth, law, or principle that other principles hinge on.
- c) Use concrete materials/examples so students discover the proof of these truths.
- d) Give specific examples of these truths using concrete materials
- e) Have students talk about their discoveries and how the concept works
- f) Show how individual experiences can be integrated into general principle or rule

Recommended Sequence, Cont.

- g) Re-emphasize the general rule that other mathematical truths hinge on
- h) Show how several specific examples obey the general rule
- i) Have students state the rule and offer specific examples that obey it.
- j) Have students explain the linguistic elements of the concept.



Math Skills Courses

- If you can't get a specialized LD math class or remedial class, then the next option would be to teach a math skills course.
- Such courses don't focus on math so much as generalized study skills that can be applied across all levels of math up to calculus.
- These courses are generally taught by DSPs.

Skills Courses, Cont.

- Studies have shown that such courses significantly improve pass rates in math classes:

Nolting, 1986: 67% of students who received a math study skills course and 5 hours of reality counseling passed elementary algebra class. 33% of control group did

The difference in a similar study at West Virginia Wesleyan was 80% pass rate (study skills class) vs. 50% (no study skills class)

Referenced in: “Develop Study Skills Rather Than Avoiding Mathematics Courses” in Disability Compliance for Higher Education (November, 1997)

The “Traditional” Approach

- If you do not have any capacity for specialized, remedial, or supportive classes, and you have no waiver system, then your students will have to take the expected courses with traditional accommodations.
- OCR has unequivocally stated that reasonable accommodations are required for students with disabilities in math classes **EVEN IF MATH IS AN ESSENTIAL ASPECT OF THE MAJOR**. Thus, OCR found that the University of Arkansas violated Section 504 when it stated that finite mathematics and calculus were not subject to accommodation since they were prerequisites to the student’s field of study. (2002)

“Traditional” Approach, Cont.

- While most standard accommodations should be considered without concern, the use of calculators will require consultation with faculty and likely will not be appropriate as it would violate an essential function of the class (i.e., that student learn the computational aspect of the class).



Conclusion

Questions?