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Editorial Comments

As developmental educators we continuously work to improve our courses and programs. We research and document the effectiveness of our work. We also understand the need to share the resulting research and best practices with our colleagues. The **NADE Digest** is a perfect avenue for disseminating educational practices that improve student success.

This issue of the **Digest** includes research being conducted by NADE members and articles based on members' best practices. We hope you enjoy this wide variety of articles.

In the opening article "Evaluation Theory for Developmental Mathematics Practitioners," Irene Duranczyk presents an overview of theory, research, and evaluation for the developmental mathematics educator.

Jane McGrath and Arden Hamer provide research-based instructional suggestions to facilitate strategy transfer in college-level developmental reading courses and practical classroom activities based on those strategies in "Facilitating Strategy Transfer in College Reading Courses."

In "Integrating Technology into the Developmental Mathematics Classroom: A WebQuest," Annette Salsovic reintroduces the use of WebQuest and gives an example of its use in developmental mathematics.

Paul Fowler uses research data to describe Louisiana State University at Eunuice's successful developmental program and provides practical advice for developmental educators who wish to implement a similar program in "Three Elements of Success: Attendance, Tutoring, and Advising."

David Sabrio and Mitchel Burchfield describe their research project on student learning styles in "Research in Developmental Writing Courses and Implication for Practice" and discuss strategies, such as cooperative learning, for teaching the writing process.

Sandra Tannen shares several strategies she has found effective in her developmental mathematics class in her article "Using Student Engagement and Goal Setting to Achieve a Winning Classroom."

In "Taking Math Anxiety Out of Math Instruction," Darla Shields provides the results of her study on math anxiety and describes strategies to help classroom instructors develop anxiety-free mathematics students.

Closing this issue is the **Digest's** first book review. In "A Critical Analysis–Teaching community: A pedagogy of hope by bell hooks" reviewer Betsy Bannier makes connections between the book and developmental education practice.

Thanks to each author for sharing effective ideas for improving developmental education and ultimately helping our students succeed.

Jane McGrath & Laura Villarreal
Co-Editors

NADE Digest

The **NADE Digest** is published two times each year with issues distributed in the fall and spring of each academic year. NADE members receive the **Digest** as part of their membership benefits. Individual members ($50 US) receive the spring issue at conference or through a mailing after the annual conference attendees are confirmed. The fall issue is mailed to all members in good standing. Institutional members ($350 US) are mailed two copies of each issue as part of their membership benefits. Individual subscriptions to the **NADE Digest** are available at $20 US and back issues are available at $10 US per issue while supplies last. Add $4 per issue for first class mailing to addresses outside the US. Contact the NADE office, 2447 Tiffin Ave #207, Findlay OH 45840, or www.nade.net for membership information or to order individual subscriptions or back issues.

Evaluation Theory for Developmental Mathematics Practitioners

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This article is designed to present an overview of critical theory, research, and evaluation for the developmental mathematics educator. Students caught in the gap between high school mathematics preparation and entry-level college mathematics expectations — developmental mathematics education students—need to have their personal narratives told and have the measures of success reflect their needs. Highlights of evaluation theory and research, as well as a combination of qualitative and quantitative methods are presented for the developmental mathematics classroom researcher. There is an ongoing need for practical information on the effectiveness of programs and services addressing the mathematics educational gap. Hopefully this article will help you define your role in advancing this important evaluation and research area.

Whenever college populations are expanding and financial resources are diminishing, the role of developmental education is questioned (Saxon & Boylan, 1999). Many studies have demonstrated the effectiveness of developmental education through a variety of research methods (Boylan, Bliss, & Bonham, 1997; Boylan, Bonham, Claxton, & Bliss, 1992; Roueche & Roueche, 1993; Thomas & Higbee, 1996; Waycaster, 2001), especially in terms of student retention (Durant, 1992; Lyons, 1990; Simmons, 1994; Umoh, Eddy, & Spaulding, 1994). Politically, this research has not been reason enough for higher education to embrace developmental education, particularly at 4-year colleges and research universities (Jenkins & Boswell, 2002). This article will outline the history and benefits of three research areas (outcomes theory, retention theory, and attribution theory) that can assist developmental mathematics education practitioners in determining

what data will assist in program evaluation and will capture the benefits of developmental mathematics education for individuals who have completed their secondary education successfully and are deemed underprepared for postsecondary educational services.

Outcomes Theory and Research

In each decade since 1960, at least one outstanding outcomes theorist in the evolution of evaluation theory stands out (Fink, 1995; Lancy, 1993; Shadish, Cook, & Leviton, 1991). Social program evaluation theories emphasized a search for truth about effective solutions to social problems in the 1960s. Although Scriven (1983) and Campbell (1963) exemplify this period, the controversial work of Scriven on unanticipated outcomes or needs-referenced evaluation particularly highlights capturing the student's voice. "Programs, like products, should be evaluated by matching their effects against the needs of those whom they affect" (Scriven, p. 235). Scriven's model for evaluation called for an outside evaluator who would not reference program goals prior to data collection—who would evaluate the program solely based on participant perceptions—without prior institutional or political program knowledge.

In the 1970s, Stake added the concerns of how social science concepts and findings could produce political and socially useful results (Shadish et al., 1991). In this vein, Stake advocated qualitative methods for social program evaluation and emphasized the role of the case study in evaluation to find useful input-output relationships. Stake, like Scriven (1983), did not emphasize management concerns. Underlying Stake's approach, however, is "concern for stakeholder well-being, identification of the particular stakes that persons have in a program and a desire to serve those whom the program is supposed to be helping" (Shadish et al., p. 273).

In the 1980s, Cronbach and Rossi (Payne, 1994) stand out. Both placed greater emphasis on evaluation to facilitate the transfer of knowledge for social program improvement throughout the U.S. The voices of all stakeholders are of equal value. Cronbach advocated the use of quantitative social research, history, ethnography, journalism, and critical reflection as evaluative research methods.

Outcomes theory and research was used primarily to evaluate social programs, not educational programs. Quantitative research dominated educational research. Numerous quantitative studies have indicated that educational and social programs did not have significant outcomes. In response to this trend, Patton (1990) advocated the use of case studies:

> Case studies are manageable, and it is more desirable to have a few carefully done case studies with results one can trust than to aim for large, probabilistic samples with results that are dubious because of the multitude of technical, logistic, and management problems. (p. 100)

Patton said that most program evaluation is based on the false premise that educational interventions are true experiments, when, in fact, uneven implementation of programs, self-interest of participants, and difficulty of specifying—let alone measuring—outcomes makes it too easy and too likely to explain away or ignore negative results. Qualitative research, relatively open ended and concerned with how as well as how well, can much more honestly depict contextual factors.

Through the work of Freire and Faundez (1989), Stage (1992), and Stage, Muller, Kinzie, and Simmons (1998), research in higher education has moved into critical research. Stage (1992) urged

> researcher[s] to move beyond explanation of what is happening today and focus research toward attempts to influence future possibilities. This perspective, critical theory, may be helpful to those seeking new ways to gather data on their campuses to effect change in those environments. (p. 2)

This philosophy has provided the foundation for current practice in evaluation in higher education.

Retention Theory and Research

One area of evaluation that continues to be a high priority for postsecondary institutions is the study of student retention. Tinto developed an interaction theory model that contends that retention or attrition results from the holistic interactions between a student and the collegiate environment and not solely from individual attributes, program components, or the environment. Tinto's model has driven much of the retention research and has been used by a number of

developmental education researchers to measure student persistence (Nora, Attinasi, & Matonak, 1990). Nora et al. contended, "Student persistence studies have not found that precollege factors have a significant impact on retention, but this lack of extensive direct effects may result from misspecification errors because studies have not incorporated appropriate indicators in quantitative models" (p. 338). The researchers hypothesized that getting ready for college would be a significant precollege indicator of persistence. This quantitative study, however, revealed that getting ready for college actually had a negative direct effect on retention.

Reflecting on Patton's (1990) evaluation of narrow-focused, quantitative studies suggests that a more exploratory study, using qualitative methods, might discover why students persist, even if they are underprepared, have histories of failure, or are identified as developmental education students. Would qualitative research on nontraditional students also indicate that precollege getting-ready experiences have a negative impact on retention? "There is only so much of human behavior that can ultimately be captured in numbers. The researcher needs to ground his or her understanding of what happens to students in college in the students' own understanding of these events" (Attinasi & Nora, 1992, p. 25).

Tinto's (1993) model has also been used to predict success. A critical ethnographic study seeking to understand why and how developmental education students persist may provide more insight into underprepared college student retention. Certainly, factors of adult motivation may be significant in predicting or promoting the success of nontraditional students. Studies by Umoh, Eddy, and Spaulding (1994) and Whiteley and Fenske (1990) added further uncertainty to the topic when they used the Tinto model with post-secondary developmental mathematics students.

Whiteley and Fenske (1990) conducted a longitudinal study examining ways in which college mathematics influences stability and changes in students' final choice of undergraduate majors. The independent variables were mathematics exposure, high school grade point average (GPA), college GPA, gender, race and ethnicity, ACT mathematics score, college mathematics experience, non-mathematics

academic experience, and shift to final major. Whiteley and Fenske concluded that a complex relationship existed:

> The interaction of the college mathematics experience with both the student and the institution are complex and should not be oversimplified across college majors and/or student preparation levels…. Our findings strongly suggest that it is time for researchers and policy makers to move away from the simplistic and now outdated notion of mathematics as the "critical filter" and toward a new focus on research and thinking about college mathematics. (p. 382)

Umoh et al. (1994) examined the relationship between retention of students in 2-year developmental mathematics programs and several variables: age, gender, parents' education, GPA, academic goal commitment, academic integration, institutional experience, placement test scores, and student performance. They found no statistically significant relationships between the independent variables and retention of developmental mathematics students. However, they did make the following comment:

> Developmental education students differ from typical college or university students because neither grade point average nor academic achievements are factors in determining retention in developmental education mathematics programs. Students taking developmental education mathematics are not forced out. Retention in developmental education mathematics seems, therefore, to be based on an individual student's intent to continue his or her studies, irrespective of getting good grades. (p. 42)

Attribution Theory and Research

Another important area of research related to understanding student trends in developmental mathematics, yet quite limited in scope, is attribution theory research. This body of research has focused on the Adult Mathematics Attribution Scale (AMAS) by Lehmann (1987) and the Mathematics Attribution Scale (MAS) developed earlier by Fennema, Wolleat, and Pedro (1979). These instruments isolate attribution of success and failure to ability, task difficulty, effort, or luck. The study by Lehmann included nontraditional students and found neither significant difference in characteristics (attribution of success and failure or pre-post course measures) of traditional and nontraditional college freshmen taking a developmental mathematics

class nor a significant correlation between attribution and pre- or post-course measures.

Bempechat, Nakkula, and Wu (1996) used attribution theory as a predictor of mathematics achievement. They asked the question, "Do high and low achievers differ in their attribution patterns, and if so how?" (p. 54). Studying sixth graders, they concluded that high achievement was associated with attributing success to ability. There were a few more studies in the last 20 years attempting to relate attribution and achievement in mathematics students at the college level using the MAS and AMAS scales.

Dependent Variables Informing Educational Research

Penny and White (1998) conducted an ex post facto multiple regression analysis of selective characteristics of developmental faculty (gender, age, educational preparation, teaching experience, and employment status) and students (gender, ethnicity, age, and enrollment status) to determine which attributes are significantly related to student performance in developmental mathematics and their subsequent college-level algebra course. Their study revealed that students' performance in the last developmental mathematics course was the strongest predictor of their performance in college algebra. The study also revealed that part-time enrollment and traditional college age had a negative effect on student performance. The impact of age on performance was not supported in the research conducted by Burgess (1992). In that study, younger students performed better in all levels of mathematics than nontraditional age students.

These studies, along with quantitative studies conducted by Durant (1992), England (1993), Feingold (1994), Lyons (1990), Seybert and Soltz (1992), and Short (1996), identified characteristics of developmental education students that affected their performance or predicted success. The question that remains unanswered is: Why do these characteristics have an impact on success? A qualitative study can shed light on the findings of quantitative studies. Qualitative studies provide the thick descriptions needed to understand the connections between student characteristics and performance. Qualitative studies can reveal and discover other characteristics that may be significant or underlie the characteristics revealed in quantitative studies (Eisner

& Peshkin, 1990). The impact of developmental education is a complex field of study which will not be understood using any single methodological approach. This article does not have answers but raises qualitative questions for the practitioner to ponder and then proceed to design a research study which will "render tone, tint, texture, and nuance" to quantitative approaches which provide only the "broad outlines of the portrait" (Pascarella & Terenzini, 2006).

Conclusion

There is much more evaluation work that can and must be done to make the case for developmental mathematics education and its benefits to society, institutions of higher education, and all postsecondary students. American College Testing (ACT, 2005) reported that only 41 percent of the high school graduates who took that ACT in 2005 scored a 22 or higher on the ACT Math Test, indicating they had a high probability of succeeding in college algebra. That leaves 59 percent of the high school graduates in 2005 demonstrating less than college level skills on the ACT Math Test and possible candidates for developmental mathematics course work. The number of students underprepared in mathematics seeking postsecondary options will continue. How will we address this need? How will we present the effectiveness of our developmental mathematics education components and programs? Hopefully the research methods presented in this article will help you think about new approaches and possibilities for evaluating developmental mathematics programs.

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Facilitating Strategy Transfer in College Reading Courses

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The success of a developmental reading course really should be measured several semesters later by how well the students have transferred their new strategies to their content courses. To help facilitate this transfer, a list of ten instructional strategies are presented that have been developed from the literature and classroom expereince. Specific classroom activities based on those strategies are also included.

In the one or two semesters developmental students spend in college reading courses, they are exposed to a variety of strategies designed to help them read, understand, and retain the information they need in academic texts and supplemental materials. Strategies are defined as tools and techniques learners consciously select to complete a task accurately and efficiently.

Typically, students can demonstrate mastery of several strategies during the reading course. Unfortunately, that is not enough. Unless students transfer the strategies — successfully adapt and use the strategies gained in the reading class in content area courses and beyond — the reading course is of little use. As Weinstein et al. (2000) says, "if transfer to other academic coursework and future learning tasks does not occur, these programs are of little value to the students or the institution" (p. 735).

Research on Strategy Transfer

The problem of transfer of knowledge and skills has been on education's research agenda throughout the century. For a historical overview, see Cox (1997), Singley and Anderson (1989), and Mayer and Wittrock (1996).

Some of the literature describes various types of transfer. For example, Brown and Campione (1984) differentiate between near transfer and far transfer, Gagné (1970) discusses vertical and lateral transfer, and Salomon and Perkins (1987) differentiate between low- and high-road transfer. In most cases, one of the labels refers to the learner being able to transfer knowledge acquired in one domain to a second similar domain,

and the second label refers to the learner's ability to relate that knowledge to a very different domain.

There is an extensive body of literature on how difficult it is to transfer knowledge and the challenges involved in facilitating it (Brown & Campione, 1984; Campione, Brown, Ferrara, Jones, & Steinberg, 1985; Crisafi & Brown, 1986; Ennis, 1989; Gick & Holyoak, 1983; Holyoak, Junn, & Billman, 1984; Holyoak & Koh, 1987; King-Johnson, 1992; and Perkins & Salomon, 1989). Specifically, in the context of reading and learning strategies, research suggests "students do not automatically or immediately transfer strategies in a flexible manner" (Simpson, Stahl & Francis, 2004).

The literature also suggests that one of the major blocks to successful transfer is the failure to spontaneously recognize transfer potential (Brown & Campione, 1984; Gick & Holyoak, 1980, 1983). Therefore, for students to overcome this block and be able to transfer a general problem solving strategy to a specific domain, they must recognize the relevance between previous examples, general schemata, and the current problem. How to best facilitate this recognition continues to be the subject of numerous studies (Brown & Campione, 1984; Crisafi & Brown, 1986; Gholson, Dattel, Morgan, & Eymard, 1989; Gick & Holyoak, 1980, 1983; Phye, 1989).

Ten Instructional Suggestions Based on Research

Although there is much about strategy transfer that we do not know, based on what we do know, we offer these ten instructional suggestions to facilitate strategy transfer in college level developmental reading courses:

1. Provide explicit, authentic instruction. Model essential reading processes, and provide guided practice in authentic texts. Initially, the learning experience must be similar to the situations to which one wants transfer to occur.
2. Provide purposeful learning activities and experiences that allow learners to start immediately on meaningful tasks.
3. Structure instruction so that initial activities are easily grasped by learners and a spiral of increasingly difficult/complex activities provides multiple opportunities for learning and practice.
4. Eliminate oversimplified and unauthentic instructional materials. Use a text that incorporates authentic college material.

5. Teach students when and why to use a particular strategy, not just how to do the task.
6. Design instructional activities that encourage learners to go beyond the specific example/information given. Give examples of when they will be able to apply what they are learning, and ask them to predict other possible applications.
7. Help learners see knowledge as highly interconnected rather than compartmentalized.
8. Provide multiple opportunities for students to practice new strategies with time for additional instruction.
9. Prompt and support students as they plan, monitor, reflect on, and evaluate their performance.
10. Allow learners to discover things for themselves while providing guidance, help, and encouragement all along the way.

Examples of Classroom Activities

Content groupings. Group students according to the content courses they are taking. During class, have them work in their content course textbook with others in their group and discuss specifically how to use a strategy or how to solve a reading/learning problem specific to that discipline using the strategies presented in class.

Ungraded in-class writings. At the first class, have students complete an in-class writing describing how they have approached textbook reading assignments in the past. Keep this paper in your file. Repeat the assignment at the midpoint of the semester and give students a chance to compare their responses. Students can examine each other's responses and make suggestions about additional strategies to incorporate.

Examine a variety of content texts. (See Appendix A.) Bring in textbooks or sample chapters from several disciplines. Have students work in small groups and examine the various chapters using the jig-saw collaborative learning strategy. Assign students a group with a number and letter designation such as 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D. Students first meet in their number group (all the 1's together, all the 2's, etc.) to examine the sample texts using the guidelines in Part I. Then, have them switch to their letter group (all the A's together, all the B's, etc.) to share what they discussed in their first group.

Compare and contrast using authentic text. Find two short articles that present two sides of an issue relevant to the students. (**USA Today**

is a good source.) Have students read and annotate the two articles; then represent the similarities and differences using a Venn Diagram. If possible, divide the students into small groups and have all groups work at the same time on the board or large newsprint. It works best if students can see all of the diagrams at once instead of individually on overheads.

Planning examination preparation. (See Appendix B.) To help students realize the amount of preparation necessary for college-level exams, at least one week before an exam have them plan what learning strategies they will use and how they will fit these strategies into their schedule.

First, have a general class discussion about *how* to prepare for the content exam, what strategies will work and why. Then, have them look at their time leading up to the exam and specifically plan what they will do and when.

Exam preparation analysis. (See Appendix C.) During the first class after an exam, have students record specifically what they did to prepare and, in light of the exam experience, evaluate their preparation and identify any changes they think they should make for the next exam. Collect and keep these papers.

After the students have received their grades, give them the same paper and have them complete the second column in which they again evaluate their preparation after learning their score. Again, collect and keep. Return the papers to the students approximately one week before the second exam in the course in order to remind them of their prior experience and reflection on what worked and what they could improve.

Weekly reflection. When focusing on a specific strategy during the course of the semester, ask students to write a one page reflection paper on how they approached a reading challenge in the past and how they could use the specific strategy to improve their comprehension and/or retention.

Final reflection. (See Appendix D.) To give student one last opportunity to make connections, include a question on the final exam specifically asking students to reflect on what strategies they used in other content courses to help themselves be successful.

Conclusion

One thing is certain: We cannot assume that transfer is going to occur. Classroom instructors must be explicit and direct when working with strategies students need to be successful in their content courses. If students do not immediately see the practical applications and benefits of these strategies, it is unlikely they will transfer them to other learning situations in the near or distant future.

As DeCorte (1999) says, "One conclusion that derives from this continuing diversified and controversial nature of the concept of transfer is that there is an obvious need for further inquiry aimed at a better and deeper understanding of the processes underlying transfer and at finding effective research-based and practically applicable ways to facilitate transfer in learners in different educational and training settings" (p. 558).

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Appendix A
Examine a Variety of Content Texts

Name _____ Date _____

Your group is _____

Subject of textbook chapter examined by group _____

Part I – In your first group:

Analyze all aspects of your assigned chapter. Specifically answer each of the following questions about the chapter:

a. Describe how the information is presented.
b. What are the positive and negative aspects of how the information is presented in this type of material?
c. What type of reading and learning support is contained in the chapter?
d. What might be unique about this type of material or information?
e. Describe how you would read and learn the information in this chapter. Your answer should be specific to the particular type of information and layout of this chapter.

Part II – In your second group, show the members the chapter that you worked on in the first group. Share with them the answers to the questions in Part I.

Part III – Consider a class that you are in this semester that is similar to one of the chapters examined in your second group. (You may examine the chapter you select more closely with other members of your group if you wish.) In the space provided below, write how you might go about reading and learning this type of material. Be very specific in your description.

The course I am writing about is _____

Appendix B
Planning Exam Preparation

Day/Date	Daily Study Plan	Strategies for studying & learning information in_____
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

Appendix C
Exam Preparation Analysis

Column #1	Column #2
Date:	Date:
Describe in detail how you prepared for the first exam. After taking the exam, how would you rate your preparation? What modification can you make in your preparation for the next exam?	What score did you earn on the first exam? Are you satisfied with this score? How can you improve your preparation for the next exam?

Appendix D
Final Reflection

This final question asks you to reflect on your target content course. What did you do well in the course to help yourself be successful? What reading and learning strategies did you use? What advice would you give a student taking the same course next semester?

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Integrating Technology into the Developmental Mathematics Classroom: A WebQuest

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Slippery Rock University

Although the WebQuest has been around for several years, it appears that not many educators are aware of it, or know how to use it. Thus, it is important to not only expose developmental educators to the use of this strategy, but also to help them realize how they can easily implement it into their curriculum. The use of a Webquest integrates technology into the classroom, while utilizing a learner-centered activity and a constructivist approach to learning. When using this strategy, the students benefit from cooperative learning, discovery learning, and a high level of engagement while practicing Internet skills. The purpose of this article is to explore the use of a WebQuest in the developmental mathematics classroom, and give an example.

The integration of technology into all classrooms is essential, and the developmental mathematics classroom should be no different. However, this educational setting provides a challenge to the educator who wants to incorporate any additional material into the curriculum. Because of the sequential nature of mathematics, it is important to cover all of the required topics, so the timeframe is usually constrained.

How then, can we as educators go beyond the limits imposed by the timeframe and content of our courses, in order to expose our students to computerized learning? According to Zimmerman, students need to become "active participants in their own learning process" (1989, p. 1). In addition, Brown and Crawford state that incorporating the Internet into the learning environment of mathematics "offers significant strengths" (2002, p.3). Among these is the development of higher-order thinking skills, which is of "primary concern within mathematics" (2002, p. 2). These and many other results can be accomplished by incorporating the WebQuest into the curriculum. This learner-centered activity utilizes a

constructivist approach to learning, achieving the benefits mentioned above. The purpose of this article is to explore the use of a WebQuest in the developmental mathematics classroom, and to propose an example.

What is a WebQuest?

A WebQuest is an inquiry-based activity or lesson, in which most or all of the information used by the learner comes from resources on the Internet (Dodge, 1997). This activity allows students to go beyond the ordinary world of classroom learning. The instructor researches the material ahead of time and presents the learners with a list of resources containing pertinent web sites that will help them learn about the topic. In their quest for information the learners answer a set of questions that are also provided by the instructor (Simon, 2005). The students are actively engaged in the learning process, higher-order thinking skills are involved, and independent learning takes place (Brown & Crawford, 2002). Most learners today are extremely comfortable using the Internet (North Central, 1999, 2005) and effective teachers are aware that the attitudes and performance of any learners are improved when the learning process involves student interests (Brown & Crawford, 2002).

It is important to note that the use of a WebQuest incorporates not only technology, but also Internet skills, cooperative learning, discovery learning, constructivism, and a high level of student engagement.

Designing the WebQuest

A WebQuest can take on a variety of formats. A well-designed WebQuest requires the learners to analyze and note only relevant information, as well as apply this information to the task at hand (LoParrino, 2005). Thus, the WebQuest is best used when students possess some basic skills relevant to the topic, whereby they can use those skills to further learn. This allows them to establish some cohesion and integrate the newly found information with previously learned skills. Rather than lecture about the subject matter, with students passively taking notes, the instructor's role will be to plan, guide, and facilitate learning of the material, while actively engaging students in the learning process (Simon, 2005).

Such a quest for information can involve from one to several class periods and can also be designed to culminate in a presentation or submission of a summary project. The proposed lesson in this article is

a WebQuest in a rather abbreviated form, involving a standard lesson for developmental Algebra. The recommended timeframe for this short-term WebQuest (1 day) is approximately the same for a traditional lesson on this topic.

The WebQuest

The proposed WebQuest involves how to graph an equation using the slope and y-intercept, with an exercise in application. This particular WebQuest is designed to replace the traditional presentation of the topic, rather than add to the curriculum. Thus, a summary project or presentation is not involved, although this WebQuest can be modified to suit any of these needs. Students will require the use of a computer lab for this class, so they can utilize the Internet. The learners should be broken into small groups of about four students, and conduct their search for information under the guidance of the instructor. The groups work collaboratively to answer the questions posed in the WebQuest. A continuation of the search for information can be extended to outside the classroom, should additional time be required. It is hoped that exercises from the textbook involving analysis and/or synthesis of the material may be assigned for homework, adding to the higher-order thinking skills involved.

An instruction/assignment page containing the questions should be made available to the learners electronically. The same instruction/assignment page should be given in hard copy form to be used as a worksheet in class. This page should contain instructions on how to complete the WebQuest, as well as suggested web sites that the learners may search. While students work in groups to complete the WebQuest, the instructor can circulate the classroom, offering help as needed.

The instruction/assignment page (See Appendix) outlines the procedures, and explains the learning quest they will take. Graph paper should also be provided. This WebQuest is intended to be completed in one class period, including instructions, etc.; therefore, the exercises are brief. What is notable is that higher-order thinking skills are involved, while independent learning takes place. Again, the level of difficulty can be adjusted according to the students' abilities and/or the instructor's needs. Please note: problem 10 in the Appendix is a variation of an exercise from Aufmann, Barker, and Lockwood (2004, p. 285).

Conclusion

In her study on WebQuests, Wagman (2005) found that experiential activities enhanced motivation, as well as critical thinking and problem-solving approaches. Cochrane, Eller, and Jones (1991) also found that using computers in combination with traditional teaching methods improves student learning of developmental math.

Because this proposed WebQuest conforms to curriculum and time constraints, this strategy can be employed often in the developmental classroom, thereby enhancing the learners' experience. It is hoped that not one, but several lessons of this type will be integrated into the curriculum. Thus by incorporating computer technology into the classroom through the use of WebQuests, our developmental students will be motivated and engaged, thereby improving their chance for successful learning.

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Appendix

A WebQuest: How to graph a straight line using the slope and y-intercept

Introduction

Each group of students will search the Internet to answer the following questions on how to graph a straight line using the slope and y-intercept. The resources listed below can be used to investigate the questions posed. You are invited to explore further sites on your own, and your textbook may be used as well. Use the information that you find to answer the questions and also to graph the indicated equations.

Sources

Your search for information can include, but does not have to be limited to, the following web sites:

http://www.math.com/school/subject2/lessons/S2U4L3GL.html#sm1

http://www.coolmath.com/algebra/Algebra1/06Lines/08_equations.htm

http://www.mathsisfun.com/equation_of_line.html

http://www.mathsisfun.com/graph/straight_line_graph.html

http://www.algebrahelp.com/worksheets/view/graphing/slopeintercept.quiz

http://www.purplemath.com/modules/slopgrph.htm

Please complete the following questions:

I.

1. a) What is the slope-intercept formula for a straight line?
   b) In this formula, what represents the slope of the line?
   c) In this formula, what represents the y-intercept?
2. Write the slope and the y-intercept for $y = x - 6$.
3. Describe how to graph a straight line using the slope and y-intercept.
4. Graph the line above on the graph paper provided, using the slope and y-intercept.

II.

5. a) Write the following equation in slope-intercept form: $2x + 4y = 8$
   b) What is the slope of the line above?
   c) What is the y-intercept?
6. Graph this line on the graph paper provided, using the slope and y-intercept.

III.

7. If you are given the slope of a line, and its y-intercept, describe how you can write the equation of the line.
8. Write the equation of the line that has a slope equal to –3 and a y-intercept (0, 2).
9. Graph this line on the graph paper provided.

IV.

10. Suppose you wanted to predict the population of the United States in the year 2050. Assuming that the rate of growth of the population from 2000 to 2050 would be the same as it was from 1950 to 2000, we can use the slope and y-intercept to calculate. Use the following information to answer the questions below.

    In the year 1950, the population of the United States was approximately 150 million.
    Over the next 50 years, the population rose by 130 million.
    Can you predict the population of the United States in the year 2050?

Draw a graph as follows, to help answer the question.

a) Draw a horizontal axis (x-axis) and label it Year. Use increments of 50, labeling up to 250. The year 1950 would correlate with 0 on this axis.

b) Draw a vertical axis (y-axis) and label it Population (in millions). Use increments of 50, labeling up to 800 million.

c) Locate and label the information (given above) about the population on your graph. You should now have two points, which will enable you to graph a line.

d) What is the y-intercept for your line?

e) What is the slope of the line?

f) What is the population in the year 2000?

g) Using the slope, how would you calculate the population for the year 2050?

h) What is the predicted population of the United States in the year 2050?

i) Assuming the rate of growth is still the same from the year 2050 to 2100, what would be the prediction for the population of the United States in the year 2100?

j) Write a formula, using the slope and y-intercept that depicts this population rate.

k) Using this formula, predict the population of the United States in the year 2200.

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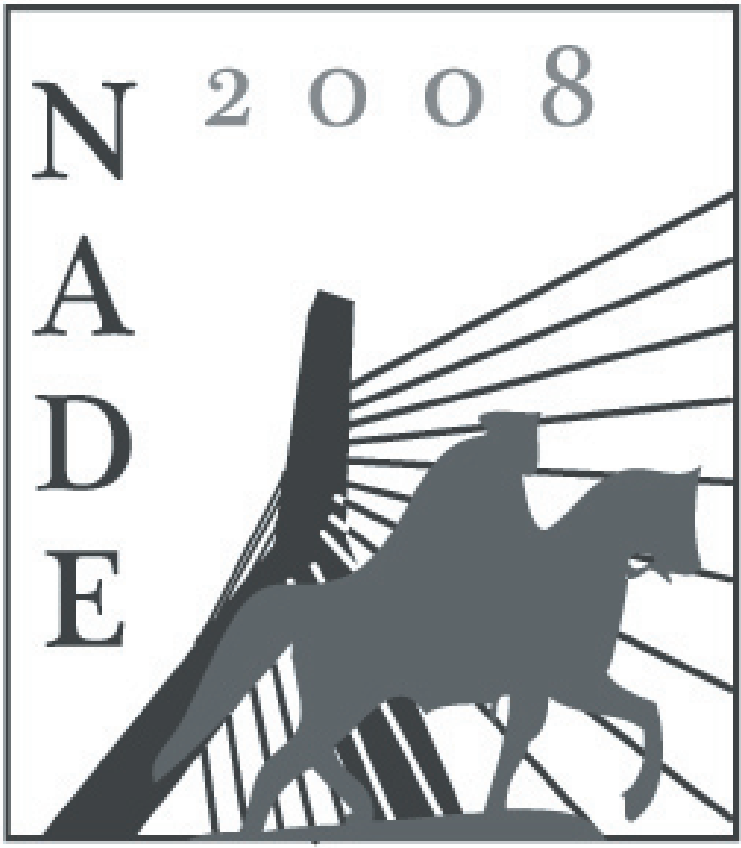

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Three Elements of Success: Attendance, Tutoring, and Advising

Paul Fowler
Louisiana State University at Eunice

Described as "tough love," Louisiana State University at Eunice's Pathways to Success *program experienced success in its first two years by implementing mandatory placement, attendance, tutoring, and advising policies. Selected student successes and retention data are discussed, along with policies and some practical advice for developmental educators at other institutions who might wish to implement a similar program.*

The need for and growth in developmental education has been well documented. In fact, between 40 percent and 63 percent of the students attending two-year institutions in the United States require developmental instruction in at least one subject (Kirst & Venezia, 2006; McCabe, 2000; Pollock, 2006; Schmidt, 2006). The Louisiana State University at Eunice (LSUE), an open-access public two-year institution of approximately 2,900 students, encounters many of the same issues faced by most higher education institutions including an increasing number of students requiring developmental education, students working while attending classes, and an increasing number of first generation college students. However, these issues have strained the institution's ability to deal with the reality of the situation given the high poverty rates and low high school graduation rates indicative of the area (Bishaw & Iceland, 2003; U.S. Bureau of the Census, 2005; U.S. Department of Education, 2006). For example, since developmental students could previously enroll themselves in classes after an initial meeting with their advisor, they would often enroll in classes for which they were not prepared, set up class schedules that were too demanding by scheduling all classes back to back, attempt a full-time course load while working full-time, and avoid tutoring and advising. In addition, even though the attendance policy stated that attendance for every class was expected, very little follow up occurred when students did not show up for class. Eventually, of course, students found themselves on academic probation and ineligible

for financial aid. Frankly, little was in place to assist students before they experienced difficulties, and institutional officials struggled to combat these types of issues. Consequently, campus leaders decided to address the situation head on by asking: How can we deal with the developmental education issue while increasing student success?

Quality Enhancement Plan and *Pathways to Success*

LSUE responded to this question by creating an institution-wide committee and by writing a Quality Enhancement Plan (QEP) in order to renew its accreditation with the Southern Association of Colleges and Schools (Quality Enhancement Plan Committee, 2003). The QEP, entitled *Pathways to Success: An Enhanced Educational Experience* is based on Boylan's (2002) *What Works: Research-Based Best Practices in Developmental Education*. The end result of the report and accreditation efforts was the creation of a centralized Office of Developmental Education in July 2004. Described as "tough love", the *Pathways to Success* program provides a structured learning environment that treats the "whole student" through academics, advising, monitoring of attendance, and support services. Students are automatically placed in the program if their ACT composite is 15 or less or if they have no ACT scores.

Once admitted, students are required to attend a one-day orientation covering everything from general LSUE procedures to detailed information on the *Pathways to Success* program. Each student sits down one-on-one with a *Pathways* advisor who then creates a personalized schedule for the student prior to the student leaving. Students are not permitted to enroll themselves for classes and actually have very little choice in the classes they may take. In addition, students in the program may take no more than four classes per semester and every effort is made to accommodate a student's work or personal schedule within limitations. For example, full-time students may take classes on Monday, Wednesday, and Friday, but only if they are willing to attend from eight or nine in the morning to two or three in the afternoon. Study, tutoring, and lunch breaks are built into the schedule by spreading out a student's classes throughout the day. Students may also attend classes five days per week which allows a student to leave campus before noon on most days; however, study and convenience breaks are still built into the schedule. First semester full-time students are not permitted to take courses on Tuesday and Thursday only because this requires a student to be in class from eight in the morning through two in the afternoon with no breaks.

Second semester students may take classes on a Tuesday Thursday schedule if high grades were obtained in the first semester.

At first, many students complained vehemently about the guidelines and scheduling requirements; however, most students have begun to believe that they need the extra help with becoming an adult and managing their time, as well as additional tutoring designed to address academic weaknesses. For example, two traditional-aged students who recently attended orientation concealed their ACT scores with a composite of 16 when they learned they would not have the same support structure since their ACT scores placed them out of the program. Institutional leaders have also seen an increase in the numbers of students who do not wish to take the math placement test simply because they realize they need some extra help and want to start at the beginning to ensure success in college. Finally, a few nontraditional students have also asked to be placed into the program due to its structure.

Student Attendance

Students sign a "Contract for Success" that acknowledges their participation in orientation and their acceptance of the three key program guidelines: attendance, advising, and tutoring. First, students must attend class. Attendance for the *Pathways to Success* program is defined as being present from the time class is scheduled to begin until it is scheduled to end. Students who come in after the scheduled starting time or leave prior to the scheduled ending time can, at the discretion of the faculty member, be counted as absent. Students are required to attend 90 percent of their developmental courses, meaning that any student may miss approximately one full week of classes with no penalty. At orientation, students are informed that there are no excused absences and that they are to be in class when they are scheduled to be in class. Very simply, doctor's appointments, caring for children, and other personal business should be conducted on their own time. Students who violate the attendance policy automatically fail the course and are sent an appeal letter both through standard mail and electronic mail to protect their due process rights. Students must then meet with the Director of Developmental Education and present appropriate documentation to explain why they were not in class in order to appeal the failing grade.

Appeals can be decided in any number of ways including consulting the faculty member for an opinion since the faculty member typically

knows the student better academically. Providing documentation, however, does not automatically guarantee the student will be reinstated to good standing in the class. Each case is decided on an individual basis by the program director and faculty member; the director then notifies the faculty member and student of the final decision via electronic mail. Students who fail to contact the director prior to the deadline date stated on the absence appeal automatically fail the course. The rigid attendance policy worked so well that the students now rarely miss days in general education classes where the attendance policy is not enforced.

Tutoring

Next, students must attend tutoring sessions with a faculty member or peer tutor. Tutoring forms mandating extra assistance for students are filled out and turned in to the departmental office when a student receives below a 70 percent or C- on a major assignment such as a test or major paper. The definition of a major assignment rests with the faculty in each department; faculty, if they wish, may also begin referring students to tutoring on the basis of quiz grades. Faculty members from the program tutor students on a first-come first-served drop-in basis approximately four hours a day while peer tutoring uses a Supplemental Instruction model requiring appointments and a formalized scheduling method. The Office of Developmental Education then tracks student tutoring by checking logs of both tutoring facilities weekly. Feedback is sent to the faculty via electronic mail regarding students' participation in tutoring.

Students also have the opportunity to use web-based electronic tutoring and digital video-tutor compact discs that come with the English composition and mathematics textbooks, which permits students the flexibility to be tutored at any time of the day or night if they have a computer at home that meets the textbook publishers' operating requirements. Students who use the face-to-face tutoring labs far outnumber the students who use the computerized tutoring since some students do not have computers or a high speed Internet connection at home. In addition, many students have difficulty downloading appropriate plug-ins and navigating the web based programs.

Advising

Students enrolled in the program must see their academic advisors at least three times per semester. These visits are mandated by the

Contract for Success that students sign at orientation and by the syllabi in the Strategies to Success and College Reading courses. To meet this requirement, two full-time advisors were hired for the program in spring 2005. In addition, one to three faculty from each division act as advisors for the *Pathways to Success* students and are trained by the director and two full-time advisors. University personnel make a conscious effort to build a relationship with the students during these visits, many times this involves explaining why the program guidelines are so rigid and the options are so limited.

Typically, during the first three weeks of the semester, the full-time advisors and the director are notified if a student is close to violating the attendance policy, not completing course work, not attending tutoring, or lacks the required materials for class. Students may be electronically mailed through their university account, called at home, called on their cell phone, stopped in the hall, pulled out of class, or visited at the campus housing facility to discuss the matter at hand. Most of the students, of course, believe that they are being hassled if this happens to them, but it is all part of a concentrated effort to keep students on track and attending class while continuously shaping their behavior so they are successful in their first year of college.

Demographic Information

In fall 2005, LSUE had a total of 2,954 students composed of 71 percent women and 19 percent men with an average age of 25. The ethnic makeup of the general student population was 71 percent Caucasian and 29 percent minority with 25 percent of the minority population being African American. Fifty-eight percent of the student body was full-time and just over 7 percent of them lived on campus. *Pathways to Success* had a total of 334 students composed of 76 percent women and 24 percent men with an average age of 23. Ethnic makeup of the group was 43 percent Caucasian and 57 percent minority with African Americans making up 54 percent of the minority subgroup. Eighty percent of the *Pathways* students were enrolled full-time.

Immediate Results of "Tough Love"

Within a few weeks of the first full semester in fall 2004, faculty began noticing that students were attending class and completing the course work. In fact, faculty believed that there was an immediate increase in student success during the first semester. However, since the program

was new, the director had no data to prove the speculation made by the faculty. As a result, the director began examining every piece of data on students with similar ACT composite scores as far back as the computer records would allow.

In essence, by taking a "tough love" attitude and mandating placement and course sequencing, rigidly enforcing the attendance policy, hiring two full-time advisors, enforcing the advising mandates, and mandating tutoring, success rates in the Strategies for Success course increased from 13 percent to 70 percent while the success rates for college reading increased from 63 percent to 74 percent in one year. The success rate for developmental English composition increased from 65 percent to 70 percent in two years. Students' academic standing results were also examined for the first time in spring 2005. In just one year, the percentage of *Pathway* students in good academic standing (grade point average at or above 2.00) increased from 56 percent to 61 percent while the percentage of students placed on academic probation decreased from 40 percent to 17 percent. These results were duplicated at the end of the second year in spring 2006 when the percentage of students in good standing increased an additional 10 percent to 71 percent and those placed on academic probation decreased an additional 4 percent to 13 percent.

In addition, fall 2004 to spring 2005 retention for first time freshman students in the program increased from 63 percent to 75 percent in the first year and then another 4 percent the second year. Fall 2004 to fall 2005 retention data for first-time students was also analyzed and found to have increased from 30 percent to 49 percent. Three other results from the first two years were found to be equally interesting. The first was that the percentage of absence appeals based on the total number of students decreased by 3 percent. This decrease was rather surprising considering nine percent of the students enrolled in the program lived in areas that were devastated or had major damage from Hurricane Rita. Second, the percentage of students seeing their advisor continued to increase. For example, 88 percent of the students complied with the advising guideline in fall 2004 while 93 percent of the students complied in spring 2006. Lastly, efforts to enforce the tutoring requirements have also increased the percentage of students attending tutoring when assigned. Data indicated that only 16 percent of the students attended

their assigned tutoring in fall 2004 while 53 percent sought the required tutoring in spring 2006.

Discussion

The *Pathways to Success* program at LSUE began to have an impact on students and faculty the first semester it was established. In fact, some faculty and staff began referring to the director as the "principal." Since the program is a highly structured bridge program for those students who need some extra support and guidance, the term "principal" is probably appropriate. Additionally, even those who initially criticized the program have been astounded by the results. It has taken the efforts of the entire campus community to make the first two years of the program a success, especially the faculty and advisors who work with the students on a daily basis.

Most of the faculty members supported the program immediately even though *Pathways* created more work for them. First, the program increased their paperwork load. Advising, tutoring, and absence forms were created in order to monitor compliance with program guidelines. The second major impact to the faculty was an increased emphasis on instructional pedagogy for developmental students. A major training session for faculty is held on campus every semester covering such issues as the characteristics of developmental students, appropriate instructional methods, and procedural issues. Very simply, the willingness of the campus community to work collaboratively has spurred the success of the program.

Even with the enormous help of all involved, it is still difficult to keep up with routine matters during student registration, new student orientation, and the beginning and end of each semester. The three full-time staff members often have lines out the doors even though students are encouraged to make appointments. Despite this, students seem to understand that the majority of the faculty and staff care about them, are paying attention to their needs, and want them to succeed in their educational and life goals. This awareness was apparent by the results on an exit survey given to the students in their final university studies course. For instance, 89 percent of the students either agreed or strongly agreed with the statement that LSUE helps students be successful in school while 92 percent agreed or strongly agreed that their instructors wanted them to succeed. In addition, 80 percent of the students agreed

or strongly agreed that their instructors taught in a way they could understand while 78 percent of the students agreed or strongly agreed that the orientation helped them understand the details of the program. As one might expect, only 33 percent of the students thought that the attendance policy was fair in the first year of the program; however, nearly two-thirds (62 percent) agreed or strongly agreed with it at the end of the second year.

Conclusions

While the *Pathways to Success* program at LSUE may be viewed by some to be overly restrictive and inflexible, the program has produced amazing results in just a short time as shown by the increase in success rates and overall retention rates. Additionally, despite criticism, the program does follow research best practices by providing a very structured environment while attending to students' educational needs, building relationships with students so they feel that faculty and staff care about them, and demanding that students take coursework that progresses toward a degree or certificate in order to meet their life long goals (Boylan, 2002; McCabe, 2000; Stewart, Brewer, & Brown Wright, 2006; Tinto, 2004).

As one might expect, there is one caveat. A program of this type is not for all institutions. Developmental educators and institutional leadership should evaluate their positions on the topics discussed in this paper before embarking on a plan to implement a similar program. For instance, student guidelines must not change midstream and the executive leadership should not override the director's decisions unless a legal issue exists or there has been a clear violation of due process. Constant communication is a must since all constituencies involved must work collaboratively in order to strive for increased student success. LSUE's program director reports to the Vice Chancellor for Academic Affairs so communication may remain open with the faculty through the academic division heads. This also maintains the rigor and academic excellence desired by establishing two-way communication and frequently involves discussions about what is not working to the benefit of the students. Student expectations in the first college level courses are also communicated to developmental educators in this manner, so communication with the senior academic officer, division heads, or deans, and faculty is imperative.

Next, institutional leaders should consider whether they believe an enrollment decline will result due to the implementation of a similar program. While LSUE has seen enrollment fluctuations since the *Pathways to Success* program was implemented, the enrollment fluctuations have been across all segments of the student population and may actually reflect the low unemployment rate in the area (U.S. Bureau of Labor Statistics, 2006). In addition, institutional officials believe that high fuel costs and the rebuilding efforts due to the 2005 hurricanes in the area have also impacted the LSUE's enrollment. The program director and Vice Chancellor for Academic Affairs meet regularly to examine possible impacts to the student population due to changing policies as the *Pathways to Success* program is implemented.

In addition, the developmental education office must collaborate and work as a team with faculty and staff. First, constant communication and collaboration with the Admissions Office and Registrar's Office are of the utmost importance. Included is an open dialogue with the clerical staff as well since they are often the first people a student encounters face-to-face at the institution. Clerical staff often alerts the director and Registrar to possible logistical problems as new policies are implemented.

Lastly, working as a team using communication and collaboration also means that faculty will not shout "academic freedom" at every opportunity, but faces change with a positive outlook toward improving instruction. Conversely, developmental education personnel must also respect the wishes of the faculty; however, both groups must keep in mind that the focus should be toward increasing student performance. The student success rates and the overall attitude at LSUE indicate that most involved do just that. Consensus is reached and then change is integrated incrementally in order to work toward more effective instruction for a diverse population. The bottom line is that there are many individual voices synergistically creating a single collaborative voice shouting one goal in harmony—do what is best for the students.

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Research in Developmental Writing Courses and Implications for Practice

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This article briefly surveys the literature on ways that developmental writing students learn; reports on student learning style research carried out in developmental writing classrooms at Texas A&M University-Kingsville and Southwest Texas Junior College, using the Productivity Environmental Preference Survey*; suggests specific strategies for teaching the writing process with regard to our students' learning styles; and discusses cooperative learning, a classroom-tested pedagogy for responding to our students' learning preferences.*

Increasingly, postsecondary institutions have been experiencing an influx of students who, a generation ago, may not have had the opportunity to continue their education beyond high school. Many of these students enroll in developmental writing courses. Faced with the challenging task of educating large numbers of nontraditional and underprepared college students, writing teachers and program administrators have been adapting and modifying the ways they teach writing and structure their classroom activities. In this paper we 1) briefly survey the literature on ways that developmental writing students learn; 2) report on research conducted on student learning styles at two Hispanic serving institutions; 3) suggest some specific strategies for teaching the writing process with regard to our students' learning styles; and 4) discuss cooperative learning, a classroom-tested and research-supported pedagogy that meshes with our students' learning styles.

Survey of Literature

Much literature discussing the learning styles of developmental writing students is based on the many years of classroom practices and experiences of veteran teachers. A number of teachers/researchers–among them Walter Ong, Lynn Troyka, and Shirley Brice Heath–have commented on the extent to which many of our entering college

students are products of an oral culture. Troyka (1982) observes that many entering students–especially developmental students–are social and more comfortable dealing with the oral rather than the written word. Just being more aware of this student orientation can start us thinking about ways to turn our students' tendencies to their and our advantage in the classroom. In addition, Bruffee (1993) has discussed the ways that composition theory has been influenced by the field of social construction, which emphasizes the benefits of various experiences associated with the speaking/hearing learning style: the idea that some kinds of truth can be negotiated and talked through to a conclusion; the transactional nature of meaning; the importance of collaboration and of peer response in the composing process; and the development of communities of writers. Shirley Brice Heath's *Ways With Words* (1983) is a comparative study of how language is used in three culturally different communities in the Carolina hill country. Basing her conclusions on field work, ethnographies, and comparative social research, Heath emphasizes the cultural constructedness of knowledge and of how people of different cultures have different beliefs about how learning ought to take place. Awareness of our own socialization and of the ways in which we are all culturally inscribed can only help us become more aware of our own and our students' cultural backgrounds.

Learning Styles Research

To attempt to support the observations of Ong, Troika, Heath, and Bruffee, for several years we collected data on the learning styles of over 200 students in the highest developmental writing course, that is, the course immediately preceding the regular first-semester college writing course. The data collection took place at Texas A&M University-Kingsville in the 1990's and at Southwest Texas Junior College at Uvalde in 2006. Both institutions are located in South Texas and serve a large number of Hispanic students, many of whom are first-generation college students. For data collection on learning styles we used the *Productivity Environmental Preference Survey* (*PEPS*), which asks students a series of questions about the conditions under which they learn best and the various factors which affect their learning. The *PEPS* asks questions about four predominant learning

styles, based on the physical senses used by the learner when acquiring new information: tactile-kinesthetic; hearing and speaking; reading and writing; and visual.

Our major findings are broken down into five areas. First, 51 percent of our students said that they learned better with an authority figure present in the classroom, and only 1 percent said that they learned better without an authority figure. Second, 70 percent (strongest preference in survey) of our students indicated a high preference for structure in learning activities. Third, listening was listed as very important in the learning of 44 percent of our students, and less than 1 percent said that listening was of little importance in learning. Fourth, 43 percent of our students indicated that they learned well working and speaking with peers, and only 3 percent said that they learned best alone. Finally, 36 percent of the respondents indicated that they learned better through tactile-kinesthetic activity, rather than passive "being talked at," with fewer than 6 percent indicating they did not learn well through tactile-kinesthetic activity.

Strategies for Teaching the Writing Process

What, then, are some practical strategies for teaching writing to students who learn well by speaking and listening, who are peer-oriented, and who like hands-on activities? One general teaching mode that may be effective is the "environmental" style described by George Hillocks, Jr., in his *Research on Written Composition* (1986). The environmental style is characterized in part by "materials and problems selected to engage students with each other in specifiable processes important to some particular aspect of writing," and "activities… conducive to high levels of peer interaction concerning specific tasks" (p. 122). An example of the environmental teaching style would be using a peer response activity in the classroom, with students using a set of questions to guide them on what to look for when responding to classmates' drafts. In fact, Hillocks states that studies have suggested that the environmental teaching style is more effective than other commonly used teaching methods, such as the traditional lecture method.

We would now like to focus on prewriting, revision, and proof-reading/editing, and suggest some strategies that may connect

with students who share some of the learning styles we have been discussing.

In the prewriting stage many students may perform more effectively with invention strategies oriented toward speaking and listening. For example, focused brainstorming sessions in peer groups of three or four, in which students talk through ideas and get immediate reaction, may be productive. Another strategy is one suggested by Mike Rose (1983). Students listen to a short talk about a particular subject, and then are asked to write a reaction to it: agreeing, disagreeing, adding to the ideas, and making connections. This activity not only integrates listening into the invention stage, but it also has the added benefit of giving our students practice in a skill—note-taking—which they must develop in order to be successful in college. A variation on this exercise is to have students discuss in small groups their reactions to the talk, rather than (or in addition to) having them write down their reactions.

In the revision stage of the composing process, a technique that works well is the old, proven method of having a face-to-face conference with the student and asking open-ended questions which allow the student to talk about ways to build on the strengths of the essay. Murray (2004) has written on his many years of experience with this conferencing method. Some of his questions to student writers include the following: What did you learn from this piece of writing? What do you intend to do in the next draft? What surprised you in the draft? Where is this piece of writing taking you? What do you like best in this piece of writing? What questions do you have of me?

In the proofreading/editing stage of the composing process, students could benefit by reading their essay drafts aloud or by having someone read their drafts back to them. Bartholomae (1980) observes that students who either read aloud their own drafts or listen to them being read tend to catch many oversights that they would probably not catch by reading silently.

Cooperative Learning

In addition to suggesting strategies for teaching the writing process, we also suggest a classroom organizational structure for connecting with students who tend to exhibit the learning styles that our survey

documented. This structure is cooperative learning. Of all the pedagogical approaches to working effectively with nontraditional students—or any students—the one that holds the most promise, the most potential, and even the best track record, is cooperative learning. This approach to teaching and learning is tailor-made for students who want an authority figure, who want structure, who learn well through speaking and listening, who are peer oriented, and who are tactile-kinesthetic learners. One of the most widely researched classroom strategies, cooperative learning has gained more attention at the post-secondary level over the last two decades partly as a response to the increasing numbers of nontraditional students attending college. Between 1898 and 1989, over 375 studies have been conducted on the effects of cooperation on performance. According to David and Roger Johnson (1989), two of the best known and widely published proponents of cooperative learning, "cooperative efforts result in higher achievement and greater productivity than do competitive or individualistic efforts" (p. 55). An overview of cooperative learning follows.

Cooperative learning is the use of small, highly structured, student-led learning teams in the classroom. It can best be understood in terms of three classroom goal structures, or the ways in which teachers structure the interactions among students. The three goal structures are competitive, individualistic, and cooperative. In the competitive goal structure, the interaction among students is negative in the sense that one student's success depends on other students being less successful. The teacher who announces on the first day of class that only five percent of the students in the class will receive an A is using the competitive goal structure. In the individualistic goal structure there is neutral or no interaction among students. That is, one student's performance is neither helped nor hindered by another student's performance. Success is determined by achieving a pre-set standard. Most classrooms today are probably oriented in this way. In the cooperative goal structure there is a positive interaction among students in each learning team. That is, the success of each student on the team enhances the success of every other student on the team.

According to David and Roger Johnson and Karl Smith (1998) of

the University of Minnesota, five basic elements must exist for cooperative learning to be successful:

1. ***Positive Interdependence***. Students must realize that they need each other in order to complete a group task. The success of one enhances the success of all group members. Four common ways to ensure positive interdependence are to establish a common goal, give each team member a role, require shared resources, and provide team rewards.
2. ***Face-to-Face Promotive Interaction***. Students work together in small groups, usually consisting of three or four students per group. They help, assist, encourage, and support each other's efforts to learn.
3. ***Individual Accountability***. Although the performance of the team depends on each member's contribution, each student is assessed individually and is held accountable for learning the content of the course. While students may receive some group grades, they do major tests and assignments individually. Peer responding to drafts of essays works well within the context of cooperative learning.
4. ***Cooperative Skills***. Team members learn appropriate communication, leadership, trust, decision-making, and conflict management skills in order to develop the social skills needed to collaborate effectively with others.
5. ***Group Processing***. Team members are given time and are taught self-assessment procedures to analyze how well the team is performing while pursuing the academic objective of the task. Two basic questions are "What are one or two specific activities that we did well in today's class?" and "What is one activity that we can do better next time?"

Some educators who have not been formally trained in cooperative learning may have some misconceptions about this pedagogical alternative. Some misconceptions, along with the actual findings of practitioners and researchers, are:

- "The teacher gives up authority and control in the classroom." In using cooperative learning the teacher does not relinquish authority and control in the classroom. In fact, many practitioners of cooperative learning discover, perhaps ironically, that they have more control in the classroom because the activities are highly structured and each student must assume a role and participate.
- "The teacher cannot cover as much content." While it is true that some initial class time must be used in forming student teams and explaining cooperative learning, over the length of a semester there is little difference between the amount of material covered in a cooperative learning classroom and that covered in a more traditional classroom.

- "Cooperative learning is the latest fad in colleges of education." In fact, research in cooperative learning extends back to the 1890s, with over five hundred studies covering business, the military, and all levels of education, kindergarten through graduate and professional school.
- "Cooperative learning changes the content of what teachers teach." It does not; the content of what we teach remains the same. The only way in which cooperative learning changes content is that it involves more students more actively in learning the content and in the process helps students learn important interpersonal skills.
- "Cooperative learning replaces lecture, and I am being paid to tell students what I know, and I feel comfortable lecturing." Cooperative learning does not replace lecture; it complements lecture. Moreover, telling is not necessarily teaching. Even the most ardent proponents of cooperative learning use it fifty or sixty percent of the time in the classroom. Concerning feeling comfortable, we concede that trying cooperative learning for the first time—and we really mean using it over several weeks—made us apprehensive and somewhat uncomfortable. The results, however, have been overwhelmingly positive.

How do students like cooperative learning? In our experience and that of our colleagues who use it, most students like it and work well with it. Interestingly, initial resistance is likely to come from two groups of students—the very high achievers and the very low achievers. The former believe that they will be pulling the wagon for their group. The latter are flustered because they discover that they actually have to do work in the classroom, and the pressure on them is much greater than just "teacher" pressure. The pressure is from peers! In time, resistance from both groups diminishes as students see the value and effectiveness of cooperative learning. Over the years we have received many unsolicited positive comments about cooperative learning from students in their journal writing and course evaluations.

What, then, are the major research findings in cooperative learning? Johnson and Johnson (1989) have compiled data from hundreds of studies on cooperative learning and its effects on students. They have drawn three major conclusions. First, cooperative learning, properly structured, enhances the efforts of all students to achieve. Second, cooperative learning tends to promote positive relationships. Third, cooperative learning promotes psychological health and social competence.

We add a final word about extending the results of our research beyond the developmental writing classroom. Based on many years' experience teaching both developmental writing and regular first-year writing at both the community college and the open-admissions or nearly open admissions regional university, we are reasonably confident that practically everything we report here can apply to teaching writing and structuring classrooms at most open admissions (or nearly open admissions) colleges and universities around the country.

Conclusion

Much of our research is preliminary and raises all sorts of questions. For instance, at what point does a generalization become a stereotype? What do we do if research data contradict our gut feelings or instincts or intuition? In what ways do empirical data and statistics belie the enormous complexities involved in language, culture, and learning? Do students learn in different ways under different circumstances or when learning different types of information? How much transfer of culture occurs during the educational process, especially in parts of the country which are bicultural? What effects do several years of college attendance have on student learning styles? Suppose a group of students is oriented toward listening as a way of learning. Would these students benefit more from listening to a poorly prepared lecture or from reading a stimulating, well-organized piece of written discourse? To what extent do our own unconscious cultural values influence us in privileging one mode of teaching or learning over another? To what extent should we attempt to use a teaching or learning style which at first may feel uncomfortable?

Community colleges and open-admissions universities will probably see more nontraditional and underprepared student enrollments in the future. So postsecondary teachers will have to accept the challenge of doing the best we can to help students fulfill their potential. Conducting classroom research, analyzing the data, and being willing to try alternative pedagogical strategies can help us and our students to be better teachers and learners.

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Using Student Engagement and Goal Setting to Achieve a Winning Classroom

Sandra Tannen
Camden County College

According to a study of 944 two- and four-year colleges, "caring attitude of faculty and staff" was listed as the most important factor for retaining students (Roueche, 1993). This article will explain how one teacher demonstrates genuine concern for students while demanding high standards of excellence and student accountability. This is often a balancing act which, when implemented effectively, will most certainly reap rewards. These methods are simple, easy to use, and do not require a lot of advance planning.

Students in developmental courses have to work hard to complete their goals. They often struggle with a variety of academic and personal challenges. Many have little or no interest in the subject matter, but must take these courses as prerequisites to other courses.

I teach developmental mathematics to students who are required to take the class. They work hard to learn difficult concepts, do not earn college credit, and usually have no interest in math. Many come to me with poor study and time-management skills. While most educators will agree that teaching developmental courses is difficult, I view it as a challenge and am determined to help my students succeed. When my students show progress, purpose, and motivation, everyone is a winner.

Three simple techniques that I have found to be extremely successful in teaching developmental students are: fostering student accountability, goal setting, and student engagement. These simple strategies can help classroom instructors motivate and encourage students.

Student Accountability

In a recent study, Curran and Rosen (2006) confirmed that some students assume a very passive orientation toward knowledge acquisition and do not seem to understand that they are partially

responsible for what happens to them in their courses. Therefore, I try to foster student accountability and independence by encouraging my students to motivate themselves. On the first day of class I make it very clear that their grades, successes, or failures are their decision. Student success will largely be determined by how hard students are willing to work, attend class, complete homework assignments, study, ask questions, and get extra help when needed. Learning is not a magical consequence of sitting in my classroom. Student success will only happen when students realize that they are responsible and in control of whether they succeed or fail.

On the first day of class, everyone appears to be crowded in the back of the room. It is almost as if they plan to make a quick getaway. As soon as class starts, I instruct them to move up and fill in all the seats from front to back. Although this seems like a trivial request, it is not. It shows the students that I will not allow them to become anonymous inside my classroom. It indicates that I expect them to participate as part of a group. Isolation and alienation are the number one cause of attrition (Tinto, 1993). There are students who try to disappear into the woodwork. Many times these students are overlooked by their instructors because they are quiet and do not cause any problems. Eventually, some of these students will simply disappear. Although some students are at a higher risk for attrition and failure, I like to do everything I can to encourage retention and success by getting to know my students and setting high standards. Having them work in groups is another great way for students to get to know each other and begin to feel comfortable. It is true that I might not have any impact on some students with a propensity toward dropping out, but I like to treat each student as if I do.

After students change seats, I ask them to exchange contact information with at least two classmates. This is to help them stay connected in the event of an absence. This also enables them to immediately start to feel as if they are part of a group. I have always found a direct correlation between comfort level and performance level. The more comfortable a person is, the higher his/her performance level. A classroom is a learning community with interdependent components all working together. This is what I try to establish on

the very first day. While the students are gathering their contact information, I am quickly making a seating chart so I can refer to them by name instantaneously.

Goal Setting

Another first-day strategy I find quite useful is "goal setting." I give students an index card and ask them to answer three questions: Why did you take this course? What do you hope to get out of this course? What is your goal (projected grade) for this course? I file these cards. We meet again in 3 to 4 weeks or when I have enough grades to see a pattern. We discuss whether they are meeting their goal and if they want to change it. If goals are not being met, we discuss strategies that might be used to ensure that goals are attained. I repeat this process several times throughout the semester.

This goal setting method works well because it forces the students to take control of their grade and their effort. It is harder to fail when one is held accountable for one's own success. When a student is not meeting a goal, I ask what he or she could do to reach that goal. Some suggestions I have gotten from students are: study harder, show up more, go to the math lab, join a study group, etc. The student verbally lays out a strategic plan to achieve a higher grade, thereby shifting the onus of student success from instructor to student.

Student Engagement

Similarly, engaging students is very important. Research has found that when students participate in class, they are more likely to prepare for class, attend class, and commit to excellence (Curran & Rosen, 2006). I encourage student participation throughout the semester through many active learning activities such as group work, board work, and presentations. One example of a great student activity is requiring students to teach a sample ten-minute lesson for a grade. Although a few students balk when I explain the project, it has proven to be a useful and rewarding teaching tool. They must use a topic that I have already taught and cannot be within two weeks of my lesson. The students are graded on clarity of explanation, proper use of mathematical terms and language, poise, and creativity. They must also be prepared to answer questions pertaining to their topic. In

addition to teaching the lesson, each student has to prepare a 10-question worksheet for the class as well as a solution page with each problem carefully worked out. Students must submit this to me at least 3 days prior to their presentation date, so I can make copies for the class. The students pick their own topics and I do not permit lessons that other students have taught to be repeated. I instruct them to be creative and have fun. During their presentation, I participate as a student.

In addition to improving critical thinking by using active learning, this assignment also serves as a great review of the topics learned. When students verbalize a concept out loud and have to formulate their explanations, their understanding of the concept begins to deepen. Some of my students have shown immense creativity and it has proven to be a lot of fun. One student taught Order of Operations. She challenged the class to come up with a different acronym besides the familiar "Aunt Sally." The winner was "Please Eat My Dead Alligator Soon." Another student put the rules for addition and subtraction of signed numbers to a rap song. Before long, the whole class was rapping along. According to the students, this has proven to be a very effective and enjoyable activity.

One group activity that my students really enjoy is the "group leader" activity. It is very easy to execute and I usually do this when I have an extra 7 – 10 minutes. The students form groups of 4 and pick a group leader. Most text books have challenging activities in the back of each exercise section. I pick one and write it on the board. The students have to work together to solve the problem. The first group to get an answer shows it to me. If it is correct, the group leader comes to the board and must explain clearly how it was solved. That leader must also answer questions posed by either the class or me, and use correct mathematical language. The students enjoy the competitiveness of this activity and they seem to enjoy brainstorming together.

Because they get to pick their group leader, that person is normally a person that enjoys coming to the board.

Conclusion

I have found that many developmental students learn concepts more easily when they are not just lectured to. Because many developmental students lack the motivation to excel, effective teachers get them involved and interested by being creative and varying methods of instruction. Implementing simple techniques such as fostering student accountability, goal setting, and encouraging student engagement, will almost certainly result in a winning classroom situation. It has for me. After all, doesn't everybody aspire to be a winner?

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1. The manuscript must not exceed 3,000 words (or 10 pages) including references, tables, and figures. The body should be in a 12 point font, double-spaced, with one-inch margins. Only the title of the article and the page number should appear on each page. Author(s) name(s) should not appear on any body pages.
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Taking Math Anxiety Out of Math Instruction

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To take math anxiety out of math instruction, teachers need to first know how to easily diagnose it in their students and second, how to analyze causes. Results of a recent study revealed that while students believed that their math anxiety was largely related to a lack of mathematical understanding, they often blamed their teachers for causing their math anxiety. Students expressed that teacher attitudes and teaching styles were often the cause and they could clearly remember the teacher's name. Strategies for the classroom instructor will be discussed to help instructors develop students who love math. Instructors, who address cognitive skills while instilling positive attitudes and interest in the subject, will develop anxiety-free mathematics students.

As a developmental math educator, I often hear versions of the phrases, "I hate math," "I just can't do math," and "I freeze when it comes to math tests." My students' negative attitudes about math developed over the years through repeated negative conditioning and many of them suffer greatly from the debilitating effects of math anxiety. Many of these students with poor math attitudes express that they choose college majors that require the least math. Many of them choose to be teachers because they believe that the math requirement in college and in the teaching field is minimal. Since many of them possess poor math attitudes, poor math skills, and math anxiety, we must make it our mission to change them into adults who will not continue the negative math cycle in the lives they affect.

Students often learn more from teachers' attitudes than from their aptitude in the classroom. If math instruction is to be effective, it must start with teachers portraying a positive, confident attitude about the subject. Teachers need to change students' mindsets that are often negatively conditioned for years. These students learn to "get by" in

their math classes, but do not have confidence in their ability. They must be taught to take control of their learning and take necessary steps to alleviate math anxiety so that they do not pass it on to future generations. The purpose of this article is to help teachers diagnose math anxiety, to understand causes and consequences, and finally to offer strategies for anxiety-free mathematics instruction.

Diagnosis

To diagnose math anxiety, it must first be understood. Math anxiety results from repeated negative experiences related to mathematics (Kogelman, Nigro, & Warren, 1978). It is a conditioned fear that leads to a fatalistic attitude. The negative attitude becomes a self-fulfilling prophecy that reinforces beliefs about mathematics ineptness. Those who suffer from math anxiety report a variety of physiological symptoms such as sweaty palms, muscle contractions, difficulty breathing, tightness in the throat and chest, nausea, headaches, heart palpitations, restless behavior, and forgetfulness.

Math anxiety knows no boundaries regarding race, age, or gender and although it is not significantly related to intelligence, it can inhibit student learning (Ashcraft, 2002) and reduce working memory capacity (Ashcraft & Kirk, 2001). Ho, Senturk, Lam, and Zimmer, (2000) stated that math anxiety is related more to an affective deficiency than a cognitive one and Meece, Wigfield, and Eccles (1990) stated that students' perceptions regarding their mathematical ability, their expectations regarding performance, and their value perceptions are directly related to math anxiety. The affective domain contains attitudes about learning math, memories of past failures, influences from others, reactions to the learning environment, and teaching styles (Martinez & Martinez, 1996).

The first step in taking math anxiety out of math instruction is self-diagnosis. In a recent study I conducted with ninety-one adult students at a western Pennsylvania state university (Shields, 2006), I asked students to rate their level of anxiety using the scale: no anxiety, a little anxiety, a fair amount of anxiety, much anxiety, or very much anxiety. This scale matched the scale on the math anxiety rating scale – short version (MARS-S) (Richardson & Suinn, 1972), which they

also took. I found a positive correlation of .718 at the .01 significance level when comparing the one question rating to the MARS-S. Thus, I concluded that simply asking students about how much anxiety they feel related to mathematics is an effective gauge of their anxiety level.

Diagnosis of students

The first step in diagnosing math anxiety is developing open communication with students. When students are comfortable enough to express their feelings, they will talk about their fears and anxieties related to the subject. If they are unable to voice their feelings, watch for signs such as poor grades, avoidance of homework, frequent excuses to leave the room during math class, sicknesses that occur during math class, not paying attention, or body language which is indicative of boredom or anger. Second, students need to be taught what math anxiety is, and then they need to be led in an exploration of causes and consequences.

Causes

Once math anxiety is realized, an analysis of the causes needs to ensue so that corrections can be made. In my study, 78 percent of the participants attributed their math anxiety to a lack of mathematical understanding whereas only 16 percent attributed their lack of understanding to math anxiety. The participants' beliefs about mathematical shortcomings emerged from poor math scores, as well as negative teacher, parent, and peer comments regarding their ability. Ultimately though, the participants took over the negative conditioning and blamed themselves for their ineptness. When students lack confidence in their ability and believe that their efforts will not produce desired results, they tend to not want to waste time studying, thus perpetuating the vicious cycle.

Students, however, often misdiagnose their mathematical understanding and research suggests that females especially report lower feelings of self-efficacy and self-perceptions related to mathematics, and they more often greatly underestimate their abilities (Juang & Silbereisen, 2002). A major problem is that those who attribute failure to a lack of understanding often possess a defeated negative attitude

related to mathematics and are in danger of learned helplessness – the perceived inability to overcome failure (Diener & Dweck, 1978).

Many students believe that middle school and the first encounter with algebra is the cause of their math anxiety. My study showed that 45 percent of the participants first experienced math anxiety in grades seven, eight, and nine. I also discovered that 51 percent of the participants expressed the onset of anxiety when they encountered algebra. When interviewees were asked what specifically caused their anxiety related to algebra, their responses included problems with negative numbers, numerous rules, lots of steps, variables, and the humiliation of having to repeat the course numerous times.

Participants also spoke of teacher actions such as: lecturing without visual cues; teaching too fast; requiring students to go to the board; not explaining well; not checking homework; not motivating them; not building confidence in them; not showing excitement for, or application of, the subject; and becoming easily frustrated by students' lack of understanding. Teachers had a great effect on these students. I found that 61 percent of the participants and eight of the ten I interviewed attributed their math anxiety to teachers. Those interviewed expressed a need for a teacher who not only cared about them as students, but for one who cared about their mathematics education.

When participants in my study were asked to identify teaching strategies that caused the most anxiety for them, independent competition was first (58 percent), followed by team competition (57 percent), independent math work (30 percent), and large group instruction (25 percent). Participants expressed the least amount of anxiety over working with a partner and being taught in small groups. For those with high math anxiety, most all methods of math instruction caused anxiety.

Math anxiety can also be caused by gaps in students' knowledge. When students transfer from one school to another, or when they are absent for even a short period of time, crucial information, that upcoming information is built upon, can be missed. Since math is a hierarchal subject, it can be impossible to understand new information without the prior skills. For that reason, teachers need to find ways to

fill in the gaps in students' learning or teach with the assumption of no prior knowledge.

Consequences

The most notable consequence of math anxiety is poor math achievement. When students receive poor grades, they attempt to cope by avoiding current math work and future math classes in school. This, in turn, leads to a limited knowledge of mathematics, a limited choice of college majors, and ultimately career choices that are restricted mathematically and monetarily.

Students with math anxiety who become elementary teachers are likely to spend less time on math in the classroom and they may unknowingly instill math anxiety in their students (Trice & Ogden, 1987). Teachers who enter the workforce with an inability to apply mathematics in the field themselves will not be able to teach students how and where to apply the subject, and they can ultimately create higher levels of anxiety in their students. In Hembree's 1990 meta-analysis of 151 research studies, it was found that pre-service elementary teachers had the highest levels of math anxiety of any major on campus. In a recent study by Bursal and Paznokas (2006), it was found that the correlation between pre-service teachers' math anxiety level and their confidence level related to teaching elementary math was r = -.638. They also found that those with negative attitudes and anxiety related to mathematics have less confidence in teaching other areas, such as science.

Strategies for the Classroom

Analyze teacher and student attitudes. If an attitude of hate, fear, defeat, or avoidance is associated with mathematics, it must be changed. First, teachers need to possess positive, confident, enthusiastic attitudes about mathematics so that similar attitudes will be instilled in their students; otherwise students will have a difficult time learning. To encourage positive dispositions in students, teachers should communicate a love for mathematics and possess a spirit that illustrates math as a great invention of the human mind (NCTM, 1991).

Students who possess positive math attitudes have been found

to make not only higher math grades, but higher grades in other disciplines as well (Aiken, 1972). "As self-concept becomes better established and more stable, it may increasingly affect motivation and study behavior, which in turn may affect academic achievement" (Skaalvik and Valas, 1999, p. 136). A teacher's ability and attitude greatly impacts students' abilities and attitudes, often for many generations. The impact needs to be a positive one.

Motivate students. Students experience less anxiety, more creativity, and better communication with peers and teachers when they see value in what they are learning and are motivated to learn. Motivation leads to an increased interest in future tasks, and a higher inclination to apply knowledge (Wlodkowski, 1986). To build interest, move instruction away from computation and rote memorization of facts and algorithms toward understanding through real-life, relevant applications. When students learn to memorize their way through math class, they are disabled when they are required to perform tasks that require critical thinking that goes beyond memorization. Finally, to motivate students, replace teacher lecture with student participation, group work, the efficient use of technology, and the application of mathematics in other disciplines and in society.

Build confidence. The National Council of Teachers of Mathematics (NCTM) suggests in its *Principles and Standards for School Mathematics* that students become confident in their ability to do mathematics (NCTM, 1989). Confidence promotes future engagement. It is important to engross students in math related activities that build confidence in the application of the subject to new situations. To build confidence in students, maintain high expectations for each student, give interactive feedback, involve the students in their own evaluation, and finally, build in a 70 percent success rate (Sowder & Schappelle, 2002). A 70 percent success rate will promote perseverance because the work is perceived as challenging enough to warrant effort and easy enough to expect success.

In class, teachers should promote motivation by creating a relaxed, supportive environment where students are encouraged to take risks

and not be ashamed of wrong answers. Remove the importance of ego and the search for one right answer from the classroom. Emphasize that everyone makes mistakes and develop respect in the classroom so that students are able to challenge and broaden each other's thinking.

Identify the source of anxiety and teach students to self-monitor. Point out that anxiety most likely began when someone else was in control of their learning. Convince them that they need to take control of their learning and stop the negative conditioning. To take control, teach them to use positive "I" messages and relaxation strategies. Teaching them to control their breathing in order to relax their body and to visualize success is also beneficial.

To self-monitor, teach students to first recognize when panic starts, to identify the cause, and to resolve the problem as they continue to write and work. The key is not stopping the thinking process. This can be accomplished by writing about feelings and thoughts during a homework session, taking specific note of where and why the blockage occurred.

Use affective skills to affect cognitive skills. A problem with just addressing the affective components related to math anxiety, however, is that students more often believe that they have math anxiety because they do not possess necessary cognitive skills (Shields, 2006). The cure lies in convincing them, through affective strategies, that they do have the ability. What I discovered in my study, was that participants believed math anxiety was alleviated through cognitive techniques, like getting help from a tutor (53 percent), doing all the homework (62 percent), asking questions in class (63 percent), and letting the instructor know when they need help (71 percent). Notice that the highest percentage of participants responded that asking questions in class and letting the instructor know when they need help provided the most relief from math anxiety. Students need to be comfortable enough in class to ask questions and talk to the teacher. Thus, it is important to have teachers who are approachable, kind, open to questions and communication, not easily frustrated, organized,

thorough in explanations, enthusiastic, and interested in a teacher/student relationship. Interviewees made it clear that the teachers' attitudes and attributes were instrumental in their own attitudes and attributes related to mathematics. One participant stated, "If the teacher likes it, I'll like it." Without the affective qualities of a good teacher, learning the cognitive skills was difficult for students.

Cognitive strategies to consider include: an emphasis on determining what really counts as math knowledge, what materials should be selected, and from what perspective teaching should take place; portrayal of math as an integrated whole, not as isolated facts that need to be memorized; a deep understanding of math, of individual student development, and of how children learn; an emphasis on mathematical communication, collaborative learning and group work; instruction that gives step-by-step, thorough explanations and fills in the gaps in learning; grading that allows student input into their own evaluations and incorporates student thought and communication processes; and the elimination of tracking.

Conclusion

Math anxiety can be alleviated through a variety of strategies; however, the most predominant change is a change in attitude. Attitude affects motivation and effort, which in turn affects achievement. Students often learn more from a teacher's attitude, be it positive or negative, than their aptitude. Those of us who will, or currently teach mathematics, need to realize the effect we have not only on our students, but on the generations that follow. If we expect to create students who do not fear or hate math, we must portray a positive, confident, motivated attitude about the subject we teach and about the students' lives we touch.

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A Critical Analysis

Teaching community: A pedagogy of hope by bell hooks

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Teaching community: A pedagogy of hope *(hooks, 2003), offers insights that are easily transferable to the field of developmental education. bell hooks' (2003) rich descriptions of her experiences as an educator, both within and beyond the classroom, are valuable reading for educators seeking to expand their perspectives on their profession. I was disoriented by several of her provocative statements, but grateful for the realization that students enrolled in developmental education courses may likewise feel off-balance in our classrooms. This critical analysis addresses the first three chapters, or "teaches" introduced by hooks, and draws out connections between her text and developmental education practice.*

Setting Context

As a developmental educator, I am committed to improving my teaching by enhancing my ability to relate to students in meaningful ways. To accomplish this, I strive to seek out fresh perspectives from within and beyond the field of developmental education. One excellent reference from outside of our field, *Teaching community: A pedagogy of hope* (hooks, 2003), offers insights that are easily transferable to the practice of developmental educators. *Teaching community* is bold and blunt, weaving issues of race and dominance into many discussions. In this text, bell hooks aims to provide "practical wisdom about what we do and can continue to do to make the classroom a place that is life-sustaining and mind-expanding, a place of liberating mutuality where teacher and student together work in partnership" (p. xv). She approaches this task in a discrete series of "teaches" – concise chapters addressing a variety of issues affecting educators and their students. This critical analysis specifically addresses the first three teaches

introduced by hooks, and draws out connections between her text and developmental education practice.

Teach 1: *The will to learn* (hooks, 2003, p.1) brings to life the drive to learn and grow that is inherent in learners regardless of race, gender, or social class. Reflecting upon this reality is critical for developmental educators, who teach an amazingly diverse student body (Boylan, 1999). hooks asserts that this will persists against, but can be overwhelmed by, dominator classrooms. She describes complicated relationships in academe between the agendas of Black Studies and Women's Studies programs and dominant "imperialist white-supremacist capitalist patriarchal values" (p.1). hooks structures her arguments around tangible examples such as the transnational literacy movement and domestic reactions to the events of September 11, 2001. Candid parallels exist between the academic relationships outlined by hooks and the historical, sometimes adversarial, relationships between developmental education programs and elitist higher education agendas.

Teach 2: *Time out* (hooks, 2003, p. 13) illustrates hooks' candid admission of burn-out among educators. She addresses not only the common urge for time away from teaching, but also the objective need. hooks (2003) connects the fatigue experienced by classroom educators to issues of race and class in "the corporate university classroom" (p. 21). To support her argument, she describes her own feelings of liberation teaching outside of the classroom.

Teach 3: *Talking race and racism* (hooks, 2003, p. 25) is the longest and most comprehensive of the first three teaches. hooks is blunt in her opening statement that "Teachers are often among the group most reluctant to acknowledge the extent to which white-supremacist thinking informs every aspect of our culture including the way we learn, the content of what we learn, and the manner in which we are taught" (2003, p. 25). She challenges how white people maneuver within white-supremacist culture, both knowingly and unwittingly. Her examples and analyses are provocative, and might spark meaningful in-service discussions among teams of developmental educators who may not always mirror the diversity of their students.

Key Ideas

Throughout *Teaching Community*, hooks (2003) develops several clear, well-supported arguments with which I, as the reader, could relate. hooks' description of the necessity of educators spending time away from their classrooms is clearly articulated in a manner with which many educators can likely relate. In addition, her explanation of the value to be gleaned from teaching beyond the classroom is captivating. hooks deftly portrays the experiences of educators that contribute to the need for sabbatical, and convincingly describes how sabbatical experiences later help educators teach "with excellence and grace" (p. 14).

I read with great interest hooks' (2003) statement that "teachers must be totally present in the moment, totally concentrated and focused. When we are not fully present...our teaching is diminished" (p. 14). Her statement triggered memories of the former president of my college making frequent public references to the need to be "fully present." Both of these well-known educators seem to understand the need for educators to take "time away from teaching at some point in their career" (p. 14). I laughed out loud at hooks' recollection of being told that a student needed to take all of her classes "on a Tuesday, and your class time was a perfect fit" (p. 16), because I have experienced this pseudo-compliment myself.

I found I could relate to hooks' (2003) desire to spend part of her teaching career working with students from "poor and working-class backgrounds similar to my own" (p. 17). In developmental education, this is often not a longing but a reality. I believe that my own background as a first-generation college graduate helps me relate to my students.

In comparing her sabbatical experiences with her university teaching, hooks (2003) demonstrates her ability to succinctly describe ideal and less-than-ideal teaching situations. As a teacher who thoroughly enjoys fast-paced summer courses, I can relate to her desire "to be immersed in short intense learning workshops where attention is concentrated and focused" (hooks, 2003, p. 21). In describing traditional teaching constraints, hooks (2003) is unfortunately accurate in her description

of "the corporate university classroom" (p. 21). As I read her pessimistic yet glaringly accurate account of the teaching and learning climate in higher education, I found myself reflecting upon how I might provide more concentrated, focused learning experiences for my students.

In addition to several well-developed arguments, *Teaching Community* (hooks, 2003) includes an underdeveloped assertion. As hooks herself explains, "When we only name the problem, when we only state complaint without a constructive focus on resolution, we take away hope" (p. xiv). hooks (2003) emphasizes that it is possible for critique to "become merely an expression of profound cynicism, which then works to sustain dominator culture" (p. xiv). I'm left wondering why her understanding of white people's perceptions of race is presented in a cynical, passive voice.

Teach 3: Talking Race and Racism (hooks, 2003) opens optimistically, with great potential for fostering true dialogue over issues surrounding race. However, from my perspective, Talking Race and Racism seems to slip into a pattern of presenting provocative viewpoints and then moving on before these arguments are fully developed. I read with great interest hooks' (2003) opinion that "individual white people, moving from denial of race to awareness, suddenly realize that white-supremacist culture encourages white folks to deny their understanding of race" (p. 26). I also see how it may be possible that "teachers are often among that group most reluctant to acknowledge the extent to which white-supremacist thinking informs every aspect of our culture" (hooks, 2003, p. 25). I believe this argument could serve as a fascinating starting point for a department in-service, especially given that a higher proportion of my colleagues than my students are Caucasian.

Final Thoughts

bell hooks' (2003) rich descriptions of her experiences as an educator, both within and beyond the classroom, are valuable reading for educators seeking to expand their perspectives on their profession. Personally, I found great inspiration in her feeling "beloved" by her students (hooks, 2003, p. 19) and felt driven to work toward an understanding of her viewpoints. I respect her efforts to teach with "excellence and grace" (hooks, 2003, p. 14) and, as an educator

myself, feel compelled to try to learn from hooks as well as other accomplished teachers.

Deep learning was difficult for me to accomplish at times while reading *Teaching Community* (hooks, 2003), because I found myself trying to analyze arguments that were uncomfortable or incomplete. I was disoriented by several of her provocative statements, but grateful for the realization that students enrolled in developmental education courses may likewise feel off-balance in our classrooms. In *Teaching Race and Racism*, hooks (2003) herself states, "Anti-racist work requires of all of us vigilance about the ways we use language" (p. 37). In grappling with this truth, I came to see how *Teaching Community: A Pedagogy of Hope* is truly a powerful book that can serve as a catalyst for my own further development as an educator.

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