

Mathematics Tutoring Center

2010 Administrative Program Review

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Mathematics Tutoring Center
Administrative Program Review
List of Appendices

- A. Director's Curriculum Vita
- B. Mathematics Tutoring Center Mission Statement
- C. Grade Comparisons
 - a. All courses tutored in MTC
 - b. Mathematics courses only
 - c. Course Grades vs Hours Tutored (Spring 1006 - graph)
- D. Budget Spreadsheet
- E. Email tutoring satisfaction instrument
- F. Tutor self-evaluation instrument
- G. "How to Survive a College Math Course" workshop outline
- H. Benchmark and Use Summary
 - a. Benchmark Summary – includes MTC
 - b. Benchmark Summary – Peer institutions only
 - c. MTC Use Summary for period under review

Mathematics Tutoring Center
Program Review 2010
Executive Summary

The primary purpose of the Mathematics Tutoring Center (MTC) is to provide academic assistance to students enrolled in mathematics courses or courses with mathematical content. The MTC provides drop-in tutoring, regularly scheduled individual tutoring, assistance with study groups and a math course strategy workshop. The MTC has a full-time Director who oversees undergraduate and graduate assistant tutors, and reports to the Assistant Vice Chancellor for Undergraduate Studies. The Center is located in and works closely with the Department of Mathematics and Computer Science.

The MTC supports the University's mission, as described by its strategic plan, and supports the educational goals of the University's Quality Enhancement Plan. Mathematics is a Core element of the Liberal Studies Program. Tutoring clients are assisted in refining mathematics skills toward developing their critical thinking, problem solving and communication skills, preparing them to become lifelong learners and responsible citizens. Tutors are primarily mathematics, mathematics education, and applied mathematics majors. They exercise problem solving and communication skills, and must integrate information from a variety of contexts while acting on the purpose and values upon which their education is based. The demand for tutoring in mathematics is indicated by ongoing use of services and by input from faculty, advisors, and residential life staff based on student performance and requests for additional support with course material.

The MTC interacts regularly with the other Academic Success Centers (Catamount Academic Tutoring and University Writing Center) and with special-population academic support programs (Student Athlete Academic Support and Student Support Services). The important role of mathematics in Business, Engineering and Engineering Technology, the health sciences, physical and social sciences provides opportunities for interaction with academic departments.

MTC services are assessed by student input, evaluation of tutor performance, and input from faculty. Studies have been done of student success as indicated by course grades in comparison to overall average course performance, and as a function of time spent in tutoring. Student input is provided as students log out after a tutoring session, by email request for evaluation and by focus groups exploring student attitudes toward tutoring services. Tutors are evaluated by self-evaluation, observation, and in individual discussion with the Director.

A significant long-term accomplishment of the center is the development of a strong relationship with the Mathematics and Computer Science Department. Recent accomplishments include participation in implementation of the institutional Quality Enhancement Plan, development of a tutor training course based on guidelines of the College Reading and Learning Association, and development of a mathematical learning and study skills workshop called "How to Survive a College Math Class."

A comparison with peer and aspirant institutions reveals that the operating costs of the MTC are in line with comparable units at other institutions. Pay rate for tutors, starting at \$8 per hour and increasing with longevity and training, is comparable to other units.

Opportunities for improvement and expansion of services include incorporating computer-based tutorial and drill-and-practice approaches, the implementation of a Supplemental Instruction program, and more efficient and effective assessment strategies. The Kimmel School (Engineering and Construction Management) and the College of Business, along with the Department of Mathematics and Computer Science, are exploring instituting a formal mathematics placement-testing program, which has implications for the MTC both in oversight and in providing remediation for students with low placement results. The MTC has explored development of a tutoring-for-credit course as a cost-saving approach to providing tutoring while enhancing the educational aspects of working as a tutor.

History and description of unit

The primary purpose of the Mathematics Tutoring Center (MTC) is to provide academic assistance to students enrolled in mathematics courses and courses with mathematical content. This is accomplished by offering a drop-in tutoring program, individual tutoring, and workshops on study skills related to learning mathematics. The Center offers students who work as tutors a way to develop and refine their mathematical knowledge and their teaching skills.

The MTC offers approximately 50 hours per week of tutor availability on a drop-in basis. A majority of tutors are mathematics graduate assistants or upper-division mathematics or mathematics education majors, so assistance with lower-division service courses is available any time that the MTC is open. For upper-division courses, a schedule based on tutors' specialties is available each semester. Students log in and out for each tutoring visit, and TutorTrac software keeps a record of all visits by course, section, and visit reason. Visit reasons include drop-in tutoring, individual tutoring, independent study, group study or workshop attendance. An email is automatically generated each week for instructors indicating use of the MTC by students enrolled in their courses. Workshops are announced in lower-division classes and attendance is reported to instructors. Tutoring services are advertised by class visits, posters, announcements in residence halls, and referrals by advisors, instructors and residence hall staff. The student newspaper and radio station have been used to advertise services. (See Appendix H, part (c) for a use summary for the period under review).

The Center is physically located within the Department of Mathematics and Computer Science on the fourth floor of Stillwell. The drop-in tutoring space is a room of approximately 800 square feet which contains three round tables that accommodate up to six students and one that accommodates four or five. The space has traditional blackboards (preferred over white boards for mathematics work) or bulletin boards on all walls except the window wall. The Center has one computer on a kiosk stand dedicated to client sign-in and –out, and two additional computers for students to check email, on-line assignments and to do their own work. The department will be installing a networked printer for student and faculty use on a pay-for-print basis. There are four individual desks for independent work. In addition, the department has two commons spaces with large conference tables and white-boards for group study and for faculty to meet with students. In addition, there is a commons space equipped with individual tables for test-taking or one-on-one meetings. This commons space includes a small kitchen area for student and faculty breaks.

The MTC Director reports to the Assistant VC for Undergraduate Studies. The Director oversees a staff of 8-12 undergraduate and graduate student peer tutors. Most of the undergraduate tutors are mathematics or mathematics education majors, and graduate assistants are in the applied mathematics or mathematics education Masters programs. The current MTC Director has served in that position since fall of 1983 (see Appendix A for Director's vita). The MTC shares an administrative assistant with the other Academic Success Centers.

The Mathematics Tutoring Center (originally the Math-Science Resource Center) was created in 1981 as part of a CAUSE grant in the then-Department of Mathematics and Physics, in an effort to address undergraduate courses with high DWF rates. In addition to a tutoring program and a library of audio-visual support materials, the Center had oversight over a remedial, modular, quasi-self-paced course for students who demonstrated extremely weak mathematical skills on an orientation placement test. Originally grant-funded, one of the conditions of the grant was that the University would take over support of the Center upon expiration of the grant. This was accomplished through the College of Arts and Sciences and the Math & Physics Department. Support consisted primarily of the Director's salary and student wage funds. Supplies and purchased services were covered by the Department, and this was the case until very recently. Over the years, the Director's duties expanded to include lower-division course instruction in mathematics, considerable university committee work, and other duties in support of lower division undergraduate education, including coordination of the first-year transition course. The University stopped offering remedial courses in the late 1990's. In 2001, the Catamount Academic Tutoring (CAT) Center and Student Technology Assistance Center were added to the existing Math and Writing Centers to form the Academic Success Centers (ASCs). The MTC oversight and funding of student wages moved from the academic department to the Enrollment Management Division. With the accompanying transition of the Director's position from EPA fixed-term to EPA non-faculty, the academic university committee work was substantially reduced. Due to recent changes in Southern Association of Colleges and Schools requirements for faculty credentialing, the Director no longer teaches mathematics courses, although she continues to teach the transition and tutor training courses. Very recently, the oversight of the Academic Success Centers was moved into the Office for Undergraduate Studies.

Alignment with WCU Mission, Vision, Values

The MTC supports the University's mission and the educational goals of the institutional Quality Enhancement Plan (QEP, required by the University's accrediting body, the Southern Association of Colleges and Schools). Through education in mathematics, students develop critical thinking and problem solving skills, and learn to integrate information from a variety of contexts through mathematics. The MTC provides the opportunity for students who work as tutors to develop their communication skills, complex problem solving skills, and to engage their own learning in a purposeful way by making mathematics meaningful to others. The MTC Director and staff, in collaboration with faculty in the Mathematics and Computer Science Department and related departments, seek to discover and develop new approaches to encouraging students to use support for their learning (see Appendix B for MTC Mission Statement).

Mathematics is a Core element of the Liberal Studies program, indicating that mathematical skill and analytical skills based in mathematics are valued in all academic departments across WCU in order to "educate its students to be personally and professionally successful in the 21st century" (UNCTomorrow 4.1). The MTC provides a bridge between the classroom and independent engagement with course material for students in mathematics courses, and students in courses with mathematical content. Tutoring provides a structured introduction to, and practice of, engaged learning by guiding students in the process of engaging with challenging class material, particularly important for students from weaker academic backgrounds, including underrepresented populations and non-traditional students (UNCT 4.2.1, 4.2.5). For students who serve as tutors, the tutoring experience engages them with their own learning—they recognize that teaching confirms learning—allowing them to "recognize the synthesis of their university experiences relative to their future education and career plans" (QEP Learning Goals and Outcomes). A number of peer-tutors are mathematics education majors and the tutoring experience motivates and confirms their dedication to public school education (UNCT 4.3). Graduate Assistants who are tutors in the MTC have the chance to confirm, refresh and expand their discipline knowledge. The MTC acts as a resource for population-specific tutoring programs on campus (Athletic Academic Coordinator; Student Support Services), and provides a point of contact for tutoring support requests for non-university students in the community.

University Mission Statement and Strategic Plan

The MTC supports the University mission statement as defined by the strategic plan by

- Developing students’ “critical thinking, problem solving, and both written and oral communication skills” (Strategic Plan), so they are better prepared to function professionally and thus contribute to “enhance[ing] economic and community development in the region, state and nation” (Mission statement);
- “Prepar[ing] students to become lifelong learners and responsible citizens in a global community” (Strategic plan) through strengthening both basic knowledge and applied skills, both for students who make use of tutoring services and those who serve in the tutoring role;
- Employing students as tutors, providing them with the opportunity to integrate curricular and co-curricular experiences while honing the skills that will allow them to be successful in life beyond college.

Institutional Quality Enhancement Plan (QEP)

Tutoring offered in the MTC provides a structured introduction to and opportunity to practice engaged, intentional learning by

- Supporting students in the process of integrating information from a variety of contexts, solving complex problems, and communicating effectively and responsibly;
- Providing opportunities for tutors to practice civic engagement and to clarify and act on purpose and values upon which their educations are based;
- Modeling effective learning practices in a proven, cost-effective learning model, which is “characterized by reciprocity and respectful exchange” (QEP).

Recent Significant Changes

The purpose of the MTC has not changed significantly in the past five years. One operational change has been the larger role of graduate assistants working as tutors until they have acquired the 18 credit hours required for teaching an undergraduate course in mathematics. In recent years, the healthy population of the MA and MAEd programs in mathematics has provided most of the tutoring staff. Undergraduate tutors are limited to special needs, primarily in the Math for Elementary Teachers course and entry-level statistics courses. While this does not affect the fundamental purpose of the unit—to help undergraduate students to be successful in mathematics courses—it has enhanced the role of the Center in preparing graduate students

for careers that incorporate teaching. In addition to filling the drop-in tutoring schedule, graduate assistants are sometimes closely associated with one particular course. In these cases, the GAs attend class meetings, help the instructor supervise group work in the classroom, teach lessons supervised by the instructor, and provide tutoring assistance specifically to students enrolled in the course. Faculty are offered the chance to request this kind of course assistance for courses that cause particular difficulty for math or math education majors or in Liberal Studies, or for courses that are experimenting with new instructional strategies, technologies, or materials. Recently, faculty who have agreed to teach over-sized sections have been offered GA help. The GAs are expected to be involved in the teaching and learning activities of the course.

Anticipated Enhancements

The ASCs have been exploring the implementation of a Supplemental Instruction program at WCU. Supplemental Instruction (SI) is an intensive form of support for “at-risk” courses that has well-documented success (<http://www.umkc.edu/cad/SI/overview.shtml>). It is a resource-intensive program, and not ideally suited to departments that offer small, multiple sections of courses as opposed to large lecture formats. The shift to larger classes dictated by institution-wide resource issues is expected to make the implementation of SI more attractive as an enrichment of ASC services.

The recent growth of the Kimmel School’s programs in Engineering, Technology and Construction Management, and in the health sciences and business, offers opportunities to the MTC. These programs depend on mathematics as a cornerstone of their curricula, yet attract students who have been out of school for a period of time and who have special needs in preparing for the demands of their programs. A task force has recently been formed with representatives from all of these academic areas to explore introducing a new placement testing scheme. The MTC will be involved both in the testing and in developing strategies to help students who need levels of review or remediation in order to be prepared for the demands of their academic programs.

The adoption and implementation of the University’s Quality Enhancement Plan, and the development of specific learning outcomes to support the QEP, have provided a new focus on the role of tutoring in synthesizing classroom experiences. Tutors are encouraged to reflect intentionally on their tutoring experience and recognize what it contributes to the whole of their educational experience. Tutoring clients have the opportunity to recognize that collaborative

learning forms a bridge between the classroom and their personal integration of knowledge. The Education Briefcase, a central component of the QEP, provides a place for intentional reflections to be stored and identified as connective moments in the educational experience.

Demand for the Program

The key users of the MTC services are students in mathematics courses or courses with mathematical content (physics, chemistry, engineering, health-related fields, business, and social sciences). Faculty benefit from the services not only from the help that their students receive, but through collaboration and cooperation in preparing students for tests and projects, and from feedback about students' issues with assignments.

Demand for services is measured both by level of student use of services, and also by input from faculty and advisors (both formal and informal, i.e., residential living) about the need for support with class material. Examinations of DWF rates and class performance results in mathematics frequently reveal that students find mathematical content to be particularly challenging on the college level. Students need support in both content and in learning strategies and skills to study course material effectively and efficiently.

The MTC interacts with the other Academic Success Centers (CAT Center and University Writing Center) in strategic and logistic planning. The Mathematics and Computer Science Department interacts very closely with the MTC in all aspects of its functioning—tutoring, tutor selection, and in an advisory capacity. In turn, the MTC Director serves on the department Curriculum Committee and works closely with the graduate coordinator in oversight of graduate assistantship duties. Other units that provide limited (special population) tutoring services, primarily Student Support Services and Student-Athlete Academic Support, collaborate in scheduling tutoring for their students and in selecting tutors for their programs. The Advising Center consults about placement in mathematics courses for entering students and in referring students who express the need for academic assistance.

The ASCs, including the MTC, are unique in that they provide services to all students and at all levels. The MTC is also unique in operating on a drop-in basis; both the CAT and Writing Centers require appointments of all clients. Most math tutors are capable of assisting in most lower-division undergraduate courses, which form the bulk of the MTC's business. As a result, it is not necessary to limit courses to specialized tutoring times. Further, clients are encouraged to use the MTC as a study location where assistance is readily available if it is needed. It is well

documented that mathematics is a subject area where many college students struggle. It is also an area that is considered necessary for students to experience at the college level, as indicated by its inclusion in the Liberal Studies Core program, and in General Education programs nationwide. Most majors require some mathematical experience, many in statistics (nursing, social sciences, and business) which is a new area of study for many college students. Many students in the science areas (engineering, physical science) encounter trigonometry in an applied way for the first time when preparing for calculus. Encountering new mathematical content in the context of a fast-moving college course is a challenge for students, and college is often the place where students discover that asking for help does not mark them as a weaker student.

Quality

Tutor certification

An obvious measure of program quality is certification of tutors following a prescribed training and performance observation period. The MTC has not yet sought certification by the College Reading and Learning Association (CRLA), largely because of the recent increase in the use of graduate assistants as tutors. While a tutor training course, designed to CRLA standards, does exist for undergraduate math tutors, it is not appropriate for graduate programs. Graduate assistant tutors take a three-credit seminar course aimed, in part, at preparing them to be instructor of record in a lower division undergraduate course upon completion of 18 graduate hours in mathematics. This course also introduces assistants to the research interests of department faculty. In recent semesters, the course has begun to include the backbone of the undergraduate tutor training course, but also takes advantage of the fact that many graduate assistants are already professional educators returning for further certification, or they are students who participated in rigorous tutoring programs during their undergraduate years. As a result, the tutoring training component of the seminar course is aimed more at developing strategies for dealing with common tutoring situations. Further progress toward CRLA certification is on hold pending increased demand for undergraduate tutors.

Client success compared to overall course averages

Included in Appendix C, parts (a) and (b), are comparisons of tutoring clients' grades with course averages, as a function of number of tutoring visits, for the period under review. A clear initial observation is that there are many more students who use the MTC for six or fewer visits.

For fall and spring semesters, the final grades for these students fall close to or slightly below the course averages, indicating that a small number of visits is not always adequate to affect student success. In most semesters, there is a decrease in comparative student success for a moderate (7-9) number of tutoring visits; these are most likely students who either withdraw or simply stop attending mid-semester. For larger numbers of visits (10 or more), the number of students is relatively small, but the success is fairly consistently at or better than class average. It is worth noting, however, that in some semesters the students who visit the MTC frequently are in fact students who struggle seriously with mathematical material—precisely the students who should use the center. However, ultimate success is up to the student, and some frequent visitors use the center as a study location only but do not avail themselves of the tutoring services. There are clearly semesters when the expected correlation between a larger number of MTC visits and success (A or B grades) in mathematics courses is evident.

Student success as a function of hours of Center use

Student success has been examined as a function of total time spent in the MTC (Appendix C part c). In the summer of 2006, a student was hired to do statistical analysis of data of number of student visits and total time spent in tutoring, compared to course grade for the two semesters of the previous academic year. There is a small positive correlation ($r \sim 0.57$) found when the crude data is corrected for students who have few visits, or those who spent an unusually large amount of time in the MTC. Students who were known to be “non-typical” were not included in this study (i.e., students known to have particular learning issues or known to have had a particularly difficult time during the semesters in question). The data indicated an increase in course grade of about 0.35 points for each 10 hours spent in the tutoring center. Prior to the implementation of the TutorTrac system and its effective coupling with the Banner student information system, this kind of study was very time consuming to do, as student grades needed to be searched individually, so it has not been repeated in detail.

Another interesting observation was made with 08-09 academic year client data. For students who used the MTC for tutoring in mathematics courses, over 50% receive grades of A or B in their classes. Only about 10 % of these students received all A and B grades for the semester, so for some, their math grade was one of their better grades. Approximately 75% of tutoring clients received a C or better, leaving a still significant 25% who fell into the DWF category.

Student satisfaction

A crude measure of student satisfaction is obtained by asking students to respond to a prompt to “describe your tutoring experience” at the time that they log out of TutorTrac after a tutoring session. This prompt includes a statement assuring that the response is confidential, and that responses cannot be tracked back to individual students. Responses that “yes, I received useful assistance” range from 72-89% of visits in the period of this review. Responses that students are not satisfied with their experience fall in the 0-1.6% range. Students respond that they are using the MTC for “study only” varied widely across semesters, from 2-18% of visits.

During some semesters, students who have used services 3 or more times are sent an email asking for a more extensive evaluation of their experiences (see Appendix E for the survey instrument). Returns on these requests are very low, usually under 10%, but the information from them is useful and open-ended comments provide the most information. Students will sometimes be motivated to reply if their experience was not good—for example, if tutors were not immediately able to answer questions or the center was too busy when they visited to avoid a prolonged wait before assistance was available, or the tutors on duty were not able to assist with the particular course material. Open ended questions also provide some very positive statements that have formed the basis for advertising materials for the Academic Success Centers. The Centers have recently become aware of a “SurveyTrac” addition to the TutorTrac system which should make development and solicitation of survey feedback much more straightforward for the ASCs.

The ASCs have, over the last two years, conducted a focus-group based assessment in an attempt to probe student attitudes toward tutoring services and to explore the lack of motivation by students to seek services. While the qualitative data from this study is rich with suggestions, there are few that are not already being used by the ASCs in some form. Perhaps one of the most significant findings is that, in spite of extensive publicity and advertising about services students do not internalize the information and then find themselves unaware of services at the time that they realize a need for it. Students cannot be told too often about what is available to support them in the academic realm.

Tutor evaluation, satisfaction, and input

Tutors are evaluated by informal observation, an end-of-semester self-evaluation, and an individual meeting with the Director. The self-evaluation includes questions that address the learning outcomes of the institutional QEP, including development of communication skills, complex problem solving skills, and reflection on better ways to handle difficult tutoring

situations (see Appendix F). In addition to reviewing their self-evaluation, tutors are asked to suggest improvements for the overall operation of the MTC. Invariably, the greatest frustrations are with clients who are not well prepared for a tutoring visit, and the knowledge that there are more students in need of services than actually take advantage of services. This frustration is invariably confirmed when GA tutors go on to be class instructors, and is frequently voiced by faculty. Faculty are encouraged to motivate students to use tutoring services by including information in their syllabi, making announcements in class and offering incentives.

Advertising

Attracting students to take advantage of academic support opportunities is an ongoing challenge for all of the ASCs. For the MTC, publicity is provided by asking faculty to include information in all lower division course syllabi, offering incentives to use services, and by making announcements in class. The Center Directors are available to make presentations to student groups in residence halls and to student organizations. The ASC have a presence at all open house and orientation information fairs. Posters are provided to Resident Assistants for posting in residence halls. MTC tutors are asked to visit classrooms to distribute ASC bookmarks and make brief presentations about MTC services, so that students have a face to put with the service. Instructors are discouraged from bringing classes on tours into the MTC as it disrupts ongoing tutoring, but classes are invited to come see where the MTC is located. Both the student newspaper and campus radio station have been used to advertise ASC services. Bookmarks are provided to departmental and Advising Center advisors for referring students in need of assistance. The ASCs are represented on the University web site in areas that students would be expected to seek information about services, in addition to individual web sites for each center.

Major accomplishments

One of the most significant accomplishments of the MTC is the sound and supportive working relationship that the Center has with the Mathematics and Computer Science Department. The Center was originally established by the department, but in spite of its more recent administrative separation from the department, the closeness of the relationship has remained. There have been occasions when the idea of centralizing the ASCs has been discussed by the institution. While this strategy has been successful at some institutions, the Math/CS department values the geographic closeness of the Center. Both undergraduate and graduate assistant tutors value the access to faculty, and both graduate teaching assistants and faculty

will hold office hours or meetings with student study groups within the Center. Because the Center is open twelve hours per day (MTWR), it is a convenient location for faculty to post class announcements, homework or test answer keys, and colloquia publicity, and for the department social club to solicit participation in fall picnics, Christmas parties, and social events around visitors to the department. Most students who are active in the department—academically, socially, or as student employees—will pass through the Center, so it is considered a critical piece of the department’s integration of the college experience.

The ASCs have had a voice in development of the QEP learning outcomes through the CAT Center Director’s participation in the QEP Assessment Committee. The ASC Directors collectively have developed assessment questions for tutors to explore their experiences around the QEP learning outcomes. Capture points for data on the QEP learning outcomes will include students’ reflections in their Education Briefcase targeted portfolios, end of semester self evaluations, reflection assignments in tutor training courses, and feedback and reflection of clients. The experience of working as a tutor provides an especially effective opportunity for students to reflect on the values that motivate them as educators, in addition to using their educational experience in a very applied and synthetic way. Tutors are confronted with complex problems almost every time they sit down with a client. They almost invariably comment, at some point in their tenure as a tutor, how teaching confirms what they have learned in the classroom themselves in a way that makes their ownership of the material richer and deeper.

The MTC has developed a tutoring training course that corresponds with the requirements of the College Reading and Learning Association’s accreditation standards. The course material has been modified to be suitable for use in the graduate assistant teaching preparation course. This modification has required abbreviating the material, but also making it flexible to take advantage of the varied educational and professional experiences of the graduate assistants. The MTC is also exploring the development of a course that will allow undergraduate students to work as tutors while earning academic credit in place of financial remuneration. This has the double benefit of contributing to cost effectiveness and providing a forum for reflection and enrichment of the tutoring experience.

The MTC offers a workshop every semester on “How to Survive a College Math Course” (see Appendix G). This is not a skills workshop, but rather an exploration of individual learning styles, as well as instruction, learning and study strategies specific to mathematics. The significant difference between how mathematics is taught in high schools and how math courses operate in

college is emphasized, recognizing that this, as much as course content, is a major stumbling block for students taking their first college math course. The workshop's development was based on years of observation of the issues other than mathematical skills that stand between new college students and success in mathematics courses. Some of the workshop content is being considered for inclusion in an algebra review course students who score poorly on the proposed placement testing program.

Cost Effectiveness

Attempts to explore cost per student served or cost per hour tutored are complicated by the variety of ways that the ASCs operate and different ways that students will take advantage of services. Comparison to peer institutions in an attempt to establish benchmarks show that similar units use 75-90% of their budgets (exclusive of professional salaries) for student wages, and pay between minimum wage \$7.25 to \$9 per hour. The MTC has used 87%, 92% and 97% of its budget for student wages in the three years under study, paying between \$7 and \$8.50 per hour (depending on minimum wage and tutor status; See Budget Appendix D, and benchmarking information, Appendix H, parts a and b).

The Director's salary, at \$53,556, is on the high side compared to peers (\$40,000-\$42,000 with one reporting \$40,000-80,000 range). The MTC Director has held the position for 26 years, and for many of those years was evaluated by the academic department, according to faculty guidelines including merit raises. Further, the Director also serves on University-wide committees and has duties outside of the MTC, such as, currently, coordinating the First Year Experience transition course and chairing the Education Briefcase implementation team. In the past, the Director has had responsibility for oversight of the departmental placement testing program, and been involved in the General Education Review and implementation of the Liberal Studies program, has served as acting director of General Education, worked on the computer requirement implementation, taught computer literacy workshops and courses, served in the faculty senate, and assisted in the Advising Center, in addition to carrying between two and eight credit hours of course instruction. None of the peer institutions have full-time directors at the Doctorate level.

The overall operational budget for the MTC for the past three years has been on the order of \$8500 for the academic year plus another \$3000 for summer sessions (exclusive of graduate assistantships). Cost efficiency efforts include the development of a tutoring-for-academic-credit course, development of a modified supplemental instruction model for specific

mathematics courses, and efficient use of graduate assistantships. Exploration of modern computer-based or on-line tutoring and drill-and-practice materials offers an alternative to support one-on-one tutoring.

Opportunity Analysis

While the Director of the MTC has duties outside the scope of the MTC's mission, there are no activities of the MTC that are outside the scope of the unit's primary purpose.

Computer-based tutorial and drill-and-practice software programs have been available for many years. Historically, they have been limited in scope and true flexibility. In recent years, truly effective tutorial software has become available, some associated with specific textbooks. Use of text-associated software is somewhat hampered by the fact that WCU uses a textbook rental system (access to software can depend on textbook purchases). Further, the MTC has not had the use of a well-equipped computer lab to make effective use of computer-aided materials. Most computer labs on campus are heavily used for classes; even the computer lab within the department is access-limited. The MTC has only three student-use computers, although the center is wireless-compatible for students who bring their own laptops. However, use of learning software is not inexpensive, somewhat beyond the scope of the limited budget of the MTC. Exploration of computer-based tutorial systems is ongoing, but adaptation of computer based tutoring or skill drill and practice will not be done at the expense of tutoring experience for math education and GA students.

The Mathematics and Computer Science department, along with the Kimmel School and the College of Business, is beginning to explore the reintroduction of placement testing for incoming students. A task force has recently been formed to examine use of on-line placement testing. The MTC was largely responsible for placement testing the last time it was used for all entering students, and the experience of the Director will be helpful in this new implementation. The MTC stands to play an important role in providing remediation to students who demonstrate skill or content deficits on placement tests that are not severe enough to require full course remediation.

Two other units on campus also provide tutoring to special populations of students. The Athletic Academic Coordinator is responsible for identifying tutors for student-athletes who express a need for academic assistance. Student-athletes have very demanding personal schedules that can impact their ability to use mainstream services. Further, the athletic programs have access

to sources of funding for academic support beyond those available to the ASCs for campus-wide student services. However, it is important for the two programs to cooperate, rather than compete, in identifying and hiring tutors. It is a drain on ASC resources when a well-funded, higher-paying special population program hires a tutor that the ASCs have already trained and scheduled to serve the wider student population.

The Student Support Services (SSS) program also serves a special population of students. Advisors in that program will call the MTC when they seek tutoring for a student. Their funding mandates more rigorous accounting of, and prescribed scheduling of, tutoring activity than the system used by the ASCs, and SSS funding cannot be used for serving the general student population. The SSS program has cooperated with the ASC in training tutors, and tutors occasionally work for both programs.

The ASCs have explored the implementation of Supplemental Instruction (SI) for several years. It was first explored in the beginning years of the MTC (then the Math-Science Resource Center), but the SI model was not originally designed for small, multiple sections of courses. Most mathematics courses are taught in small sections and the service demand of many lower division courses mandates multiple sections. Small class size has long been a core value at WCU. Since the addition of the CAT Center, SI has again been explored and the ASCs have repeatedly submitted proposals asking for a student fee increase to support SI, which is admittedly more expensive than small group or drop-in tutoring. This proposal has yet to be funded, in spite of sincere interest in SI on campus. The ASCs continue to explore this potential expansion of services.

In terms of cost-saving measures, the MTC continues to explore the development of a tutoring-for-academic-credit course. However, such a course is not suitable to the current graduate programs, and with the generous staffing by graduate assistants, there has been less dependence on undergraduate tutors. The MTC has explored the development of a tutoring-by-appointment system. Some students seem to prefer to be able to set an appointment, and there are occasions when the drop-in service is very busy and students would like to be able to get more one-on-one service than the drop-in system provides. The drop-in service is also occasionally plagued by dry spells, which are, of course, less cost-efficient. An appointment system would help to identify these periods, which vary somewhat from semester to semester, and make the use of tutor time marginally more efficient. An upgrade to the TutorTrac system

will be implemented over the coming summer session that should make an appointment system feasible. This would complement the convenience of the drop-in system in the MTC.

Efforts to explore external funding opportunities have revealed the difficulty of finding sources interested in funding on-going student support programs. The ASCs did receive funding from the Faculty Center to do qualitative assessment of student attitude toward academic support.

Improvements that would make the Mathematics Tutoring Center exemplary would include:

- Exploration of the use of modern computer-based tutorial and drill-and-practice systems, including support for server space or computer equipment for the exclusive use of the ASCs or the MTC specifically;
- Continued refinement of effective assessment strategies, including on-line or email surveys that effectively capture and characterize student needs;
- Development of a viable student placement testing scheme that would reveal an effective, efficient approach to providing skill- or concept-specific remedial support to under-prepared students; including
- Development of a mathematics survival skills course that would visit remedial concepts, but focus primarily on learning and study skills specific to mathematics;
- Expansion of collaboration with the Kimmel School and the Colleges of Business and Health Sciences, all of whom have expressed specific needs in mathematical preparation of their students;
- Similar expansion to other colleges or departments as needed;
- Discovery of the elusive concept that would make academic assistance acceptable and attractive to the general student population.