

Efficacy and Implementation of HeartMath Instruction in College Readiness Program: Improving Students' Mathematics Performance and Learning

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Abstract

In 2002, the University of Cincinnati Clermont College (UCCC) and the Greater Cincinnati Tech Prep Consortium (GCTPC) formed a partnership to address the pedagogical needs of high school students in the area of mathematics in order to prepare them for entry into higher education. Over the past four years (2002-2005), HeartMath emotional management training has been offered to Tech Prep students. It is well established that both math courses and math tests can lead to anxiety, and anxiety, in turn, interferes with students' performance in mathematics. On the first day of instruction, students completed the COMPASS Math Placement Test and the post-test was completed on the last day. The math portion was in the form of guided program learning directed at their skill level as determined by their score on the COMPASS pre-test. Instructors were available to answer student questions. In the years 2002-2004, instruction on HeartMath tools and math skills were presented in separate classrooms. In 2005, the two forms of instruction were combined in the 3-hour class. Looking at the average improvement in test points from the COMPASS pre-test and post-test, the following results were obtained: 2002 – 19% average percent increase; 2003 – 15% average percent increase; 2004 – 24% average percent increase; 2005 – 73% average percent increase.

Introduction

In 2002, the University of Cincinnati Clermont College (UCCC) and the Greater Cincinnati Tech Prep Consortium (GCTPC) formed a partnership to address the pedagogical needs of high school students in the area of mathematics in order to prepare them for entry into higher education. The GCTPC, formed in 1994, is part of a national reform designed to create educational change through collaborative leadership with businesses and educational institutions. Ohio's Tech Prep programs are jointly administered through the Ohio Department of Education and the Ohio Board of Regents. As Ohio's largest consortium, the GCTPC serves eight counties in southwestern Ohio, and includes nine colleges, school districts, and numerous business and community groups. Its mission, like that of the national consortium, is to combine "college prep academics with skill building technologies to create high school and college pathways to high tech career success" (infor@techprepswohio.org, 2002).

Since a large number of GCTPC students enroll in UCCC after graduating from their specific vocational education programs, both institutions benefit from better preparing students to perform mathematics at levels appropriate for their degree programs.

Mathematics remediation is a major barrier for high school students transitioning into college. Personnel at UCCC observe that as many as ninety-two percent of incoming college freshmen score below college level mathematics (Davis, 2000). As a result, freshmen have difficulty succeeding in their required mathematics courses. Given that GCTPC's goal is to reduce remediation by at least ten percent, they have solicited academic assistance for these students.

Method

Over the past four years, HeartMath emotional management training has been offered to Tech Prep students. It is well established that both math courses and math tests can lead to anxiety, and anxiety, in turn, interferes with students' performance in mathematics. Instructors met with seven students, three hours per day, five days per week, for three weeks. Each day alternated between 45 minutes HeartMath instruction and 45 minutes math tutoring. On the first day of instruction, students completed the COMPASS Math Placement Test and the post-test was completed on the last day. The math portion was in the form of guided program learning directed at their skill level as determined by their score on the COMPASS pre-test. Instructors were available to answer student questions.

Intervention

The first three days of HeartMath training consisted of 1) talking about the physiology of emotions; 2) talking about core values exercises and engaging students in experiences to give them practice sharing heart felt emotions emerging from their of core values; 3) Moving from the state of thinking about positive emotional experiences to re-experiencing those emotions; 4) Gaining awareness of changes in mood shifts; and 5) working in small groups to examine commonalities to build a sense of community to become comfortable sharing and generating positive emotions. The overall goal of this instruction was to introduce students to the relationship between stress and performance.

In the first year of implementing this program, instruction on HeartMath self-regulation tools (Neutral, Freeze-Frame and Heart Lock-in) was presented separately from math remediation. While math instruction was presented, the instructors encouraged students to use HeartMath tools, but focused more on working through the directed guided program learning of the mathematics skills. The HeartMath session was conducted in a computer lab setting so the students could practice the HeartMath techniques while using the [emWave PC] heart rhythm coherence training system while the math portion was conducted in a room with four students seated at tables.

In program year 2003, instructors met with fifteen students for three and a half hours per day, Monday through Thursday, over a three week period. Instruction started out in a conference room setting and the first hour focused on emotions, experiential sharing with each other, listening to HeartMath music and practicing the Heart Lock-in technique. There were many experiential activities to integrate HeartMath techniques into the large group individual homework assignments from the previous evening. In the second hour of instruction, students worked with the [emWave PC] in a computer lab setting. During the final hour, students worked on math assignments and were presented with answers to the problems from the previous assignment. These assignments were not directed guided program learning worksheets. They consisted of problems and answers. Students graded

their own assignments. When they completed an assignment and made corrections on problems they missed, they were given another assignment. These assignments were assigned individually based on their COMPASS pre-test score. Students were encouraged to correct problems on their own. However, an instructor was available to answer questions. No teaching took place unlike during this instructional year, as compared to the teaching that took place in the previous year's form of guided program learning. The year 2003's instruction focused more on HeartMath tools and techniques than math, but the instruction was still separated between HeartMath sessions and math sessions.

In 2004, instructors and students met three and a half hours per day, Monday through Thursday, for three weeks. Instruction followed the same format as the previous year. However, this year's instruction presented an integration of HeartMath tools and math skills. Students were given assignments with answers, the same as the previous year. Using the [emWave PC], students observed their reaction to difficult problems. They then utilized the heart focused tools to achieved a level of coherence, and then were guided to use their intuition to find a way to solve the problem. During these two hours, students were practicing shifting into coherence and used their intuition to solve problems. The last half hour of instruction was reserved for a review of the lab experience and the class ended with HeartMath music and a Heart Lock-in.

Finally, in 2005, HeartMath was introduced into the math learning environment during a seven week period. A high school Principal and Mathematics Teacher agreed to work with UCCC in order to integrate HeartMath into the classroom. Sixteen students came to UC Clermont to take the COMPASS pre-test on March 21, 2005, and they received an introduction to the HeartMath system and the science behind it. Instructors also gave students and the teacher an introduction to the College Prep Readiness Program. On April 4, 2005, UCCC instructors met with the math teacher and the students in their classroom during their regularly scheduled class period. The teacher and the students were learning HeartMath tools at the same time. Four [emWave PC] stations were then set up in the classroom and students practiced using it by rotating throughout the class period. It took about three weeks for the teacher and the students to become comfortable using HeartMath during the learning process. As the teacher became more comfortable, she began guiding the students and reminding the students to use HeartMath tools during the class lecture and assignments.

Results

Students began listening and thinking through the heart, and integrating the use of intuition and reason. For example, a problem was posed to the class to introduce a topic that was to be covered next. After enough time had passed and no one had solved the problem, the teacher asked if they were using HeartMath and no one was. The teacher guided them in using HeartMath and within five minutes all students had solved the problem. Similarly, another teacher reported that she once began a lecture on a new topic and students were instructed to put all books and paper away, since students weren't permitted to take notes. This caused a heightened level of anxiety, self-doubt, and uncertainty among the students—all of which inhibit higher level thinking. The teacher guided students in using the HeartMath coherent listening tool. After the lecture, students were assigned problems to do at the chalk board. Students applied HeartMath and had no real difficulty working the

problems. That night, they were assigned homework problems that they had to do without a book or notes to rely on. The students reported that they were surprised to learn that the HeartMath tools had helped them to do the homework successfully. These types of teacher strategies were continually reinforced by positive feedback such as this.

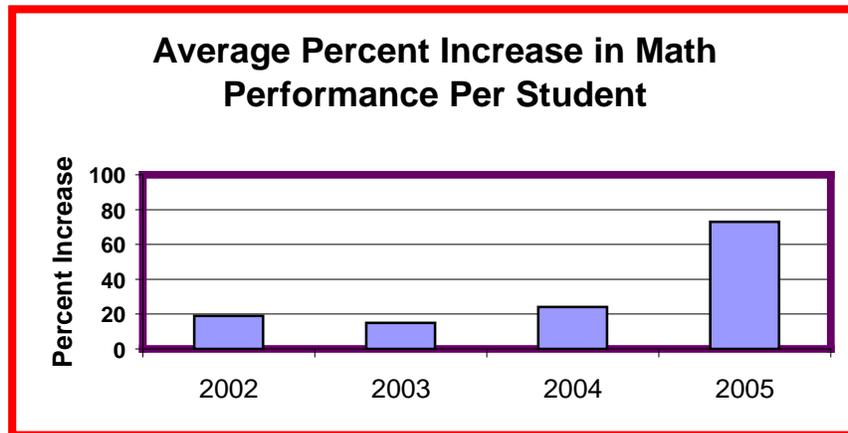
As the UCCC professors reflected on the experience at Bethel Tate High School, it is important to note that the teacher took on a dual role: math teacher and HeartMath facilitator. There was a seamless integration of learning math and HeartMath infused with the curriculum in the context of the classroom setting. The teacher internalized and facilitated the HeartMath process, and actively engaged students in the learning process. The teacher got the students personally involved by giving assignments and journaling their HeartMath experiences. This provided opportunities to make continuous improvements based on feedback from students. Students were confident that their input was valued and acted upon through adjustments in the classroom. Instructors discovered several key concepts related to the success of this intervention:

- ⌚ Committed teacher/facilitator
- ⌚ Emotional management should take place in the context of the classroom
- ⌚ High expectations for student success
- ⌚ Journaling or some mechanism for feedback to make continuous improvements along the way
- ⌚ Begin program at the beginning of the school year
- ⌚ Train the teacher/facilitator
- ⌚ Students must be provided with ample opportunities to apply HeartMath tools inside and outside the classroom
- ⌚ Real classroom experiences using HeartMath tools to see a direct benefit to the individual
- ⌚ Classroom HeartMath integration is important to promote student to student interaction

The integrated system produced the greatest results over the past four years. The post-test was administered on May 19, 2005. The results far exceeded our expectations. In contrast, not having these key elements in place produced no gain.

In addition, Intangible factors such as low student expectations, lack of student discipline, no classroom order, no teacher engagement, and fear of failure/success on the part of the student acted as moderators of success.

Looking at the average improvement in test points from the COMPASS pre-test and post-test, the following results were obtained.



- ⌚ 2002 – 19% average percent increase
- ⌚ 2003 – 15% average percent increase
- ⌚ 2004 – 24% average percent increase
- ⌚ 2005 – 73% average percent increase