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Annotated Bibliography Scavenger Hunt

Understanding and Teaching Mathematics with a Diverse Student Population

#16

Center for Research on Education, Diversity and Excellence. 20 Sept. 2001 <http://www.crede.ucsc.edu>.

This is a website of CREDE (Center for Research on Education, Diversity and Excellence), an organization created by the University of California in Santa Cruz. CREDE's mission is "to assist the nation's diverse students at risk of educational failure to achieve academic excellence." The site contains a lot of useful information and links. The main categories of the site include News & Multimedia, Products & Publications, Research Programs, and Services. The services include consultation, professional development training, evaluation and assessment of teachers and schools. The other categories can serve as useful research tools to anybody interested in multicultural education. Among other things, the site provides an annotated bibliography on the group's research in the area of multicultural education. This site is useful to beginning teachers as well as experienced teachers. It not only realizes the challenges of teaching in a diverse environment but it provides information on how to be more effective in such a situation and provides support to teachers and schools that are trying to practice multicultural education.

#9

Gorski, Paul. Multicultural Pavilion: Resources and Dialogues for Educators, Students, and Activists. University of Maryland. 20 Sept. 2001 <http://curry.edschool.virginia.edu/go/multicultural>.

This site was created by a professor at the University of Maryland, Paul Gorski. Paul is the author of several books on multicultural education. On the site there is a "Research Room" where you can read various publications on multicultural education. There is a section on technology and what is called "Digital Divide" or in other words the idea that students of certain backgrounds typically don't have as much access to technology in their classrooms as their peers. There is a "Teachers Corner" where teachers can find information specifically related to teaching in a diverse classroom. There are specific activities that can be done in class that promote intercultural awareness. There is a multitude of related links, a poetry journal, a multicultural song index, a discussion forum, etc. This site is an excellent resource because it contains a ton of information, both theoretical and practical, related to multicultural

education. I would recommend to anyone who wants to get the most out of the website to use the categories under the heading "Multicultural Pavilion Features" as a starting point in the browsing of this extensive website. That would be the fastest way to get to information you're seeking whether it is a quote, a song, or an article on diverse classrooms and multicultural education.

#6

Rice, Craig, Bruce Roberts, and Howard Thorsheim. Intercultural E-mail Classroom Connections. Mar. 1994. St. Olaf College. 20 Sept. 2001 <http://www.teaching.com/IECC>.

IECC is a service started by several people from the St. Olaf College. They were originally interested in communicating with educators from various countries around the globe, but their service grew into what it is today because of the overwhelming amount of interest they saw expressed by their national and international colleagues. IECC stands for Intercultural E-mail Classroom Connection and it is just that. A teacher can register him/herself and/or his or her class for free and be matched up with a similar classroom in a different country for pen-pals, project exchanges, etc. Currently more than 7,650 teachers in 82 countries are participating in the program. The site provides registration in elementary school and high school categories, as well as intergenerational connections for young teachers and teachers over 50. There is also a survey section which can be used by teachers as well as students to gather opinions from a worldwide audience. Finally, there is a discussion forum regarding the service. This is beneficial because it is an unordinary activity that the students might enjoy. It would take some time away from the traditional math lecture, but the kids might learn something from their peers in other countries. They would learn to appreciate diversity through knowing somebody who is not like themselves.

#4

Strutchens, Marilyn. (2001, September). "Multicultural Mathematics: A More Inclusive Mathematics." ERIC Digests Mar. 1995: ERIC Clearinghouse for Science Mathematics and Environmental Education.

This article lays out all the challenges that diversity creates in mathematical classrooms and offers specific suggestions on how math can be made more inclusive. The article blames the lack of culture links in a mathematics classroom for the lower level of performance of certain cultural groups. It offers five ways to tie math and culture together. Then the author explains each one in greater detail giving examples of specific lessons that could be integrated into the curriculum in order to link math to the cultural backgrounds of the students in the classroom. Reading this article is very important to all teachers, but especially those with little experience in the area. The article is very well written and easy to understand. Most

importantly it provides real answers and specific examples of multicultural learning in a *math* class; something that is difficult to find.

Incorporating Technology into the Mathematics Classroom

#14

Calvert, L. G. (1999, September). "A dependence on technology or a lack of number sense." Teaching Children Mathematics, 6, 6-7. Retrieved September 23, 2001, from <http://newfirstsearch.oclc.org/WebZ/FTFETCH?sessionid=sp03sw03-34069-crzd3vg3ikpqv6:entitypagenum=3:0:rule=990:fetchtype=fulltext:dbname=WilsonSelectPlus_FT:recno=2:resultset=1:ftformat=ASCII:format=T:isbillable=TRUE:numrecs=1:isdirectarticle=FALSE:entityemailfullrecno=2:entityemailfullresultset=1:entityemailftfrom=WilsonSelectPlus_FT>.

In this article, Lynn Gordon Calvert assesses the claim that the use of technologies in the classroom has caused students to become dependent on such tools as calculators. Calvert contends that students are no more dependent on technology than they are on pencil and paper, and provides evidence for his point by comparing the problems that clerks who use machines and clerks that calculate change manually. In his comparison, he finds the common thread to be a lack of number sense, or how numbers relate with one another. Calvert suggests that some math students never gain a good sense of how numbers relate has a good deal to do with the fact that math problems have generally been presented in an abstract and unrelated fashion. Because math problems that students do are unrelated, it is difficult for students to think about the relationships between numbers outside of school. This can make calculations miserable for store clerks who are given $5.03 for an item that costs $3.28; instead of just realizing that this is the same problem as $5.00 take away $3.25, the clerk uses the less efficient and more prone to error rote subtraction technique.

This article has considerable implications for beginning teachers. First, it reassures teachers that the use of technology should not be seen as a habit-forming crutch that can disable their students. On the other hand, new teachers need to make connections between the math numbers that students are manipulating and with the real world. With these two things in mind, beginning teachers can eliminate their students' reliance on algorithms, and replace it with a better developed sense of numbers.

#1

Charischak, I. (2000, November). "A look at technology's role in professional development of mathematics teachers at the middle school level." School Science and Mathematics, 100, 349-54. Retrieved September 23, 2001, from

<http://newfirstsearch.oclc.org/WebZ/FTFETCH?sessionid=sp03sw03-34069-crzd3vg3ikpqv6:entitypagenum=7:0:rule=990:fetchtype=fulltext:dbname=WilsonSelectPlus_FT:recno=1:resultset=2:ftformat=ASCII:format=T:isbillable=TRUE:numrecs=1:isdirectarticle=FALSE:entityemailfullrecno=1:entityemailfullresultset=2:entityemailftfrom=WilsonSelectPlus_FT>.

In this resource, Ihor Charischak recognizes the importance of technology as a teaching tool, but more importantly points out that technology has to be thoughtfully integrated into the schools current curriculum. Charischak sites a Rand Study that indicates that technology integration into a school fails if technology is not incorporated in away that takes into account the way the school functions and if the technology does not directly benefit central personnel in the school. For beginning teachers, this information is not all that useful, but Charischak goes on to list six domains of knowledge that are important for teachers, new and old, to have. First, teachers need the ability to use and access resources such as computers, software, calculators, hand-held devices and the Internet. Secondly, teachers need to be able to create technology-oriented learning environments, such as ones that utilize projection device to lead a class discussion. Thirdly, teachers need a strong mathematical background in different types of math software, such as spreadsheets. Fourthly, teachers need to have a positive attitude toward learning mathematics, so that they are prepared to learn new information through technology use and training. Fifthly, teachers need pedagogical strategies and discourse that is aligned with the new Principle and Standards; that is, students should do problems that in context make sense to the students and also gives information about how math can be used as a tool of abstraction. Finally, teachers need to be able to use technology in their assessment strategies.

New teachers that are masters of these six domains will be effective utilizers of technology in their classrooms. Additionally, a list such as this gives new teachers a reference point for what specific places and ways they should utilize technology in their classroom without being overly specific. Also, if beginning teachers are able to become well accustomed to these six areas early in their career, it is more likely that they can integrate them into their teaching style before it becomes more rigid.

#7

Hubbard, L. (2000, October). "Technology-based math curriculums: custom built for today's classroom." T.H.E. Journal, 28, 80-4. Retrieved September 23, 2001, from <http://newfirstsearch.oclc.org/WebZ/FSQUERY?format=BI:next=html/records.html:bad=html/records.html:numrecs=10:sessionid=sp03sw03-34069-crzd3vg3-ikpqv6:entitypagenum=2:0:searchtype=advanced>.

This article expresses the experiences of Lawrence Hubbard, the principal of Langley High School, with using technology in educational settings. Hubbard first discusses the importance of schools near colleges to use the resources near to them. Langley High is very close to Carnegie Mellon University, and the two schools traded information constantly to try

to understand what works best in educating students. From research at Langley High School, Carnegie Mellon was able to write a computer program, called the Cognitive Tutor, that has greatly impacted the performance of classrooms who use the program. The Cognitive Tutor is an intelligent problem-posing program that guides students through connected questions in a way that emphasizes the key concepts being covered. Even more, students overwhelmingly enjoy the program and like going to their math classes. In Addition, teachers who use this program can spend more one-on-one time with students, especially those who need more assistance, and only need to spend half as much time reviewing old material. Most importantly, test scores from classes that use this program indicate that students perform twenty-five percent better in achievement and one hundred percent better in problem solving.

The usefulness of the information in this article is impossible to ignore. If beginning teachers are willing to collaborate with colleges around them, it's possible that great new research can be obtained that will help those teachers be more effective teachers. Additionally, beginning teachers must realize the importance of technology in the classroom. Programs like the Cognitive Tutor, although not a replacement for teachers, can greatly improve the abilities of students. Also, technology can help new teachers distribute more of their time to students who need extra help, as well as removing redundant and uninspiring lessons from their class schedule.

#12

Isernhagen, J. (1999, August). "Technology: a major catalyst for increasing learning." T.H.E. Journal, 27, 30. Retrieved September 23, 2001, from <http://newfirstsearch.oclc.org/WebZ/FTFETCH?sessionid=sp03sw05-35496-crzc7cdwa8rxnt:entitypagenum=3:0:rule=990:fetchtype=fulltext:dbname=WilsonSelectPlus_FT:recno=1:resultset=1:ftformat=ASCII:format=T:isbillable=TRUE:numrecs=1:isdirectarticle=FALSE:entityemailfullrecno=1:entityemailfullresultset=1:entityemailftfrom=WilsonSelectPlus_FT>.

This case study, performed by Jody C. Isernhagen, analyzed the effects of integrating different technologies into classrooms. The study involved a rural Nebraska school district that placed a computer in each of its eighty classrooms and twenty-seven in the elementary Integrated Lab. Results of the study were collecting by a teacher survey, observations by a technology consultant, and through the results of the California Achievement Test (CAT). The results of the teacher survey indicated that teachers and students had significantly increased their use of technology since the installation of more computers. Also, According to the technology consultant, students were commonly found doing authentic work with computers at all age levels in the school district. More importantly, the CAT scores revealed that students scoring below the 50th percentile before the introduction of new computers increased significantly.

This is very important information for new teachers. This case study indicates that if teachers are given technology to use in their classroom, students who normally do not perform well can benefit academically. Additionally, because the case study was on a school system

that used technology often in classes, beginning teachers cannot expect to just sit on their computer and hope their students will suddenly perform better. Instead, new teachers should actively use such technology to ensure that the results of this case study can be obtained in their classrooms.

Professional Development for Practicing Mathematics Teachers

#10

Anderson, R. D. (1997). "Professional development for science and mathematics teachers in a time of educational reform and new standards." In Reform in Math and Science Education: Issues for Teachers. Columbus, OH: Eisenhower National Clearinghouse.

This article by Ronald D. Anderson, a University of Colorado Professor, addresses the reasons behind professional development within the schools. He discusses how significant professional development can occur when one understands the current educational situation. This situation is very much influenced by the National Council of Teachers of Mathematics Standards. Once understanding the new situation in mathematics education, one can see how important development is and the purpose behind advancements.

The purpose of professional development is to enhance the growth and development of teachers to create the most effective instructors possible. The author discusses this purpose according to the technical, political and cultural dimensions of professional development. Within the technical dimension, inservice education, peer coaching, reading, professional conferences and networking are all discussed as important ideas behind development. There is also a political aspect of teacher learning, including matters of authority, power and influence, and moral issues of justice and fairness. What happens within the political world greatly affects how professional development is performed. The cultural dimension of development includes values, beliefs and school norms. Teachers must acquire new knowledge and skills in these areas in order to address cultural differences and become an effective teacher. Five different models of development were discussed: an individually guided staff development model, an observation/assessment model, a development/improvement process, a training model and an inquiry model. With all of these models, the most important point to make this development effective is to sustain the training for a long period of time.

Overall, this article addresses many important issues within professional development for a math or science teacher. Although not offering specific ways to seek out these development programs, it offers the reasons behind this ongoing process and provides a sense of direction to teachers and is important to promoting professional development.

#13

Basista, Beth; Tomlin, James; Pennington, Katherine; Pugh, Delores. (Spring 2001): "Inquiry-based integrated science and mathematics professional development

program." In Education, no. 3 p. 615-624. Project Innovation.

This article discusses a newly developed professional development program in the education of math and science. The authors state that teachers don't provide enough connections to students between mathematics and science within the classroom. This is an important relationship to make to students because many do not realize the importance of these subjects in daily life. In order to better prepare for this education, this program was designed by Wright State University and two Ohio school districts in 1997. This article describes the program and its results in its two year running.

The program involves administrator workshops, a four-week intensive summer institute, and academic year follow-ups including seminars, class visitations and support. The administrator workshop included mostly principals from participating schools. In this program, they discussed traditional teaching methods, science and mathematics standards, and the support systems and resources teachers would need to implement this in the classroom. In the teacher sessions, teachers participated in inquiry activities and cooperative learning involving different mathematics and science applications. They discussed national and state mathematics and science standards, inquiry and constructivist teaching practices, alternative assessment, implementing cooperative learning in the classroom, and equity within the class. Teachers worked together to create units which collaborated mathematics and science. Overall, teachers said they felt more prepared to teach in this manner, and a significant knowledge gain was recorded among them. The article also included testimonies from the participating teachers, and generally had a positive result.

This article shows a specific example of a professional development program. It describes what the teachers learned and went through, and had positive results. It is based on a new standard of learning, and incorporates many different aspects of teaching and learning. Overall, it is a worthwhile article for a teacher to read as an example of different programs that may be available to them in their profession.

#5

Math Teacher Link - Professional Development Consortium for Mathematics Teachers

16 Sept. 2001

<http://mtl.math.uiuc.edu>.

The University of Illinois Math Department developed a website called Math Teacher Link available from the UIUC web page. This site contains professional development opportunities and classroom resources for high school or lower level college teachers.

There are Course Modules available that are time-flexible to be taken at home or at school via the Internet. Each module contains a required classroom unit that can be used within the classrooms. There is an online registration for these modules and they can be taken for Graduate Credit or for Continuing Education Credit from the University of Illinois. Or, someone could register as a guest for free to try out some of the available programs. These Courses are offered for a variety of topics, including Calculus and Mathematica for

Mathematics Teachers, Using Internet Resources for High School Mathematics Instruction, Teaching Statistics in High School, and Computers and Connections. There are also non-credit tutorials available for computers and graphing calculators.

Also accessible on this website are links and announcements about sites and events for mathematics teachers. This includes various seminars and also information regarding obtaining an online Masters of Education Degree from the University of Illinois. There is a Classroom Resource Bank that is sorted by course topics and instructional strategies to aid with instruction within the classroom. There is also a Message Board that contains comments and questions posed by other mathematics teachers across the country. Anyone can post a question concerning anything to be answered by other teachers. This provides a connection and a network for teachers across the country to help one another.

This website was selected as one of the Digital Dozen websites by Eisenhower National Clearinghouse in May of 1997 and by Education World as one of it's "Best of January" education websites in January, 1998. It is a useful source for any math teacher and especially for those familiar with or alumni of the University of Illinois.

#2

Phi Delta Kappa International - Professional Development 16 Sept. 2001 <http://www.pdkintl.org/profdev/cphome.htm>.

Phi Delta Kappa is an international association of professional educators whose mission is to promote quality education. They believe that professional development should be an ongoing and systematic process and should be based upon research. The main goal of the professional development link of the website is to provide teachers and school administrators opportunities for professional development to improve both the schools and the students.

This site contains numerous links to these opportunities. There is information on their Center for Professional Development and Services programs available to the schools. They deliver the programs directly to the schools and will collaborate to customize a program that meets the staff's individual needs. The site provides information on programs for a variety of topics, including accountability issues, curriculum specific needs, leadership topics, instructional strategies, and parent involvement. In addition to these catered programs for individual schools, there are also over 100 videotapes and publications available to order from the website. These also have a wide range of topics to assist in professional development of a teacher of any subject. For example, a math teacher can purchase the book 101 Great Ideas for Introducing Key Concepts in Mathematics: A Resource for Secondary School Teachers by Alfred S. Posamentier and Herbert A. Hauptman to further their education and enhance their classroom teaching.

Overall this site contains many useful links and information for new teachers, experienced teachers and administrators to further professional development within the schools. There are contact sources listed and other information to find out how to implement

these programs within a school. The Phi Delta Kappa website is an excellent source for an educator interested in improving schools and students.

Cooperative Learning in the Mathematics Classroom

#8

Davidson, Neil. Cooperative learning in mathematics. A handbook for teachers. United States: Addison-Wesley Publishing, c.1990.

This book is a collection of essays and research studies that are mainly concerned with different aspects of cooperative learning. The editor begins with presenting an overview of cooperative learning. He also asks questions in regards to different issues that arise. These questions are then explored in the following essays that are also categorized to which school level they belong: elementary, secondary, or general. For example, the very first entry in the book is written by Marilyn Burns who is a creator of The Math Solution courses that help teachers develop the skills to teach through a problem solving approach using cooperative learning. In her essay, The Math Solution: Using Groups of Four, Burns first presents the problems with current mathematics education. The then presents her approach theoretically, and then practically. In great detail she gives an example of a lesson that she observed presenting even the dialog between the teacher and the students and the follow up activities that the teacher plans to do. Another entry in the book is by Robert Slavin. Slavin has done a great deal of research in regards to cooperative learning. Here, he describes a couple of instructional methods that have been used in mathematics. One of them, Student Teams Achievement Divisions (STAD), Slavin lays out in great detail including examples of worksheets, lesson plans, grading policies and etc.

This book can be of great use to a teacher, new or experienced, who is trying to implement, or even research, cooperative learning in a mathematics classroom. Because this is a collection of the work of many people, the teacher will not just get one approach, but many. The teacher also gets examples of lessons tried in different classrooms by different teachers, the reaction of students and teachers to the lesson. Also, this book can be useful just because of the way that it is organized. After each entry, there is a description of the author, who they are, what they do, and other works and research done by them. Also, there are tons of references that lead the reader to even more detailed works.

#11

Good, T. L., Reys, B. J., Grouws, D.A., &Mulryan, C.M. (1989-90). Using work groups in mathematics instruction. Educational Leadership, v.47, 56-60.

This study explored the types of groups that work best in a mathematical cooperative learning classroom. 15 teachers were chosen from 9 different schools due to their regular use of cooperative learning in the classrooms. During observations conducted, group and lesson

framework were observed. Moreover, the teachers identified five top and bottom students in the class, random two of which were observed intently during each observation. The study identified two types of group formations: achievement-groups and work-groups. Achievement-groups were made according to achievement of the students in order to accommodate to their educational difference. Work-groups, on the other hand, were constructed heterogeneously in order to promote cooperative learning and to promote social and academic outcomes. The study found that in work-groups comparatively more students exchanged mathematical ideas than in achievement groups. Also, teachers in work-group classrooms were more likely to design activities that promoted higher-order thinking as well as gave opportunities to explore diverse topics instead of emphasizing quick computational skills. Overall, the study concluded that although in both group structures students improved their ability to work with others, to use strengths that every member brings to a task, as well as being more sensitive to each other's needs, work-groups performed better in promoting deeper understanding of mathematical concepts.

This research study is useful to a teacher who is just beginning to research implementation of cooperative learning in to a mathematics classroom. Because it presents two different approaches to group formation, it lets the teacher know what kind of things have been considered and what has seemed to create better results. However, it still lets the teacher have the option of trying both varieties in the classroom.

#15

Husted, Terry. (2001) A Homepage for New (and not so New) Math Teachers. <http://people.clarityconnect.com/webpages/terri/terri.html>.

This website is titled "A Homepage for New (and not so New) Math Teachers for a reason. It is really helpful for teachers who are nervous about starting their profession and for those who need to be updated with new resources that are available for mathematics education. Terri Husted has been a math teacher for the last 20 years and shares her experiences and resources with the rest of the world. There are many links that go off from the homepage. Some of them are just her experiences and philosophies, her advices and realistic awakenings. One takes you to a description of a math workbook that Terri created for elementary and middle school levels of math education. Another takes you to awards that this page has received giving you justification for using it. Others links take you to examples of lessons and other great sites for math teachers, elementary as well as secondary. One of those linked websites leads you to the article "The Essential Elements of Cooperative Learning in the Classroom" from ERIC Digest. (http://www.ed.gov/databases/ERIC_Digests/ed370881.html) This article includes exactly what the title of it suggests. It is very constructed very clearly. It is written in a sense like a constitution of implementation of cooperative learning. It is a very good summary of all important aspects of cooperative learning that a teacher can use in a way to check herself to make sure that all those aspects are addressed in the classroom.

#3

Nunnery, J. A., Bol, L., Whicker, K. M. (1997). Cooperative learning in the secondary mathematics classroom. The Journal of Education Research, v.91, 42-48.

This study researched the effects of cooperative learning by comparing test scores and attitudes of students in a group bases classroom and a lecture format classroom. The participants consisted of 31 11^{th} and 12^{th} graders in a pre-calculus course in a rural, lower-middle-class area. The groups in the treatment classroom (15 students) were made up of 5 people, one from the top and one from the bottom of the class. The control group received the same information, but in a strictly lecture format. To evaluate achievement, three tests were administered based on the three chapters covered. Although tests were individual, extra credit points were awarded for the group based on how much their tests scores exceeded their past tests' average. In the control classroom those points were awarded for individual improvement. Although the scores did not significantly differ between the groups for the first two tests, by the third test the treatment group performed significantly better. The conclusion that can be drawn from this is that it takes time for groups to form a bond and learn how to make the best of group work, but ultimately it still succeeds. To a survey distributed to the kids in the treatment group, most students responded that they liked getting help from other students, that harder problems were easier to solve in groups and that the only thing that they would change is the rotation of group members.

This study is useful to a teacher who is just beginning to research implementation of cooperative learning in a mathematics classroom. It presents the basics of how groups and lessons were formed. Although it does conclude that cooperative learning is more beneficial then not, it shows that the results may take a while to notice. This tells a teacher who is just beginning to not get discouraged too fast. It also gives an example of a survey that students responded to, something that can be done in class as well to get the students' opinion on how group learning is working out.