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NCTM Standards, Second Edition: A Review and Commentary on Zalman Usiskin's Address

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Did you have the privilege of attending Zalman Usiskin's address, "What Changes Should be Made for the Second Edition of the NCTM Standards?" given at the Eighth Annual UCSMP Secondary Conference? Well, neither did I. In fact, when I received my copy of the UCSMP Newsletter where a slightly edited version of the talk was printed, I was so caught up with department and teaching responsibilities that I didn't have time to read it. However, I did have the time to digest it in the leisure of this past summer, when the load was lighter and the light was longer.

Professor Usiskin's work in mathematics education is well known, and his ideas are always well thought out. The ideas presented in this address are important, timely, and deserving of as wide dissemination as possible. I would like to pass them along to readers of the HMN Journal along with a few comments of my own.

The main premise of Professor Usiskin's talk is that although there are not current plans for a second edition of the "Standards", there should be.

1. First of all, he states, if there is not a second edition, the "Standards" will die just as all the other reports on mathematics education have died. He cites sundry such reports beginning with the report of a committee formed in 1918. I can relate to that. I have been cleaning out a twenty-five year accumulation in my office in preparation for my pending retirement. I was astounded at the number of reports from special committees, task forces, and what have you that had published reports (recommendations) on mathematics education reform over the years, usually supported with funds obtained from foundations. These had been placed in various piles with

the intention that someday I would read them (actually I did read a few of them). The point is, as Professor Usiskin said, they have all died.

2. Secondly, there are people who do not agree with many of the general goals presented in the "Standards". He says there are school districts hoping that by the time they have to do their next textbook adoption, the movement will go away. Also, I think that those who disagree should be heard and their concerns debated.
3. Times have changed. Professor Usiskin cites the significant advances made in technology, changes in textbooks, and changes in attitudes and views on assessment even in the short time since the "Standards" came out. Curriculum should be dynamic, not static. A continuous evolution is much better than a series of discrete revolutions.
4. The "Standards" have been interpreted in different ways by teachers, curriculum developers, teacher trainers, and administrators. A second edition could provide clarification.
5. Professor Usiskin dares to say that there may be some errors in the "Standards"; and also, that with time and experience, some of the recommendations may have been shown to be unwise. Most importantly, some things in the "Standards" had not been tested, and now, with experience and results, we may gain insight into the wisdom of some of them.
6. A second edition could reflect the changes that have been implemented as a result of the

"Standards" and, in some cases, have gone beyond. Some may want to know what to do next; i.e., keep up the momentum of change.

Professor Usiskin then addresses what he thinks should be kept and what should be changed. Problem solving, the language of mathematics, and reasoning are the aspects he indicates should be kept. He argues for a fourth aspect, mathematics as procedures (algorithms). He feels that the fourth aspect of the "Standards", mathematical connections, should permeate all curricular work, but it is not parallel to the other aspects. Regardless of how you view it, it is important. Those of you who know me know that I think we should also stress the place of mathematics in our culture and the significant force mathematics has been in the development of our culture.

He feels the "Standards" do not adequately discuss grades 3-6 because, he states, these are years in which teachers (in the U.S.) have traditionally spent most of the time on paper/pencil computations. That is certainly food for thought, but a much more powerful suggestion he makes is that the "Standards" have not taken into consideration the best ideas of what is done in the other countries. Professor Usiskin contends that one reason the authors of the "Standards" ignored what was going on in other countries is that the authors' philosophy differs from the philosophy of those constructing curriculum in other countries. Among these differences, he states that curriculum

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designers in other countries do not believe that children always have to construct knowledge for themselves, do not believe that symbolic mathematics needs to be delayed, they don't

believe in Piaget, and they don't use calculators. I must confess that I disagree with the constructionists in this country and agree with the foreigners on the first two items. In fact, I am greatly concerned that the constructionist movement has gone so far as to have a deleterious effect. As for the use of calculators (and computers), I think they should and must be used. However, they should be used wisely; unfortunately, from what I have seen, they are often used as a substitute for thinking, and this is not good. Regardless of whether we agree with the philosophies of the other countries, Professor Usiskin states, we cannot ignore their programs because the Second International Mathematics Assessment Study concluded that we have an underachieving curriculum. This, of course, assumes the International Assessment is assessing the things we think are important. I think there are other indications of great underachievement, also. Professor Usiskin agrees with the scope of the "Standards" 9-12 program, but based upon his experiences with the UCSMP program, it cannot be done in four years. I disagree that this cannot be done in four years because I have done it. However, it was done in a college prep math program where tracking existed in the high school and at a time of a different societal climate. Professor Usiskin also states that the "Standards" fail to acknowledge, and compensate, for individual differences. I heartily agree, and think the egalitarian ethic has been carried too far. I still believe with the statement made long ago by John Kemeny that it is much more in keeping with the democratic philosophy to have students in a program consistent with their abilities, and I agree with Zalman Usiskin that students do not, and indeed cannot, learn at the same pace.

I strongly agree with Professor Usiskin's concern about our overemphasis on the use of technology for exploration. As stated before, too often the calculator or computer is used as a substitute for thinking (deductive, if you will). It leads to fuzzy thinking and often false conclusions. We need to retain (or put back in, in some cases) the deductive process. He cites an anecdote about former President Bush, and it might be one reason he is former.

There are a couple of cogent statements Professor Usiskin makes about assessment:

1. We cannot say poor performance on former tests indicate a need for curricular reform and then say we must change our testing techniques because they are not valid measures of performances.
2. We better be able to show that the use of technology allows students to outperform their counterparts of the past. It should be easy to demonstrate this; and if we cannot, we might want to re-think the technology question or how we make use of technology.

He mentions questioning certain things such as multiple choice questions. I would like to interject some opinions on this. I have never believed that multiple choice questions tested students' knowledge of mathematics. They might test the students' skills at making choices from four or five options; realistically, there are more often an infinite number of options. As Peter Hilton has stated, the only place multiple choice questions are valid is for finite group theorists. Also, we should

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take cognizance of the research project in Britain (sorry, I temporarily lost the reference) that indicated that multiple choice tests (at least in mathematics) were biased in favor of males. The multiple choice test showed markedly higher scores for males while the "traditional" test (I assume they meant that students provided the answers) showed no difference between males and females. I think this is important, and we should strive for gender neutral assessment.

On teaching, Professor Usiskin agrees with the importance of the NCTM stated role of the teacher, but says something is missing. He says there is still a time and place for the traditional direct instruction; e.g., to give directions, set the stage

for new things, to summarize, to tell a story, to emphasize what is important, and to bring cohesion to the class.

As in many discussions on improving education, the "Standards" fail to address the most important aspect in the teaching/learning process, the students. As Professor Usiskin points out, we can change the curriculum, the ways of teaching, and the means of assessment; but the desired outcome will not be achieved without changes taking place in the students. We need to discuss reasonable expectations about how much students need to work, about tools we expect them to have, and their attitudes. Governor Lester Maddox said that if they wanted a more successful prison system, they should get a better class of prisoners. Why do we have such difficulty facing the fact that students are an important factor in the success of our educational system? The failure to consider the student factor, however, goes back a long time. I recall that shortly after the "new math" endeavor of the late fifties, one of the big guns (who shall remain nameless) in that movement wrote an article in *The Mathematics Teacher* about teacher effectiveness. He attempted to measure teaching effectiveness by student performance on tests and stated that they could not figure out why one teacher was very "effective" one year and the very next year was not. I wrote a letter to the editors of NCTM stating the obvious; that teacher had a different set of students. They refused to print it. I guess they didn't want to embarrass the author. It was also obvious that they were not measuring teacher effectiveness; they were measuring student effectiveness.

Professor Usiskin also addresses how we look at what we do. We cannot expect cure alls in education any more than in medical practice. We should communicate to the public that our recommendations are not anticipated to be "sure fire-cures", but they are the best treatment we know now. I would like to add that we must realize that when we change things because the changes will benefit some students, these changes often make things worse for other students.

Professor Usiskin states in closing that the second edition should include options; and by the time the third edition appears, the process will be "institutionalized", and we will have an ongoing study of a dynamic curriculum for mathematics education.