

Missouri Draft Standards

REVIEWED BY R. JAMES MILGRAM

There are some pluses and probably far too many minuses in this draft and it is essential that the draft be revised, particularly at the middle and high school levels.

The organization of the draft standards is quite well done in grades K - 8. In each grade there are 3 - 5 or 6 Core Concepts listed, and under each a list of learning goals and performance indicators. The Core Concepts are closely connected with the NCTM Focal Points in K - 7, often, particularly in grades K - 4, being essentially identical to corresponding Focal Points. This provides a well thought out way of focusing the mathematics curriculum in much the way that the curricula in the high achieving countries are focused.

This style of organization is also used for the more advanced material in these standards: the Algebra I, Geometry, Algebra II sequence, and the three course integrated sequence that are both designed to cover three years of high school mathematics. At this more advanced level the organization is far less successful.

There are no standards for advanced courses such as pre-calculus, trigonometry, linear algebra, calculus, and statistics, that are often found in the most highly rated state standards. Why is this? It is these courses, particularly trigonometry, pre-calculus, and calculus, that show the strongest correlations with success in college - and across the country, over 75% of high school graduates attend college.

It is notable that the type of focus here on limited topics that should all be learned to mastery is designed to put into place the most solid foundations possible. The goal of this approach is to make it possible for all students to handle more advanced material both quickly and with confidence. However, from the practice in the high achieving countries, by the end of grade 8 at the latest, these foundations are in place, and there is no longer any need for such focus. Their courses then become more traditional, and it is likely that the standards for Algebra I, Geometry, and Algebra II should also have a more traditional structure in Missouri.

The draft that I evaluated, dated March 31, 2008, is very rough. Much of the language in the learning goals is sloppy, and there are a number of outright errors. I have made extensive comments at all grade levels. While I believe that the material in grades K - 5 is acceptable after being edited, **I do not believe this to be the case for the material in grades 6 - 8.** These standards need to be rewritten.

I think that the discussion of Algebra I, Geometry, and Algebra II would benefit considerably from the input of the professional mathematics (not math education) community in Missouri. This is especially important because there is an articulation problem between high school outcomes and college level requirements all across this country and certainly in Missouri as well. I also believe that input from this group is essential in craft-

ing solid standards for courses like trigonometry, pre-calculus, calculus, linear algebra, and statistics.

Since further outside advice is needed to bring the more advanced material in this draft to the level needed, I have not commented on these courses as extensively as with K - 8. However, I did compare the draft's recommended content for the Algebra I and Algebra II courses with the recommendations of the National Math Panel report, and I indicate the many areas where the draft courses do not discuss crucial content recommended in the NMP report.

I did not have the time to go over the Integrated 1 through Integrated 3 courses.

Returning to the problems with grades 6 - 8, it seemed to me that the authors of the draft document did not have a clear idea of what the NCTM Focal Points - the model for the Core Concepts - really intended in those grades. Alternatively, they believed that Missouri students could not handle the recommended material in the NCTM Focal Points. (In this context, it is worth noting that by seventh or eighth grade the Focal Points are about one year behind the usual practices in the high achieving countries.)

Whatever the reason, the effect is that the grades 6 - 8 expectations are so weak that they are basically not salvageable. To explain this and to help give guidance for what was actually hoped for by the authors of the Focal Points, I have prepared a discussion of the intent of the Focal Points in grades 6 and 7. The language I use is that of high level mathematics since it is the language in which I can be sure that I am saying exactly what I intend to. It goes without saying that I believe it should be direct for solid mathematics educators to translate from this language to a language more accessible to teachers, students, and parents.

The discussion of the intent of the grades 6 and 7 focal points appears in one of the two included files. I am including my detailed comments on the March 31 Draft Missouri Mathematics Standards in the second (Word) file.

Yours,

R. James Milgram