MathSPIN News

Newsletter of the NADE Math SPIN Group **December 2003**

In This Issue

From the Chair

As I sit here and write this, I can't believe our fall semester is almost over. I know several of you have had experiences similar to mine: budget cuts have meant changes to the way things have always been done. In my case our separate developmental studies division was decentralized, and I became a member of the math department faculty, meaning more meetings to attend, among other things. Fortunately for us, the chair of the math department here at ETSU is a wonderful man to work with. We have had interesting challenges, too, such as not being able to copy much of anything except tests (the department gained six full-time faculty and some adjuncts but not one additional cent towards the copier budget). This has meant that, like our Math SPIN newsletter, my review pages, copies of old tests, test answer keys, and so forth had to go online for students to print out if they wished. The best thing to do is to look at the changes as opportunities for professional growth and examining how I teach. (One interesting side effect is that now I can say "I'm in the math department" and not have to explain to people what I do, but that robs me of the opportunity to speak up for developmental education.)

Between an increased teaching load, writing a dissertation, and going to more committee meetings, I haven't had as much time as in past years to upgrade our MathSPIN web site. I want to keep it current and to add more to it so that it s a useful, relevant resource for anyone teaching developmental math. If you have any links you d like to add, please e-mail them to me (stephen@mail.etsu.edu) with a short description about the site. If you have any handouts, short articles, or teaching ideas you d like to share, please send those to me as well. I would like to keep beefing up our website, but I need your help and suggestions.

As we look forward to the 2004 conference, I d like to invite anyone making a presentation to submit a summary (2-5 paragraphs) of their session for inclusion in the post-conference Math SPIN newsletter. This will allow you to reach people who were unable to attend the conference as well as people who attended but couldn t go to several sessions simultaneously. Please send those to Diane (dmartlin@harpercollege.edu). The more we share our teaching ideas, our successes and failures, the better our profession gets. As a reminder, I d love for you to include your conference handouts on the web site as well. Send me a computer file in Word, Word Perfect, Open Office, Power Point, Corel Presentations, PDF, Rich Text Format, plain text, or MS Publisher (but not MS Home Publisher), and I'll post them on the web site, doing any conversions necessary to make it easy for people to view them. If you have trouble e-mailing them to me, you can send me paper copies to Box 70663, Johnson City, TN 37614.

I wish for you a successful and enjoyable fall term, and look forward to seeing many of you in St. Louis!

Daryl Stephens

Letter from the Co-Chair

Welcome to the Fall 2003 MATH SPIN Newsletter. We have an exciting jam-packed issue with submissions from many of our embers. We hope that you continue to be active participants of this SPIN group. I have also included a new feature where members have presented an opinion and then the comments to/fro from other members. Let us know if this is a good idea or if it needs some help.

As we enter this holiday season, we wish you the very best and a Happy New Year as well. Let us not forget that 2004 is a Leap Year—one more day to have some "math fun." We also look forward to seeing you at the NADE Conference: **Developmental Education: Gateway to Success** in **St Louis**, **March 10-14**. Talking to some of the Missouri contingent at AMATYC last month, the conference promises to be a very productive one. Our NADE conference is an excellent opportunity for seeing old friends, making new members feel welcome, and a time to rejuvenate ourselves professionally. Daryl and I want to be sure to invite you all to come to the Math Spin Meeting on Friday, March 12. See you all there.

Diane Martling

MathSPIN Yahoo! Group

Remember that our e-group (also known as a "listserv," but technically that's a trademark, so we aren't supposed to use that name) is available to all MathSPIN members. This is a free e-mail forum in which members can send questions or comments by e-mail to others about issues of interest to developmental math faculty. The MathSPIN e-mail group is archived at http://groups.yahoo.com/group/mathspin/, but you have to get a free Yahoo! account to see the archives. You can join the group by sending a blank e-mail to mathspin-subscribe@yahoogroups.com. Your e-mail box will NOT be flooded with junk mail from this group. The number of messages per month is quite small. In the past people have used this group to start collaborative research projects, discuss some topics in math reform, get views on textbook readability, and request information from people at other institutions on various policies such as attendance, calculator use, and COMPASS cut-off scores. This group is the easiest way for us to communicate with the MathSPIN membership. Please consider signing up today if you aren't already on the list. Right now only 153 of our approximately 400 SPIN members are on the list.

Looking ahead to the 2004 NADE Conference

We would like to use about half an hour of our time at our Math SPIN meeting at the 2004 NADE conference for you to share teaching ideas. If you would like to make a 3-5 minute presentation on a developmental math topic of your choice, or share a favorite game or worksheet, please e-mail Daryl Stephens at stephen@mail.etsu.edu by Monday, February 23. This time will be first come, first serve. Please reserve this time for presenting something other than something you're presenting at a regular session. More information will be forthcoming in the early spring newsletter, which should come out before anyone leaves for St. Louis.

Math SPIN Web Pages

The Math SPIN web site, located at http://www.etsu.edu/devstudy/spin/, is your source for information about the SPIN. There you'll find a large number of links to sites of interest, archives of SPIN newsletters dating back to 1997, quarterly and annual reports that the SPIN must send to NADE, publications by SPIN members, information on how to contribute content to the site, and more. The more that people submit, the better the site becomes! The site is crafted to be compatible with most major browsers (Internet Explorer, Netscape, and Opera).

Greater Expectations

Thomas Armington, Felician College

Last summer, the American Association of Colleges and Universities released a report entitled *Greater Expectations*. In the same way that the NCTM *Standards* and AMATYC's *Crossroads in Mathematics* have become models for change in teaching mathematics, the *Greater Expectations* report is becoming a model for broader reforms in higher education. While the report does not deal strictly with mathematics, it has major implications for how developmental mathematics should be taught at the college level.

The title "Greater Expectations" refers to two main premises of the report. The first is that students aspire to the level of their teachers' expectations. If teachers hold low expectations of their students, the students will perform at low levels; if teachers hold higher expectations, the students will perform at higher levels. The second premise is that students should expect to receive *higher* levels of learning from institutions of *higher* education. If students are graduating from college without having developed high-level thinking skills, perhaps there is a need for colleges to reexamine the education they are providing their students. Essentially, the report calls for colleges to have *greater expectations* of themselves as well as their students. The bulk of the report focuses on several themes for implementing these greater expectations. These are summarized below.

What should students be learning?
Learning is more than the acquisition of facts or rote skills. As students progress through college, they need to develop the abilities to analyze and apply the knowledge they are acquiring; "students need to know facts, but even more importantly how to interpret and what to do with those facts." College instructors should emphasize the development of thinking skills, not just subject knowledge, and college graduates should be able to use the knowledge they have acquired in the real world.

Learning-centered instruction
Colleges should be places where people learn, rather than places where people teach. While learning happens in the formal classroom setting, it also happens in other ways. For example, while two semesters of classroom instruction may not produce competence in a foreign language, living in a bilingual residence or a study abroad experience might. In other words, classroom presentation of material is not necessarily the only way, or even the best way, to help students learn. There is a range of learning styles that includes visual, aural, and experiential learning. Cooperative, as opposed to individual, activities allow students to learn from each other as well as the instructor. With learning rather than teaching as the focus, instructors need to consider employing a range of activities in their classroom instruction.

Fragmentation of the curriculum
Historically, colleges have separated the curriculum into general education, major, and elective categories with little attempt to establish connections between these areas. Individual courses tend to be "owned" by individual departments or professors. As a result, there is little coherence to the overall curriculum. (How often do faculty in the sciences and business complain that their students can't handle the math, even when the students have fulfilled their prerequisite mathematics requirements?) Interdisciplinary coordination of courses is needed, and college faculty are responsible for creating a coherent curriculum by working cooperatively.

Assessing student learning
Assessment shapes the curriculum. If instructors test low-level rote skills or factual recall as opposed to higher-level skills such as the ability to analyze and apply information, students will remain at low levels of learning. Multiple choice tests, in particular, provide little assessment of higher-level thinking skills. Instructors need to develop broader forms of assessment that allow students to demonstrate a variety of skills. Portfolios or final projects, for example, can represent capstone experiences where many skills are brought together in a single assessment.

The *Greater Expectations* report provides a good overview of broad changes that are needed at the college level. Given that developmental course work is intended to provide the foundation for college learning by addressing students' academic deficiencies, there is no reason these reforms should not be implemented at the developmental level. After all, the *developmental* concept itself implies the *development* of something. If not higher-level thinking skills, then what?

(Disclaimer: With the exception of the first and last paragraphs, and the parenthetical sentence in the paragraph on "Fragmentation of the curriculum," this article is a summary of the *Greater Expectations* report and represents the ideas of the authors of that report, *not* the original ideas of this author.)

References

American Association of Colleges and Universities. (2002). *Greater Expectations*. Washington, DC: Author.

(The *Greater Expectations* report is available in its entirety at http://www.greaterexpectations.org)

***Thomas Armington is a former chair of the NADE MathSPIN and former editor of this newsletter. He is also editor of* Best Practices in Developmental Mathematics.**

KUDOS: A hearty CONGRATULATIONS to Irene Doo as she was just elected Secretary of AMATYC. It is nice to have one of "our own" become a national officer in this 2-year college organization and have the interests of Developmental Education in Mathematics as a vantage point. In some of the schools, Developmental Math comprises 75% of all course offerings.

Remediation Rates in your state

by Ed Laughbaum, Ohio State University

I am researching remediation rates in the United States and hope you can help me by providing sources of data on the topic. I find that many state higher education governing bodies do not have the data where it is easily accessible on their web page. Michael Meagher is a graduate student at Ohio State and is doing most of the research. We are interested in remediation of high school mathematics at the higher education level.

If you can help us, please reply to Michael Meagher at <meagher.10@osu.edu>. Below is his inquiry:

> I am conducting some research on remediation rates in mathematics in the United States and hope that you will be able to help me with some information and data about remediation rates in your states.
>
> Could you please provide me with the following information:
>
> (a) remediation rates in mathematics in your state for as many years as possible (hopefully at least the last five years);
>
> (b) a definition of remediation in your state (definitions can be those taking remedial courses in the first (or second) semester after they graduate or may include returning students);
>
> (c) whether your state has an EMPT (Early Mathematics Placement Test) program whose goal is to provide intervention at the high school level.
>
> Thank you, in advance, for you attention to this matter and for your help in facilitating my research.

AMATYC Foundation/Developmental Newsletter

by Jeff Morford

The Foundation/Developmental Math Committee of AMATYC [American Mathematical Association of Two-Year Colleges] held a successful series of themed short sessions - a series of 15 minute talks at the Salt Lake City conference. The attendance at this section was large and the reviews very positive.

So we have decided to try to offer another session in Orlando. The theme for Orlando will be "Lighting the Bridge from Ideas to Student Success." If you have used the Crossroads Standards to improve student success and you can present your work in 15 minutes we would love to have you speak in Orlando. You could also encourage faculty who have never presented before at AMATYC to use the short sessions as a comfortable way to present their first session. Please contact Jeff Morford for details at jmorford@hfcc.edu if you are interested.
(Short Session Presenters do not receive the presenter rate at the conference.)

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What, exactly, are we trying to develop?

Alain Schremmer
Community College of Philadelphia

Judging by the nature of most of the talks at the AMATYC annual conferences, Students In Remedial Mathematics (SIRM) are much appreciated … as the ultimate challenge: Many are called and few make it to the next course.

Judging by the available textbooks in "remedial" mathematics (but also, in fact, up to calculus), we are taking SIRM for morons in that "show and tell and drill" reigns supreme. The supposedly bitter mathematical pill has been sugar-coated in many ways:

Today, it is graphing calculators. Yesterday, it was computers. The day before yesterday, it was television. Before that,

> In 1922 Thomas Edison predicted that "the motion picture is destined to revolutionize our educational system and … in a few years it will supplant largely, if not entirely, the use of textbooks. " Twenty-three years later, in 1945, William Levenson, the director of the Cleveland public school's radio station, claimed that "the time may come when a portable radio receiver will be as common in the classroom as is the blackboard." Forty years after that, the noted psychologist B. F. Skinner, referring to the first days of his "teaching machines," in the late 1950s and early 1960s, wrote, "I was soon saying that, with the help of teaching machines and programmed instruction, students could learn twice as much in the same time and with the same effort as in a standard classroom. "
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> – Oppenheimer, T. (1997, July). The Computer Delusion. *The Atlantic Monthly*. 45-62.

Yet, there is not a shadow of a proof that SIRM might not be fully capable of mathematical thinking. This reminds me of the days when women were deemed to be genetically incapable of thinking logically.

Even though phrases like Coherent View of Mathematics (CVM) and Profound Understanding of Fundamental Mathematics (PUFM) have begun to appear, I have yet to see even the preliminary signs of an implementation.

To create such texts, though, will require a considerable, collective, rethinking effort and so can only happen as an "open source" development on the web.

Combined 9 credit Developmental Mathematics Course

Martin Weissman
Essex County College, Newark, NJ

Weissman has been selected to teach an experimental course that combines the usual 2 semester sequence of Pre-Algebra and Introductory Algebra. This class meets 5 times a week in the usual lecture setting and has its sixth session in a computer lab using tutorial software.

Since the venue is a Smart classroom, the software is also used occasionally, during the lesson and projected onto the SmartBoard.

Professor Weissman is using a spiral a la carte approach. The course is broken into 20 modules or lessons each of which will cover 5 areas including vocabulary, basic skills, equations, word problems, and graphing. Each module is summarized with a crossword puzzle.

By continuously exposing students to word problems and graphing students become comfortable with them as the days pass. An the spiral approach takes takes them from the simple to the complex.

The rationale for this 5 item menu is that in the traditional approach students (and teachers) get bored doing the same thing for days on end. Also, topics, like Graphing, are sometimes not taught until the end of the semester and then it's a rush case.

The course is an effort to shorten the timeframe that students need to finish developmental course requirements.

The software was developed by Professor Weissman and is available free to schools that are looking for ways to integrate technology into the curriculum.

Martin Weissman
347-528-7837

Perspectives on Developmental Algebra Reform

These perspectives by Ed Laughbaum, Betsy Darken, and Alain Schremmer originally appeared on the MathSPIN Yahoo Group e-mail list. They are reproduced here to help spur discussion among ourselves. If you would like to respond to these perspectives, please e-mail your responses to Diane Martling, newsletter editor (dmartlin@harpercollege.edu).

Ed Laughbaum

Ohio State University

I thought this group may want to see my DM odyssey I posted on the AMATYC listserv today.

In the early-1980's I was teaching beginning and intermediate algebra at a two-year college, and as I recall, the textbooks were designed to teach students to memorize. That is, each section started with a definitions, laws, or theorems followed by 4 to 8 examples of the use of the laws, theorems, ... followed by an exercise set of 30 - 60 exercises that could be worked by mimicking the worked examples. At the end of the exercise set you would often find "word" problems that could also be worked by following the suggestions in the examples. So finally after teaching by the textbook curriculum (described above) for 20 years you start to wonder how effective the method is. You notice that students taking the next course in the sequence have forgotten what you taught them and it must be re-taught. The physics prof calls and asks why you didn't teach solving quadratic equations - her students maintain that you didn't - yet you did. You notice that you have 15 students in class come exam week, but you started with 37 at the beginning of the quarter. Why isn't what I am doing working? It worked fine for me when I was in high school! So you do some research of all intermediate algebra students on campus. You give them a pre- and post-test and find that it isn't just you. A majority of the students didn't learn to manipulate symbols. You subscribe to a listserv and discover that students aren't just dropping out of your class, but it seems to be a national problem. At this point you start to look for solutions. We were a progressive college. It was 1985-6 and we had a few computers on carts. So you write code for being able to graph functions and you can now "demo" basic ideas about functions. But you still use the same textbook. You look into presentation software and discover it exists, so you convert lessons to state-of-the-art presentations. Student pay more attention, but success is still elusive.

Sure, this is my story (being an old person, I have probably told it before). But it isn't over because the graphing calculator is about to be invented.

It was this tool that gave me the freedom to explore new teaching ideas. It was this tool that allowed me to think about how I would change the curriculum to capitalize on this new-found power. It was the graphing calculator that opened the door to creating collaborative activities (for me). It was this tool that gave students the power to explore and investigate. It was this tool that provided access to modeling at the developmental algebra level. It was the graphing calculator that made conceptual understanding possible through guided discovery activities. It was the graphing calculator that opened my eyes to the power of teaching math in the context of real-world problems. It was the graphing calculator that allowed me to use real-world data sets (functions) to connect mathematics to live classroom events in the physical world (through the CBL).

Are these good ideas? Do they help? Are students now learning and understanding algebra? Just like most of us, we teach and do not do educational research, but in my opinion, absolutely, they are successful! But will everyone be successful with this pedagogy and curriculum? Is it better to keep on teaching the traditional curriculum and with traditional methods? Should we continue to ignore technology as a teaching tool? Should we continue to blame others for our poor students? Should higher level course instructors blame us for their poorly prepared students? You probably could guess my answers.. . Just the richness of the curriculum and pedagogy are sufficient reasons for changing.

Ed Laughbaum (Part Two)

Hello All,

I am curious about your opinions on the current state of reform in developmental algebra in the US. I know that reform has many fronts, but I am particularly interested in the state of reform in beginning and intermediate algebra (and maybe even pre-algebra) relative to the use of the graphing calculator (and data collection devices) used as tools to help implement reform ideas and curricula.

Historically, we know that most of the "reform" developmental algebra textbooks using hand-held technology never made final publishable versions,but rather, died after a run as "preliminary" versions. We also know that the national graphing calculator usage at the developmental algebra level was about 25% from 1998 and 2000 surveys, when in higher level courses the usage level has been running 60-75%. We also know that graduation success rates of developmental algebra students has not been good.

But I think there are changes that have taken place within the last two years that may indicate increased activity at this level. An example of change might be the increased number of graphing calculator activities (for groups or individuals) being used to supplement a traditional developmental curriculum. Another example might be increased professional development for developmental instructors. A positive change indicator may be specific activity by professional associations like NADE and AMATYC toward the issue. I don't think we can argue that since there have been no reform textbooks published in the last couple years (to my knowledge) that reform in not happening - since publishers run 3 - 4 years behind.

Thoughts? Agree? Disagree? Why? Am I thinking a change is happening because of a bias toward I have toward their use? If you think changes are happening, what are the indicators? Has there been a decreased usage, and I am wrong?

Thanks for reading and responding.

Betsy Darken

University of Tennessee at Chattanooga

In any discussion of the use of calculators in developmental math (DM) courses (or any other math courses), I believe the starting point must be to develop a clearer understanding of our goals for these courses. Here I see a real dilemma for DM. DM courses usually serve a host of purposes, some of which I think may be in conflict with others. One goal has lately been referred to as developing "quantitative literacy." Another is to prepare students for college algebra, precalculus, etc. Let's consider these two goals:

(1) Quantitative literacy is not well-defined, but all of us who have ever taught DM students can instantly start a list of items we think should be included under "quantitative literacy". For example, all high school (college?) graduates should:
(1) know instantly that 1/3 is equivalent to thirty-three and a third percent;
(2) recognize that 0.004 is 4 thousandths;
(3) determine the percent raise, given the old and new salaries;
(4) solve a linear equation;
(5) find the area of any triangle, using a ruler and either American ("customary") units or metric units, a right angle, and a calculator;
(5) find the area of any polygon, using a ruler and either American ("customary") units or metric units, a right angle, and a calculator; etc.

In my mind, for high school graduates, "quantitative literacy" refers to having a solid understanding of material that should be learned in kindergarten through eighth or ninth grade, through the ideas of elementary algebra. I am not sure what quantitative literacy should mean for college graduates, but I would certainly include a solid understanding of basic probability and statistics, a deeper understanding of deductive reasoning, a more thorough understanding of linear, quadratic, and exponential functions, and an increased ability to reason one's way through quantitative problems.

(2) A second goal of DM courses is usually to prepare students for college algebra, pre-calculus, etc. Most such courses require a considerable amount of specialized knowledge

that goes beyond what I would include in quantitative literacy. For instance it may be useful (although this is debatable) for students heading for calculus to know how to factor a variety of polynomials, including quadratics such as $12x^2 - 4x - 5$ or cubics such as $a^3 + 27$. I doubt whether such knowledge needs to be part of quantitative literacy. Likewise, I doubt that being able to simplify messy exponential expressions full of rational number exponents is a component of quantitative literacy, but it can be important for students heading toward calculus.

So here is the dilemma. In my observation, most DM students--as well as many DM graduates, college level students, AND college graduates --are not quantitatively literate. They have managed to pass their math courses by memorizing meaningless rules. (This is one reason why we have so many DM students--they have forgotten what they learned in grade K-12 because most of it did not make sense to them.) However, most DM courses around the country proceed to repeat the process of teaching students meaningless rules because they concentrate on preparing students for college algebra, etc. After all, DM courses are "basic skills courses." They concentrate on rules for adding fractions, solving various types of equations, simplifying expressions, etc. "Word problems" are usually given short shrift, and even when we spend time on them, the problems are usually rigged.

I believe we need to go back to the drawing board in order to improve DM programs. First, we need to develop DM courses that focus on quantitative literacy. Then we might need to have separate DM courses that are essentially pre-pre-calculus courses. Within such a curriculum we can make intelligent use of technology. While we're doing the latter, we should also insist that students work on their number sense, so that they do not pick up their calculators to compute 27 - 22, 25% of 60,etc.

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Alain Schremmer

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In any discussion, we ought to indeed to know what we are talking about and what we know. While Darken's analysis is correct, there may not be a dilemma or, at least not a severe one, inasmuch as the lack of quantitative literacy and the lack of preparation for college course proceed from the same basic issue, namely the fact that, by and large, that is with the exception of (future) math majors, the teaching profession takes it for granted that thinking mathematically is not for the great unwashed masses. Now should this not be the case, then no more dilemma. Just to avoid any misunderstanding, I do not propose that we start anyone on Bourbaki page 1. On the other hand, not a single text I know, from "remedial" mathematics to calculus, is even trying to impart to the students a Profound Understanding of Fundamental Mathematics (PUFM). For this, and to use another term that is beginning to make it to the surface, a Coherent View of Mathematics (CVM) in the teacher/author would be necessary. To create such texts, though, will require a considerable, collective, rethinking effort and so can only happen as an "open source" development on the web. So, while we may not have a dilemma, we may have a problem and, yes, we should analyze what the problem is.

The *Math SPIN Newsletter* is published online approximately three times a year. Membership in one SPIN is included in the dues paid to the National Association for Developmental Education. To join NADE, please go to the website at http://www.nade.net for membership information.

To contribute articles, e-mail Diane Martling (dmartlin@harpercollege.edu), co-chair.

Book Review by Roberta S. Lacefield

I take some comfort in knowing that some books, like Jordan/Palow's "Integrated Arithmetic and Basic Algebra" (http://www.aw-bc.com/catalog/academic/product/0,4096,0201642034,00.html) , have made it past the preliminary edition. This particular book addresses basic numerical literacy while also building a bridge to more advanced topics AND making the point that in algebra we are simply doing arithmetic abstractly. There ARE a few such books out there. Certainly we aren't where I thought we'd be this long after the publication of AMATYC's Crossroads (http://www.amatyc.org/Crossroads/CrsrdsXS.html) and the Calculus Reform (http://mathforum.org/mathed/calculus.reform.html) movement but change is painful and REAL change is slow. I haven't given up the dream yet. :-)

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So What Happened to *Best Practices in Developmental Mathematics, Volume 2*, Anyway?

Back in the spring Tom Armington solicited and received manuscripts for an updated version of *Best Practices in Developmental Mathematics, Volume 2*. The first volume got many favorable comments, and there were requests for more copies from people outside the SPIN. The manuscript for volume 2 was completed in the summer, and a publisher volunteered to print the new volume in booklet form for all Math SPIN members. Some technical glitches came up that needed investigating and correcting. Then, because the NADE publications committee had been disbanded, the NADE executive board had to act to approve *BP2* as a NADE publication. Then it has taken a while to complete negotiations regarding copyright, future use, and so forth. Complicating all this were extended illness of one or more executive board members and increased work loads at school.

So when will we be getting *BP2* out? No one knows, but don't plan on receiving one in your Christmas stocking. With any luck, they'll be available by the time of the NADE conference in March. Stay tuned. As soon as they're printed, they will be distributed to members.