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ABSTRACT

Bay Mills Community College (BMCC), in Michigan, is the state's only tribally controlled community college, offering vocational degrees, a pre-health program, and transfer programs. As part of an evaluation of its developmental mathematics (DM) curriculum, BMCC undertook a survey of the 27 other community colleges in the American Indian Higher Education Consortium (AIHEC) to determine their current admissions, placement, and evaluation practices. Results of the study, based on responses from 12 of the colleges, included the following: (1) Native American students represented 91% of the enrollments at responding colleges; (2) 83% of the colleges indicated that they tested newly admitted students; (3) in addition to placement tests, nine colleges indicated that they used other methods to identify students needing DM courses, such as instructor and counselor referrals; (4) all 12 colleges reported have an open admissions policy, while 10 required students to pass prescribed DM courses before enrolling in college courses; and (5) the most common method for determining student success in DM courses was course completion, followed by developmental course pass rates and the percentage of students achieving a grade of "C" or above. Recommendations for improving the study design are included. Contains 23 references. Appendixes include introductory and cover letters, the survey instrument, a list of AIHEC colleges, and tabulated results by survey item. (TGI)

A SURVEY OF DEVELOPMENTAL MATHEMATICS POPULATIONS, COURSES AND ENTRY REQUIREMENTS OF AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM COMMUNITY COLLEGES

A Study for Bay Mills Community College

Bay Mills Indian Community

Brimley, Michigan

by

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Submitted in partial fulfillment of the requirements
for the Master of Arts in Secondary Education
Central Michigan University

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CHAPTER I

INTRODUCTION

Description of the Problem

Bay Mills Community College (BMCC) is the only tribally controlled community college in the State of Michigan. A student population of 100+ on campus and 100+ off campus is drawn from a population of 55,000 Native Americans living on seven federally recognized Indian Reservations and throughout Michigan (1990, U.S. Census). BMCC was granted a charter in 1984 to meet specific vocational and technical educational needs of Michigan's tribal communities. Presently, BMCC offers six vocational degrees, a one year pre-health transfer program and an Associate of Arts degree that transfers to other colleges and universities.

Rapid expansion of the college has mandated assessment programs to group students of like ability into appropriate mathematics courses. Many students test below a predetermined level and are required to enroll in Fundamental Mathematics or Algebra. Course content and advancement criteria is determined by the instructor. To meet articulation agreements with State of Michigan public colleges and universities, and specific objectives detailed by the Commission of Institutions of Higher Education of the North Central Association of Colleges and Schools (NCA)

accreditation process, BMCC needs to review the mathematics requirements for graduation as a component of their core curriculum. A survey of all tribal colleges in the American Indian Higher Education Consortium (AIHEC) was developed to reveal innovative approaches that BMCC might use in establishing a developmental mathematics curriculum that meets the current needs of their students.

Significance of the Problem

Upon acceptance to BMCC, all students take the Test of Adult Basic Education (TABE). If a student tests below the eleventh grade level in mathematics, they must enroll in Fundamentals of Mathematics. Fundamentals of Mathematics is a lecture based class offered every term. Completion of this class is necessary to enter college level math and algebra courses. All instructors utilize mastery learning for advancement to college level mathematics. If a student does not pass the required level for that unit, each section that is lacking must be reviewed and retaken before advancement to the next level. Students take this class as often as necessary to meet the basic math objectives established by the individual mathematics instructor. New for the 1992-93 school year, a learning laboratory has been placed in operation for students seeking additional assistance.

Since BMCC's inception as a community college, student success in subsequent mathematics classes as a result of having taken Fundamentals of Mathematics has not been assessed. Bay Mills Community College personnel decided that there was a need to evaluate what had been done in the Developmental Mathematics program and to what extent the program had been successful. This led to the question as to whether BMCC objectives and practices conformed with those of other AIHEC schools and accrediting agencies. As a result of this discussion, a decision was made to develop a questionnaire for the purpose of finding out how similar institutions were responding to these questions.

Purpose of the Study

The purpose of this study is to survey the current admission practices, placement testing, and evaluation methods in developmental mathematics of the 28 tribally controlled community colleges in the American Indian Higher Education Consortium. The American Indian Higher Education Consortium (AIHEC) has 28 colleges, all of which possess similar charter, student backgrounds and missions as BMCC. A profile of AIHEC college developmental mathematics programs will give BMCC faculty and staff guidance in enhancing their curriculum.

The specific purpose of this study can be divided into

two areas: 1)to establish a baseline of the number of AIHEC college students enrolled in developmental mathematics, and 2)to gather information about the evaluation methods used to assess and determine students' success in developmental mathematics.

Delimitation of the Project

Dr. Barbara Argumedo conducted an extensive survey of administrators and instructors in Michigan's 29 public community colleges concerning their perceptions of assessment and developmental education in their schools. Parts of the survey instrument she developed have been utilized in this study. This project has not utilized all the questions Dr. Argumedo asked in her 1989 survey. The survey requested AIHEC colleges to answer questions that are directly related to the mission of the mathematics department at BMCC. There is concern that a voluntary questionnaire of this nature might be too long for most administrators or developmental instructional directors to fill out. This survey was modified to facilitate speedy return and processing.

Definition of Terms

American Indian Higher Education Consortium - An organization of 28 tribal community colleges in the United States and Canada (see Appendix C) that lobbies for congressional funding, sponsors student athletic events, and publishes Tribal College, a journal of American Indian Higher Education.

Articulation Agreements - A college credit transfer agreement between two institutions of higher learning.

ASSET - An assessment test utilized by many Michigan public community colleges to provide a basis for student placement.

Developmental Education - Post secondary educational program to teach academically unprepared students the skills necessary to be successful learners. Also referred to as remedial education.

Fundamentals of Algebra - Bay Mills Community College course that reviews basic Algebra. Credit in this class does not apply towards graduation.

Fundamentals of Mathematics - Bay Mills Community College course that reviews basic mathematics operations. Credit in this class does not apply towards graduation.

Native American - Indigenous people of North America. Native American people are also referred to as Indian, American Indian, and Native People.

State of Michigan public community colleges - Twenty nine community colleges supported by local and state taxes.

Test of Adult Basic Education - A placement test used by many colleges and adult education centers normed on the California Achievement Test. Also referred to as TABE.

Tribally Controlled Community Colleges - Twenty four tribally controlled colleges scattered across the United States that owe their existence to the Tribally Controlled Community College Assistance Act of 1978.

CHAPTER II

REVIEW OF THE LITERATURE

Historical Mission of Two Year Colleges

The first community (junior) college in the United States opened its doors in 1901 to offer post secondary education as a link between high school and four-year colleges (Brint and Karabel, 1989). At that time the belief was that universities were institutions for the elite and wealthy. The newly developed community (junior) colleges provided students an option to attend college and transfer to a university at the completion of their community college program. By the 1930's, many educational leaders looked at junior colleges as institutions to teach vocational terminal degree programs. The idea of offering vocational terminal degree programs in community colleges did not catch on with students until the 1970's when businesses offered job placement programs upon completion of college programs. (Brint and Karabel, 1989).

Today, Michigan's 29 state supported community colleges enroll over 55 percent of all students in state supported colleges and universities. Ninety-five percent of Michigan's population is within 40 miles of a community college. With open admissions and a close proximity to large population centers, the mission of Michigan's

community colleges has evolved into the following: (1) Occupational (vocational) education, (2) General and Transfer Education, (3) Continuing Education, (4) Developmental Education, (5) Student Services and (6) Community Development (Argumedo, 1992 personal conversation).

Historical Perspective of Education for American Indians

In the early days of the United States, the idea of educating Indians centered around learning English and Christianity. Harvard, William and Mary, and Dartmouth all had written within their charter the provision to educate Indians (Boyer, 1989). In 1879, Richard Henry Pratt founded the Carlisle Indian School. The goal of this school was to remove Indian children from their families and submit these children to the rigors of European ways. Students were forbidden to speak their own language, wear traditional dress, or act in any way that was of their native culture. The goal of Carlisle and other boarding schools was assimilation of Indians into non-Indian society. This system did not produce graduates that would fit into either society (Boyer, 1989). This condition changed little when Congress passed the Indian Reorganization Act of 1934. While the schools moved to the community, the focus was still the same: assimilation into the dominant culture.

With the passage of the Civil Rights Act of 1964, the Higher Education Act of 1965 and the Indian Self-Determination Act of 1968, the stage was set for Indians to take control of their own destiny. In 1970, the Navajo Indian Nation established the Navajo Community College. In 1972, the college received federal funding through the Navajo Community College Act. With the passage of the Indian Self-Determination and Education Acts of 1972 and 1975 and the Tribally Controlled Community College Assistance Act of 1978, the way was paved for the establishment of 24 tribal colleges across the United States. The mission of these colleges was to reflect the educational needs of the Indian community. Tribal colleges were viewed as the bridge students needed to enter state-supported colleges and universities or employment off the reservation. As tribal governments achieved increased economic independence, tribal colleges became more important as vocational training centers.

Tribal colleges in Canada and the United States formed the American Indian Higher Education Consortium (AIHEC) to provide assistance to new tribal colleges and monitor Indian education legislation. This organization produces a quarterly journal, Tribal College, dedicated to informing employees of tribal colleges, teaching innovations, and research within AIHEC institutions.

The original mission of Bay Mills Community College was: to raise the level of general education skills of office workers, to provide general business practices to middle managers, and to train blackjack dealers. As these goals were accomplished, BMCC began offering general education courses to community members that were transferrable toward advanced degrees at institutions of higher learning. In addition to general education, BMCC offers a curriculum that respects the traditional beliefs of the students and teaches native languages and arts. (BMCC Self study, 1990).

Standards and Admission to Colleges and Universities

Admission standards were established at the time of the conception of colleges and universities in the United States. In the 1800's, all admission standards were based on oral examination. Each set of college admission standards followed its own requirements without regard to those of other institutions. High school graduates showed a wide variety of achievements and abilities. Definite high school requirements and college entrance standards were established by the Carnegie Foundation for the Advancement of Teaching in 1905. Andrew Carnegie gave $10 million to establish a pension fund for retired college professors to write a set of standards. The Board for the Advancement of

Teaching in 1906 needed to establish standards for a college and high school curriculum before pensions could be distributed. A wide range of skills and requirements for high school graduation and college entrance existed. The Carnegie Foundation did not enforce the definition of college admission requirements. A college faculty had to meet basic standard requirements to receive a pension. Through this action, minimum basic standards for college entrance were established by the trustees of the Carnegie Foundation. As increasing numbers of colleges accepted the standards established by the Carnegie Foundation, individual colleges were compelled to ask high school graduates to meet standards of excellence.

Reyhner (1989) reported that only 56 percent of American Indians over 25 years of age had completed four years of high school, in comparison to 67 percent for the entire population of the United States. Fifty-four percent of Michigan American Indians had graduated from high school (U.S. census, 1990). The comparison for Baccalaureate degrees earned by Native Americans to general population is even less (7.4 % to 16.2%) (Blum et al, 1992).

In recent years, an increasing proportion of Native American students graduate from high school and many seek further education by attending college. Upon acceptance by colleges and universities, students are tested to identify

areas of strengths and remediation. A large proportion of Native students are required to take developmental classes before entering regular college curriculum (Kibble, Malmberg and Ratwik, 1991). With the Michigan tuition waiver and textbook scholarship, 162 Native American students were enrolled in Michigan state colleges and universities in 1989 (Kibble et al, 1990). This record number of Native American students enrolled in state colleges and universities is noteworthy, but little is written on tracking these students through graduation. Kibble, et al (1990) looked at the enrollment records of 346 Native American students that entered Lake Superior State University from 1984 to 1988 and the persistence of the nine that graduated. While a large percentage of students did not complete programs of study (97%), little information is known concerning the achievement levels attained by those students who needed remediation or developmental classes.

After the United States Commission on Excellence in Education (1983) publication of A Nation at Risk, the Michigan State Board of Education implemented initiatives to hold local school boards accountable for the quality of their graduates. To support the Michigan State Board of Education initiatives, legislators enacted Public Acts 197 and 25. These acts established educational standards for all Michigan public schools and minimum competency

requirements for high school graduates. This action resulted in establishing the first set of statewide standards for mathematics. Michigan's colleges and universities were free to set their own mathematics entry and exit requirements. The Michigan State Board of Education, Higher Education Management Services Division, wanted to establish a profile of the students that were enrolled in developmental curricula. The 1989 survey established a baseline of assessment practices and developmental education in Michigan's 29 community colleges. In 1990, a follow-up survey was conducted to gain more detail concerning student assessment practices and developmental programs offered by Michigan's public community colleges. The information gathered from Argumedo (1990) has assisted the developmental program at BMCC. A survey of AIHEC institutions can yield information that is beneficial to the future of the developmental curricula at BMCC.

Assessment/Placement

Testing is the most frequent tool available to an institution to ascertain the readiness of a student for college mathematics. McDonald (1988) found 80 percent of the 165 college developmental programs surveyed utilized tests to place students in developmental courses. Akst and Ryzewic (1985) found 92 percent of 541 colleges surveyed require students to take some form of achievement test. Argumedo (1990) found that 93 percent of all Michigan community colleges require students to take one or more placement tests as a condition for enrollment. McDonald (1988), Akst and Ryzewic (1985), and Schonberger (1985) reported that the American College Testing (ACT), the Scholastic Aptitude Testing (SAT) and high school grades in appropriate mathematics courses were used more frequently by four-year institutions than community colleges as assessment and placement mechanisms.

Assessment Tools

While testing is the most frequently used placement tool in most institutions, the type of test differs. The placement test is either a standardized commercial test or a college developed test. Akst and Ryzewic (1985) reported that 31 percent of responding colleges used commercially distributed placement tests while Argumedo (1990) found 48

percent of all Michigan community colleges use the ASSET of the American College Testing as the most common standardized test. Thirty-one percent of Michigan's community colleges also develop their own mathematics assessment at some level.

Developmental Mathematics Population

A wide variety of studies look at students enrolled in developmental mathematics courses. One group of studies includes research on gender and ethnicity. Other areas of research include: personal mathematics histories, student's self attitudes towards math, and math self concept and cognitive styles and abilities (Schonberger, 1985). The focus of this review was on institutional research concerning the variables of ethnic background, sex and age.

McDonald (1988) found the larger the enrollment in the university, the greater the percentage of Black students enrolled in developmental mathematics. Brod and Brod (1982) found that their developmental mathematics courses at the University of Montana included 8 percent Native American students while the Native American population of the entire institution was only 4.6 percent. Yanosko (1981) found a large percentage of the total enrollment of Native American students at Humboldt State University to be in developmental mathematics. McDonald (1988) also reported the gender ratio in 165 colleges to be an even 50 percent. Argumedo (1990)

and Yanosko (1981) identified women as needing more remediation than men for all ethnic groups in math computation. Clagett (1989) reported a similar trend concerning higher female enrollment in developmental mathematics, but also found women had a higher passage rate for mathematics than men. Frerichs and Eldersveld (1981) and Clagett and Diehl (1988) agreed with Clagett (1989) that perhaps older students are more successful in developmental mathematics and received a greater benefit than younger classmates.

Institutional and Developmental Curriculum Policies

Most community colleges in the United States have a policy of "open admissions". This policy allows a high school graduate, or a person that has earned a GED, to enroll in general education classes. Argumedo (1992, personal conversation) stated that Michigan's public community colleges included developmental education as a major mission of all 29 Michigan public community colleges. The Illinois Community College School Board (1985) adopted new admission standards required of all newly entering students. These standards specify three years of high school mathematics that include classes in advanced algebra, geometry and trigonometry. Open admissions into an Illinois community college is allowed without adequate mathematics

skills, but these skills are necessary before entering a specific curriculum. Nationally, many community colleges have similar rules, but considerable variances exist in the rules within each state.

Corbin (1991) edited Proceedings of the Oct. 10-11, 1991 Roundtable on Student Assessment and Developmental Education. Within this document, Dr. Betty Jones of Delta College (Michigan) stated her concern for students that are admitted under open enrollment and are "underprepared" for college level developmental classes. These students are referred to Adult Basic Education and are worked with until ready to enter Delta College as full-time students. This practice is similar to that of Bay Mills Community College, which has a written policy to allow students admission to the college without a high school diploma or GED (BMCC 1992-94 catalog). Because Native American students had a grade school dropout rate of 40 percent nationwide (U.S. Census, 1990), tribal colleges needed to be more flexible in their admission standards to allow a larger student enrollment. BMCC has a working agreement with Consolidated Community School Service to provide teachers for high school completion and developmental classes.

Program Evaluation and Student Success

A wide variety of evaluation techniques, methods, and strategies exist to evaluate program student success in the classroom. Bostic and Hyink (1987) attempted to find a method to predict success on high school exit exams so assistance could be given high risk students. The belief was that research could benefit colleges by early detection of deficient students. The Academic Senate for California Community Colleges (1982) and the Alabama State Commission on Higher Education (1989) published booklets for high school students presenting basic competencies and courses that students must pass in order to predict their own college success.

Akst and Ryzewic (1985) conducted a national survey of the evaluation methods used by 650 colleges in their developmental mathematics programs. The survey found about 50 percent of responding institutions with remedial math programs indicated that their program had been evaluated. Only 14 percent of the 650 responding colleges had ever formally evaluated their program. Program evaluation varied from each institution due to funding allocations, the number of years the developmental curriculum had been in place and readily available data.

The methods that most researchers found to evaluate the effectiveness of curriculum included the following:

comparison of student success in classes after a developmental class to the success rate of students that did not receive remediation, grades in subsequent math classes, pre and post-tests for remedial classes, retention rates, and student opinions of the developmental mathematics course upon completion (Akst and Ryzewic, 1985), (Schonberger, 1985), (Argumedo, 1990), (McDonald, 1988). The most feasible way to evaluate a mathematics program is to use a hybrid method that meets the mission statement of the college and the needs of the students.

CHAPTER III

METHODOLOGY

Development of Questionnaire

The review of the literature revealed that Argumedo (1990) and Akst and Rzyewic (1985) had the best tested questionnaires for areas of concern in the developmental mathematics curriculum at Bay Mills Community College. Argumedo is employed by the Michigan Department of Education, Higher Education Management Services. The Argumedo survey received a 100 percent return rate, a mandatory requirement for Michigan's 29 public community colleges. Akst and Rzyewic had 650 (25%) chairpersons of developmental mathematics programs respond to their nationwide survey. This survey was endorsed by the American Mathematics Association of Two Year Colleges. Each survey contained questions that provided information of benefit to the BMCC developmental mathematics program.

For this investigation a hybrid survey was developed which selected questions from the surveys of Argumedo (1990) and Akst and Rzyewic (1985) that would yield necessary data needed for curriculum improvement.

tion Development for Survey

Only AIHEC colleges were selected for this survey because they have a base population of Native American students. To take advantage of AIHEC federal funding enrollment reports, specific questions were developed to aid in the response rate of the survey. Only 12 percent of the total enrollment in AIHEC schools are Non-Indian (personal communication with AIHEC, 1992). Many Indian people do not recognize the Canadian-United States political border and have relatives on both sides of the border. Non-Resident Alien category was used for this reason.

Sections I through III of the survey on developmental populations of Michigan's community colleges were taken from Argumedo (1990). Section IV was taken from Akst and Ryzewic (1985), Argumedo (1990) and myself. BMCC has a policy allowing students dual enrollment in college and high school classes under certain conditions with developmental and high school classes taught as one. How widespread the occurrence of this policy in tribal colleges is not known. Section V was taken from Akst and Ryzewic (1985) research on methods of evaluating college remedial mathematics programs and student progress. The entire questionnaire consisted of 18 questions and estimated time to complete was 15 to 30 minutes, depending on each college data retrieval system. Questions 1-6 were designed to collect information on type

of student tested, tests used, cut-off scores for standardized tests, and areas of developmental mathematics offered. Questions 7 and 8 were designed to provide breakdowns of populations of developmental students by ethnic origin, sex, and age. Questions 9-14 collected information on institutional policies that had a direct relationship to developmental mathematics courses at each institution. Questions 15-18 were basic questions to generate data concerning the evaluation methods used by each institution. In all, this survey was developed to generate a baseline of data that could be useful to all AIHEC institutions in comparing their institution to other colleges in the consortium and state-supported schools within their region.

This survey was reviewed by Dr. Russ Wood, Academic Dean at BMCC and Dr. Murari Suvedi, a coworker in the Department of Agriculture and Extension Education at Michigan State University. A few suggestions were made and incorporated into the document before presentation to Dr. Charles Jaquith at Central Michigan University. Dr. Jaquith offered some minor changes which were made prior to mailing the survey to the AIHEC Executive Director and the presidents of the AIHEC colleges.

Distribution of Cover Letter and Instrument

An introduction letter was sent two weeks prior to the survey (See Appendix A). The letter gave notice of the developmental mathematics survey and requested participation. The original idea was to have the President or the Academic Dean of BMCC write a letter asking AIHEC colleges for support of this project. Since I am no longer on the faculty of BMCC, permission was denied. The letter was sent under my name on my current letterhead. The survey, the cover letter, and the distribution of the survey are found in Appendix B. Responses to the survey were accepted via telephone or FAX, or upon return of the questionaire in the enclosed self-addressed envelope. Up to four telephone calls were made for non-compliant surveys.

Description of Population Sampled

There are 28 AIHEC community colleges in the United States and Canada (Appendix C). Because of the relatively small population, the decision was made to send the questionnaire to all schools except Bay Mills Community College for a total of 27 colleges.

Assumptions of the Survey

1. Enrollment figures for Fall 1991 semester/term were compiled and readily available to complete this survey.
2. AIHEC college presidents or the coordinators of developmental services would participate in the survey because the valuable baseline data obtained would benefit the institution.
3. The survey could be completed within a minimal amount of time (15 to 30 minutes).

Statistical Procedures Used

Because the sample population was so small, statistical analysis of the results was limited to comparing percentages of the responses.

CHAPTER IV

RESULTS

Twelve of the 27 AIHEC schools (44%) responded to the survey. Figure 1 provides a breakdown of student enrollment by ethnic background, gender, and enrollment status. Forty-nine percent of students in the schools sampled were enrolled full-time, 20 percent were part-time on campus, 12 percent were part-time off campus and 26 percent of all sampled students were not identified by their enrollment status.

Native American students represented 91 percent of the students tabulated by responding colleges. The largest single group of students were full-time Native American women represented by 27 percent of all students enrolled from responding institutions. Native American males enrolled full-time responded as the second largest population at 18 percent of the total population. Native American women represent 58 percent of all students enrolled in the 12 responding AIHEC institutions. No college reported a Non-Resident Alien population in their enrollment population.

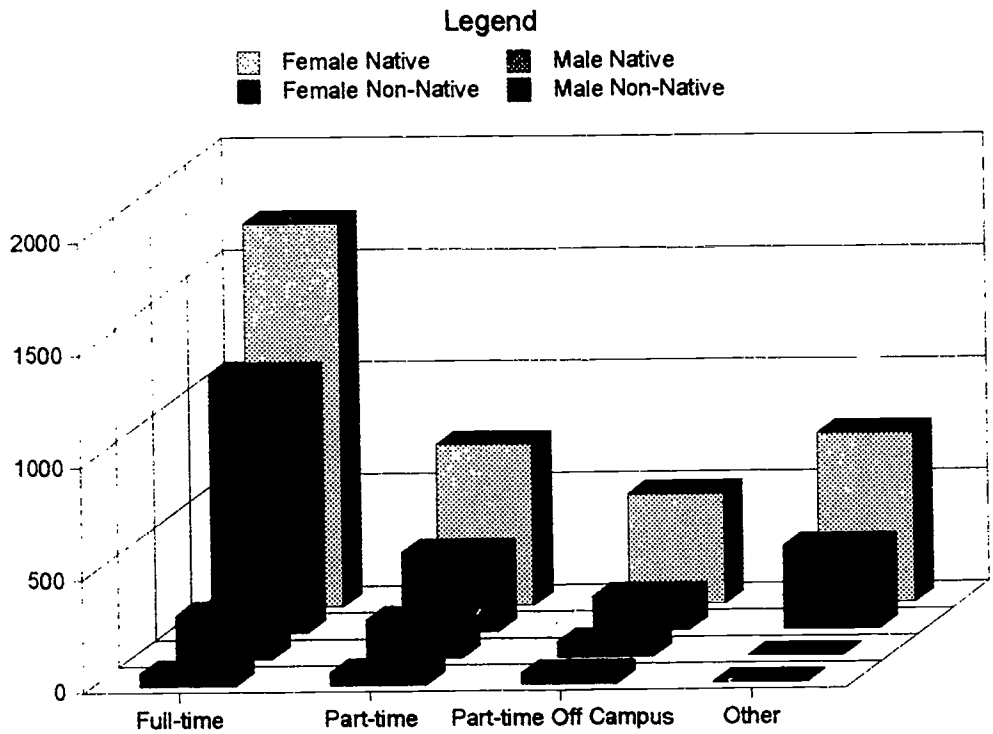

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Figure 1. Fall 1991 Enrollment of 12 American Indian Higher Education Consortium Community Colleges.

Eighty-three percent of responding schools tested newly admitted students. Of the 10 institutions responding to the follow-up question, 90 percent tested all students as opposed to selecting particular groups for testing.

Figure 2 provides a breakdown of schools responding to the question of developmental mathematics courses offered with testing and placement of students. Ten of the responding schools (83%) offered and tested for arithmetic

but nine schools (75%) used the test as a tool for placement. As seen in Figure 2, most schools offer upper level developmental mathematics courses (Elementary Algebra, Intermediate Algebra, Trigonometry and Pre-Calculus). Fewer than 50 percent used testing as a tool for placement in these classes.

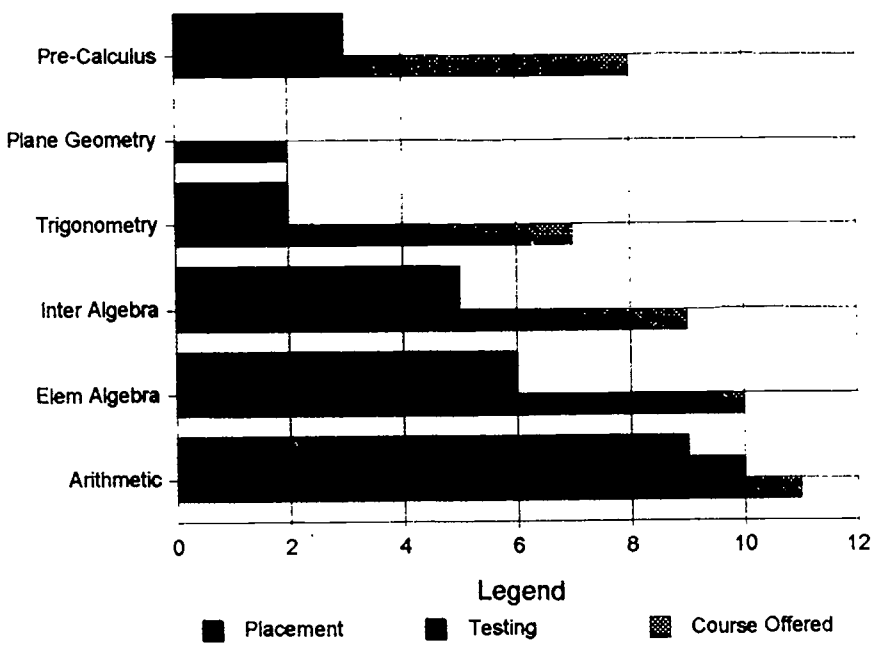

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Figure 2. Developmental Mathematics Courses Offered, Testing, and Placement in 12 American Indian Higher Education Consortium Community Colleges

Table 1 shows the variety of placement tests used by AIHEC colleges. The Test of Adult Basic Education (TABE) was the most common developmental mathematics test used for placement in AIHEC colleges for arithmetic. Upper level developmental mathematics classes were more likely to use a college developed placement/assessment test than to purchase a commercial one.

TABLE 1. REPORTED CUT-OFF SCORES FOR DEVELOPMENTAL MATHEMATICS FROM TWELVE RESPONDING AIHEC INSTITUTIONS

TABLE 1-A. REPORTED CUT-OFF SCORES FOR ARITHMETIC

TABE	ASSET	College Develop.
1 - 8.9	1 - 33	1 - 11/30 correct
3 - 9.0		2 - No score
1 - 11.0		
1 - 11.9		

TABLE 1-B. REPORTED CUT-OFF SCORES FOR ELEMENTARY ALGEBRA

TABE	ASSET	College Develop.
	1 - 37	1 - 17/30 correct
		2 - No score

TABLE 1-C. REPORTED CUT-OFF SCORES FOR INTERMEDIATE ALGEBRA

BAT**	ASSET	College Develop.
1 - 6		1 - 22/30 correct
		2 - No score

TABLE 1-D. REPORTED CUT-OFF SCORES FOR PRE-CALCULUS

Calc. Readiness		College Develop.
1 - 4		1 - No score

*The number preceding the score indicates the number of colleges which reported that cut-off score.

**The Basic Algebra Test (BAT) is part of the MAA - Placement Testing Program.

In addition to placement tests, nine colleges (75%) used other methods to identify students that needed developmental mathematics. All responding colleges selected college instructors/counselor referrals as the most common method in which students were identified as needing developmental mathematics. Student referrals and high school records were both selected by four colleges. Figure 3 illustrates this and other methods selected by responding colleges.

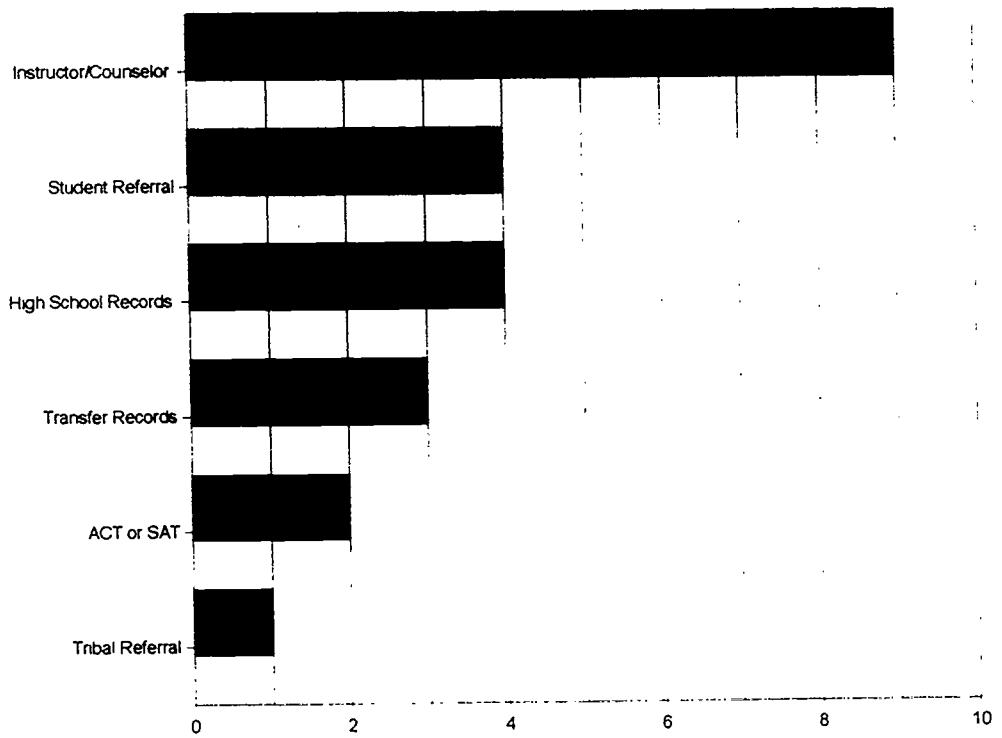

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Figure 3. Methods Other Than Testing Used to Identify Students Needing Developmental Mathematics

Developmental Mathematics Populations

Five hundred sixteen students, identified from nine colleges, were tested and placed in developmental mathematics. Since two schools did not give a breakdown for question 7, developmental mathematics enrollment as a percentage of total enrollment was difficult to predict. Seventy-one percent of all students identified as needing developmental mathematics were enrolled in an Arithmetic

course. Of the Arithmetic population, 59 percent were female. Twenty-five percent of the 516 students were placed and enrolled in Elementary Algebra. Females represented 64 percent of the Elementary Algebra population. Females represented 69 percent of the total population as needing and placed in developmental mathematics.

Figure 4 shows the distribution of students by ethnic origin, sex and developmental class. Of the 516 students identified as needing developmental mathematics, 58 percent were Native American females and 39 percent were Native American males.

A closer look at the data in response to Question 7 reveals Native American females in developmental Arithmetic was the single largest group in all of the developmental mathematics classes at 41 percent of the population. Native American males enrolled in the same classes was the second largest group at 27 percent of the population.

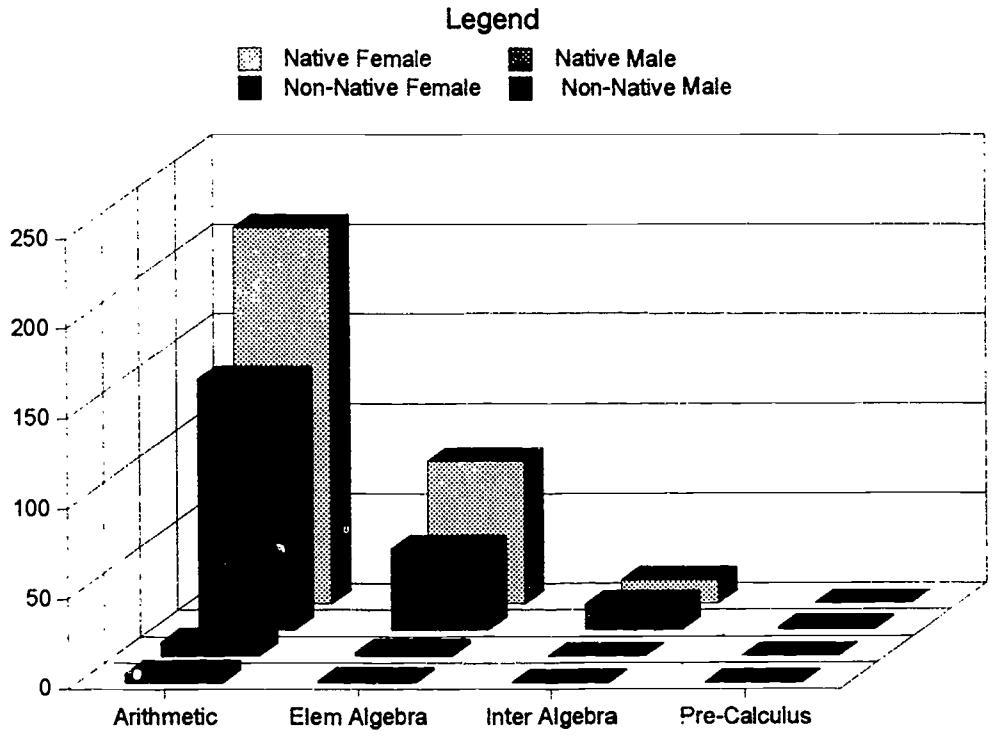

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Figure 4. Students Identified From Nine American Indian Higher Education Consortium Community Colleges Needing and Enrolled in Developmental Mathematics

Figure 5 represents a distribution of students by sex and age groups that were enrolled in developmental mathematics. Sixty-two percent of the total population were represented in three major age groups of schools reporting; 18 percent were in the 20-21 age group, 22 percent are in the 22-24 age group and 22 percent are in the 25-29 age group. This data was further divided into categories by age and sex.

The three highest groups of women in developmental mathematics were in the 20-21 (16%), 22-24 (20%), and 25-29 (30%) age groups from the total reported female population. The men had the highest representation in the 20-21 (22%), 22-24 (30%), and 30-34 (20%) age groups. Of the total developmental mathematics population for this question, 58 percent were female.

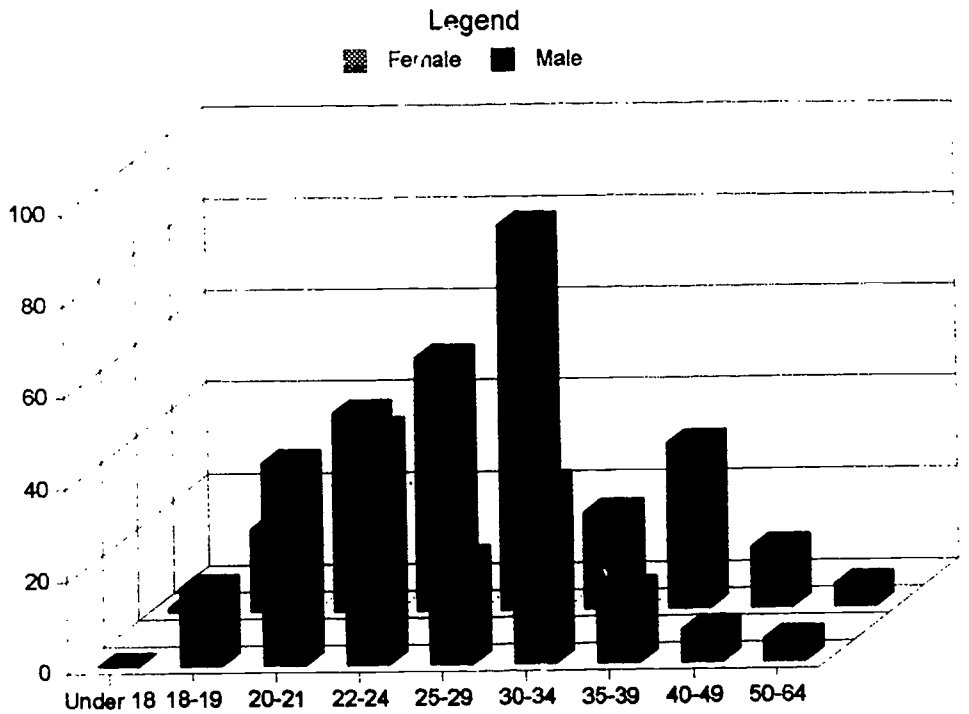

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Figure 5. Students Identified by Gender and Age Enrolled in Developmental Mathematics

Institutional Policies

All colleges (100%) reported having an open admissions policy at their institution. Nine colleges (75%) allowed students to earn a high school diploma while working on a college certificate or an associates degree. Schools listed different reasons, but most stated that a minimum of a GED must be completed within one year.

Ten of the responding colleges (83%) required students to pass prescribed developmental mathematics courses before enrolling in college courses but only seven colleges (58%) gave an affirmative response to the question of requiring students to take college level mathematics as a requirement for graduation.

Figure 6 shows the main goal of developmental mathematics is to prepare students for subsequent mathematics classes (92%). But almost as important a function of developmental mathematics is to prepare students for subsequent science/technical classes (67%) or meet a college competency (58%).

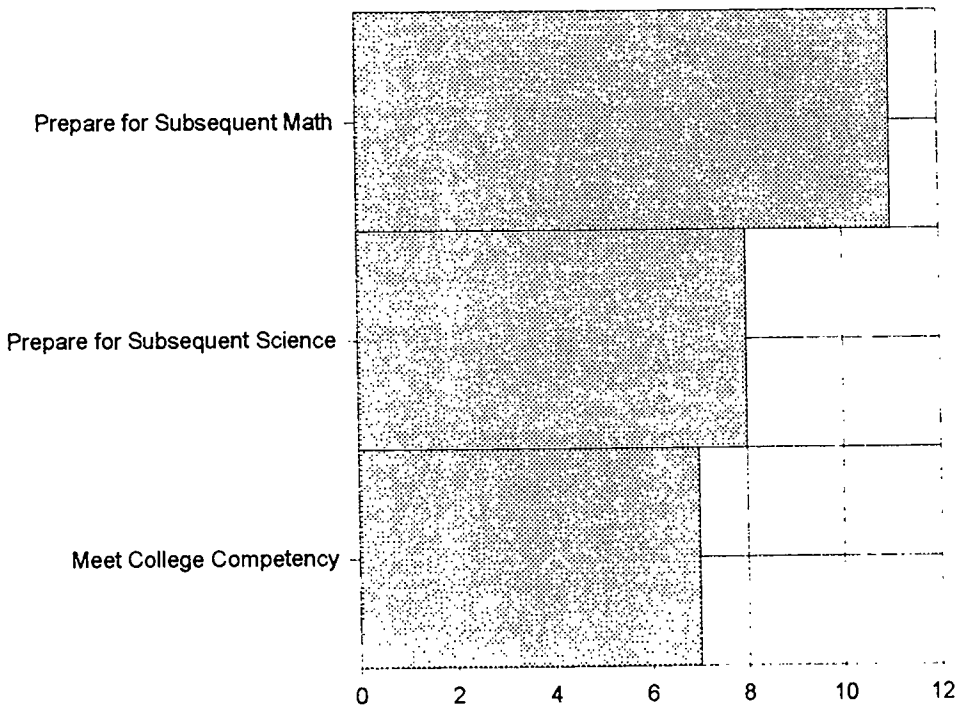

Figure 6. Major Goals of Developmental Mathematics in American Indian Higher Education Consortium Community Colleges

The data in Table 2 resulted from the responses of colleges and are the percentages of time that each of the responding schools spent on instruction. Each school's response followed an assigned letter to facilitate analysis of the diverse response pattern. Computerized instruction, selected by seven colleges (60%), was the delivery system most frequently used by responding AIHEC institutions. Closer analysis reveals a variety of delivery systems. The most common method of instruction was delivery in a

traditional classroom with students of dissimilar learning styles (68%). The second most common method was a combination of all mentioned delivery systems (59%).

TABLE 2. PERCENTAGE OF INSTRUCTION IN DEVELOPMENTAL MATHEMATICS AND METHOD OF DELIVERY (NOTE: EACH LETTER INDICATES AN INSTITUTIONAL RESPONSE)

Institution	A	B	C	D	E	F	G	H	I	J	K	L	Mean Time
Traditional Classroom (dissimilar)		40		60				80	85			75	68
Traditional Classroom (similar)		60			30					70	50	10	44
Paired Courses					30								30
Learning Centers	25							10		20			18
Computerized Instruction	25		50	20				5		5	50	5	23
Individual-ized Learning Lab										5			5
One-to-One Instruction	25		50	20	40			3					28
Competency-Based	25							2					14
Combination of above						100	100		15			20	59

Evaluation

Table 3 shows survey responses to the measurement of student success. Course completion was the method most frequently used by responding colleges to determine student success in a developmental mathematics courses. For all developmental mathematics courses, the second most frequent marked responses were colleges using a "Passing rate of 2.0 or above" and the "Percentage of students that were at a "C" or above" as a measure of a student successfully completing a developmental mathematics course. Five responding colleges indicated that pre-test/post-test comparison was a method to determine student success in Arithmetic, the second highest response for this question in the survey.

Ten of the responding schools (83%) had some method to evaluate their developmental mathematics program and looked at student performance as a factor for evaluation. Fifty percent of all responding colleges also examined the policies and practices in the developmental mathematics curriculum as criteria for evaluation.

TABLE 3. MEASUREMENT OF STUDENT SUCCESS IN DEVELOPMENTAL MATHEMATICS COURSES

A = Arithmetic
E A = Elementary Algebra
I A = Inter. Algebra
T = Trigonometry
P G = Plane Geometry
P C = Pre-Calculus

DEVELOPMENTAL COURSE	A	E A	I A	T	P G	P C
a. Completion of modules/competency based materials	4	3	2	1		1
b. Pre-test/post-test comparison	5	2				
c. Post-test only	1	1	2	1		1
d. Course completion	9	9	7	5	1	5
e. Passing rates in developmental courses (2.0 or above)	4	4	2	2		3
f. Percentage at "C" or above	4	3	3	2		3
g. Percentage who reach minimum competence on a post-test sufficient for college-level course	1	1	1	1		1
h. Successful retention rate in subsequent college level course(s) (2.0 or above)	2	2	1	1		1
i. Academic performance in subsequent college level courses	2	2	1	1		1
j. Program evaluation	2	3	2	1		2

CHAPTER V

SUMMARY, CONCLUSIONS and RECOMMENDATIONS

Summary

Ten of the responding AIHEC schools, or 83 percent, tested newly admitted students. The percentage was higher than the 80 percent found in the survey by McDonald (1988). The percentage was lower than the 92 percent found in the survey by Akst and Ryzewic (1988) and the 93 percent found in the survey by Argumedo (1990). Bay Mills Community College has recently implemented a testing policy for **all** students. The goal is to predict college readiness and to qualify students for the "Ability to Benefit" program for federal grants and loans.

To ease the admission and scoring of tests, most AIHEC colleges used the TABE both as a placement and assessment test. The test is accepted by the GED program and by the Pell Grant Program. The dual function of the TABE and the inexpensive cost made it the test of choice for 50 percent of all responding AIHEC developmental mathematics programs. The TABE is primarily used for Arithmetic but also serves as an assessment test for Elementary Algebra. Another 25 percent of responding AIHEC colleges used college developed tests for assessing and placing students in Arithmetic. Argumedo (1990) reported that 31 percent of

Michigan's community colleges developed their own assessment tests for developmental mathematics. As an AIHEC developmental mathematics instructor, I also used the TABE for Arithmetic but developed my own assessment test for higher level classes due to budget constraints, ease in grading and the opportunity to develop a test that met my immediate needs.

In addition to an assessment test, Argumedo (1990) showed that 97 percent of Michigan's public community colleges used other methods to identify students in need of developmental mathematics. College instructor/counselors and student referrals were the two top selected categories for both Argumedo and myself.

When I did follow up non-compliant surveys with telephone calls, I found the main reasons for not returning my survey sooner (or at all) were Questions 7 and 8. Very few schools kept detailed records, tracked their students through developmental mathematics or determined student success in subsequent mathematics courses. Argumedo (1990) also had difficulty with colleges not answering these questions. These complaints dispute my original thoughts about my survey: That the data was readily available and the survey could be completed in a relatively short period of time.

Question 8 did reveal a trend that can be compared to

Argumedo (1990), whose survey indicated over 50 percent of all Michigan community college students enrolled in developmental education classes were in the 17-21 age groups. This survey found 75 percent of the students enrolled in developmental mathematics at responding AIHEC schools were in the 20-34 age groups. This older student population in developmental mathematics was a trend I observed at BMCC. Younger students that were recently out of high school seemed to enter into the college curriculum with greater ease. This was a casual observation not a scientific statement.

All responding AIHEC institutions had a policy of open admissions, but 75 percent of the schools also allowed students to earn a high school diploma while working on a college certificate or an associates degree. With a very high drop-out rate from high school for Native Americans nationwide, AIHEC schools responded by saying they wanted to take students from where they had left off and assist them in obtaining their own educational goals. This includes GED and high school completion classes offered within the school.

The responses to Question 12 reflected the importance of developmental mathematics curriculum within AIHEC institutions. Eighty-three percent of all AIHEC colleges required all students pass developmental mathematics courses

before entering college level courses. Argumedo (1990) reported that only 52 percent of responding community colleges in Michigan required students to pass developmental mathematics courses before enrolling in college level courses. This policy ensures that students possess adequate skills before they enter into college level mathematics courses. Ninety-two percent of all responding AIHEC institutions stated that developmental mathematics was necessary to prepare students for subsequent mathematics courses. Preparation of students for subsequent science/technical classes and to meet the college standard of competency were also listed as important goals of the developmental mathematics curriculum in AIHEC colleges.

In the delivery of educational instruction, AIHEC institutions had many different ways to present the material. There was not one dominant method. Written comments on the surveys stressed small class size, presenting the material in small bits, and having the right person teaching developmental mathematics.

Eighty-three percent of all responding AIHEC institutions did evaluate the effectiveness of their developmental mathematics program. A majority of the schools (80%) looked at student performance as a measure of effectiveness. Table 3 shows that a majority of responding AIHEC schools used course completion as a measure of success

in developmental mathematics. Argumedo (1990) found similar results with course completion rated as the most frequently reported indicator of success.

Conclusions

This survey did not achieve a survey return rate of 50 percent or greater from the small sampling of populations of 28 schools. The 43 percent returned fell two short of this goal. Comments received from Native American educators and administrators were: "can we trust a white man taking from the Indians again?" or "your survey is just one of several and we see no value in it" or "..Indian people are tired of being guinea pigs". With no personal connection to Bay Mills Community College, AIHEC institutions were reluctant to assist an unknown government worker in finishing his Master's degree.

I am pleased with the results I did obtain from this survey and plan to share the results with all institutions that responded. It is my opinion that when an institution takes time to respond to a survey, institutional research is viewed as important and most likely the institution has a comprehensive developmental curriculum and is pleased to share this information. An institution that does not want to share this information either does not value this type of research or does not have the data readily available. Therefore our results could be skewed by receiving only responses from institutions that want to inform the outside world of their commitment to developmental education.

A few generalizations can be made about responding AIHEC community colleges and the population served from the data collected by this survey:

1. American Indian Higher Education Consortium community colleges had a student population primarily of Native American heritage.
2. A majority of the students enrolled in an AIHEC community college were Female Native Americans.
3. Female Native American students in the 20-39 age group was the largest group served by the developmental mathematics curriculum at responding AIHEC colleges.
4. A majority of AIHEC colleges required newly admitted students to take assessment tests to determine the students' strengths and weaknesses.
5. A majority of AIHEC colleges offered more than one course in their developmental curriculum but Arithmetic is the only course where testing and placement were widely practiced.
6. There was no trend for an institution to choose one particular placement test, except for Arithmetic. Here the TABE was the preferred placement test. A wide variation of cut-off scores for placement into developmental mathematics were used by the AIHEC

colleges.

7. All responding AIHEC colleges had an open admissions policy with a majority allowing students to earn a high school diploma while working on a college certificate or an associates degree. In general, most schools had policies that required completion of a high school diploma within a specific time frame.

8. Most responding AIHEC colleges required students to finish developmental mathematics before enrollment in college level mathematics.

9. The main function of developmental mathematics in responding AIHEC colleges was to prepare students for subsequent mathematics.

10. A majority of AIHEC colleges evaluated their developmental curriculum by looking at student performance as the main indicator of success.

Recommendations

If I was to perform this survey again, I would change questions 7 and 8 and ask institutions to estimate a percentage of students enrolled in each developmental mathematics course instead of requesting actual numbers. I would also work more closely with the national AIHEC office and ask for their endorsement of this project. Obtaining additional endorsement and support from an AIHEC president

could have increased the response rate to my survey. As AIHEC institutions expand to meet the diverse needs of Native American people in North America, institutional research will be necessary to meet the demands of tribal governments and businesses. Research is not a role of this consortium, but may have a greater role in years to come as more AIHEC colleges enter federal financial aid programs, students transfer to other institutions of higher learning and AIHEC faculty members are encouraged to obtain higher degrees. All the above will require institutions to keep a variety of records and open communications with institutions of higher learning outside the AIHEC community. These factors alone will encourage institutional research.

Question 18 in my survey asked for advice in designing a developmental mathematics program evaluation. All the responses I received focused on the needs of the individual student. As a former developmental mathematics instructor, I agree with this statement. In the discourse of this project, I discovered how little I know about developmental education, effective testing and assessment, methods of tracking student success and who are the major researchers in the field of developmental mathematics. Focusing on my student's immediate needs reduced the time and energy I had to research new delivery and evaluation methods. By not researching different methods of delivery,

evaluation, or tracking methods I was doing a disservice to individual students and their future employers. Research of this nature is the key to accountability and a tool to evaluate the effectiveness of a developmental mathematics program.

Recommendations for Bay Mills Community College or any AIHEC institution:

1. Research the effectiveness of individual assessment and placement tests utilized by AIHEC institutions and share these results with all schools.
2. Do long term studies of students in developmental mathematics for course effectiveness, passing rate, repeat rate, success with college level mathematics courses, employment, or higher education.
3. Appoint a director of developmental education that will document the above recommendations.
4. Establish communications between AIHEC institutions to share ideas, success stories and research between developmental educators and directors.
5. Establish communication between AIHEC community colleges and institutions where students are most likely to transfer.
6. Establish communications between individual AIHEC institutions and developmental educators at state-supported community colleges. Both have information

that is vital to each group.

7. Establish communications with tribal leaders and local employers to meet the mathematical needs of these groups.

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APPENDIX A

INTRODUCTORY LETTERS TO AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM COLLEGE PRESIDENTS

MICHIGAN STATE
UNIVERSITY
EXTENSION

September 18, 1992

President's name
Names of school
Address of school
Location of school

Dear President _____:

As a mathematics instructor at Bay Mills Community College for four years, I have seen an increased placement of students in developmental mathematics courses. To have a better understanding of programs that work, I am conducting a study of student assessment and developmental mathematics in American Indian Higher Education Consortium (AIHEC) colleges. This study seeks to establish a baseline of data on the current admission and developmental mathematics practices of AIHEC colleges.

When you receive this survey, within the next two weeks, we are asking you to select a representative from your college to take the responsibility to complete the survey by the requested date. The results from this survey will be presented in an aggregate form, no one institution will be mentioned by name. This is not an evaluation of program effectiveness. The information you provide will be confidential.

The final report will be largely statistical in nature and all responding institutions will receive a copy. Thank you for your participation in this important project.

Sincerely,

James J. Lucas
Acting District Extension Sea Grant Agent

MICHIGAN SEA GRANT EXTENSION
Cooperative Extension Service
Michigan Sea Grant College Program
Chippewa County
300 Court Street
Sault Ste Marie, Michigan
49783-2185
906/635 6368
FAX 906/635-1256

CO

MICHIGAN STATE
UNIVERSITY
EXTENSION

September 29, 1992

Ms. Georgianna Tiger, Executive Director
American Indian Higher Education Consortium
513 Capitol Court N.E. Suite 100
Washington D.C. 20002

Dear Ms. Tiger:

Enclosed is a letter I am sending to all AIHEC presidents asking their support on completing a survey of their developmental mathematics programs. When I was a mathematics/science instructor at Bay Mills Community College, there was a large number of students that entered the developmental curriculum however no records were kept on the number of students that entered the curriculum or succeed in subsequent mathematics classes. The basis for this survey is to establish a baseline of data that other AIHEC colleges or researcher can utilize.

This letter is not seeking your official endorsement, only to inform you of the research that is being conduct within your consortium. A copy of the survey will arrive shortly and the results will be mailed to upon completion of the project. I am open to any comments you have regarding this project. Please give my thanks to Robert and Stephen for their valuable assistance.

Thank you again for your valuable assistance.

Sincerely,

James J. Lucas
Acting District Extension Sea Grant Agent

Enclosure

MICHIGAN SEA GRANT EXTENSION
Cooperative Extension Service
Michigan Sea Grant College Program
Chippewa County
300 Court Street
Sault Ste. Marie, Michigan
49783-2185
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APPENDIX B

COVER LETTER AND SURVEY SENT TO AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM COLLEGE PRESIDENTS

MICHIGAN STATE
UNIVERSITY
EXTENSION

October 5,1992

Ms. Georgianna Tiger, Executive Director
American Indian Higher Education Consortium
513 Capitol Court, N.E. Suite 100
Washington D.C. 20002

Dear Ms. Tiger:

Enclosed is the developmental mathematics survey being sent to all AIHEC presidents. It is important for you to see exactly what is being mailed to all the colleges in the consortium. We strive for a 100 percent return rate to facilitate an accurate statistical analysis. This final report will be shared with all participating AIHEC colleges and your office. We hope to establish a baseline of data necessary for future institutional research on college campuses.

If you have any questions, feel free to contact me at your convenience. Thank you for the support your office has given this project by supplying addresses and basic statistics on each college.

Sincerely,

James J. Lucas
Acting District Extension Sea Grant Agent

Enclosure

MICHIGAN SEA GRANT EXTENSION
Cooperative Extension Service
Michigan Sea Grant College Program
Chippewa County
300 Court Street
Sault Ste Marie, Michigan
49783-2185
906/635-6368
FAX 906/635-1256

MICHIGAN STATE
UNIVERSITY
EXTENSION

October 5, 1992

President's name
Names of school
Address of school
Location of school

Dear President _____:

During the past eight years, the student population of Bay Mills Community College has grown at an exponential rate. As enrollment increases, the number of students needing developmental mathematics increases also. To meet the needs of the students, the enclosed survey was developed to indicate what colleges of similar backgrounds are teaching in developmental mathematics. All American Indian Higher Education Consortium (AIHEC) colleges are being asked to respond to this survey.

Please fill out this questionnaire or forward it to the appropriate individual on your campus, stressing the importance of this project. The information you provide will be confidential. The results of the survey will be presented in the aggregate only; no institution will be mentioned either by name or identifying data. A copy of the completed report will be sent to all respondents.

If your survey is not received by October 15, 1992, we will call your institution requesting your response. Your response will benefit all AIHEC colleges by establishing a baseline of developmental mathematics courses taught and the population served.

Mail the completed survey in the enclosed self-addressed, stamped envelope or FAX to (906) 635-1256. Thank you for your participation in this important project.

Sincerely,

James J. Lucas
Acting District Extension Sea Grant Agent

JL/tr

MICHIGAN SEA GRANT EXTENSION
Cooperative Extension Service
Michigan Sea Grant College Program
Chippewa County
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A SURVEY OF DEVELOPMENTAL MATHEMATICS CURRICULUM: POLICIES, ADMISSION PRACTICES, AND POPULATION IN AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM COLLEGES

I. COLLEGE BACKGROUND INFORMATION

Name of your School:_____

FALL 1991 ENROLLMENT

Enrollment population	American Indian		American Non-Indian		Non-Res. Alien		Total	
	M	F	M	F	M	F	M	F
Full-time Students								
Part-time on campus								
Part-time off campus								
Other (specify)								
Total								

II. ASSESSMENT/PLACEMENT:

1. Do you test newly admitted students?

_____No testing (Go to 3)

_____Optional testing

_____Yes

2. What type of students are tested? (Check all that apply)

_____All students

_____Full-time credit students

_____Full-time non-credit students

_____Part-time credit students

_____Part-time non-credit students

_____All transfer students

_____Off-campus students

3. Please check off which developmental mathematic courses are offered at your college. Indicate if your institution has policies of **mandatory** testing and **mandatory** placement? (Check all that apply)

Fall 1991

	COURSE OFFERED?		TESTING?		PLACE-MENT?	
COURSE	YES	NO	YES	NO	YES	NO
ARITHMETIC						
ELE. ALGEBRA						
INTER. ALGEBRA						
TRIGONO-METRY						
PLANE GEOMETRY						
PRE-CALCULUS						
OTHER(S) (specify)						

4. What are the cut-off scores at or below which students are recommended for placement in developmental or below college-level courses? (Please name the standardized test or note if you use a college developed test).

Fall 1991

COURSE	CUT-OFF SCORES	TEST INSTRUMENT (i.e., give name of standardized test, college developed test, or other)
ARITHMETIC		
ELE. ALGEBRA		
INTER. ALGEBRA		
TRIGONO-METRY		
PLANE GEOMETRY		
PRE-CALCULUS		
OTHER(S) (specify)		

5. Do you use other methods to identify students who need developmental mathematics?

_____YES (Go to 6)

_____NO (Go to 7)

6. If **YES,** please check all that apply:

_____College Instructor/Counselor Referral

_____Student Referral

_____High School Record

_____Transfer Record

_____ACT or SAT Scores

_____Business and Industry Referrals

_____Tribal Referral

_____Other (please specify) _____

_____

III. DEVELOPMENTAL MATHEMATICS POPULATIONS

7. Please identify the number of students by ethnic origin and sex who tested **as needing and placed** in developmental mathematics Fall term, 1991.

Fall 1991

Remedial/ Develop-mental	American Indian		American Non-Indian		Non-Res. Alien		Total	
	M	F	M	F	M	F	M	F
Arithmetic								
Elementary Algebra								
Inter. Algebra								
Trigonom-etry								
Plane Geometry								
Pre- Calculus								
Other (specify)								

8. Please provide an enrollment summary of students by **age** who **tested as needing and were placed in** a developmental mathematics course during Fall term, 1991

Fall 1991

AGE	MEN	WOMEN
Under 18		
18-19		
20-21		
22-24		
25-29		
30-34		
35-39		
40-49		
50-64		
65 and Over		
Age Unknown		
TOTAL STUDENTS		

IV. INSTITUTIONAL POLICIES

9. Does your institution have an open admissions policy?

_____ Yes

_____ No

If **NO**, please give policy_____

_____

10. Does your institution allow a student to earn a high school diploma while working on a certificate or associate degree?

_____Yes

_____No

If **YES**, please explain conditions and terms of enrollment.

_____

11. Are students at your college required to take one or more college level mathematics course to graduate?

____ All students are required to take one or more mathematics course.

____ Students in certain majors are required to take one or more mathematics courses.

____ All students are required to meet basic competency requirements toward which college-level mathematics courses count.

____ Students in certain majors are required to meet basic competency requirements toward which college-level mathematics courses count.

____ No student is required to take college-level mathematics course

____ Other (please specify)_____

12. Do students need to pass prescribed developmental course work befor they can enroll in college-level mathematics course?

_____Yes

____ No. (comments:)_____

_____

13. Which of the following are the major goals of your developmental mathematics courses? (please check all that apply)

___ To prepare students for subsequent mathematics courses.

___ To prepare students for subsequent science/technical classes.

___ To prepare students to meet a college standard of competency.

___ Other (please specify)_____

_____

14. What percent (%) of instruction in developmental mathematics is delivered: (please check all that apply)

Delivery System	**Percentage of Instruction**
_____Traditional Classroom Setting (whole-group instruction with students of dissimilar academic achievement levels)	_____
_____Traditional Classroom Setting (whole-group instruction with students of similar academic achievement levels)	_____
_____Paired Courses (i.e., developmental and content area)	_____
_____Learning Assistance Centers	_____
_____Computer-Assisted Instruction	_____
_____Individualized Learning Lab (non-computerized)	_____
_____One-to-One Individualized Instruction	_____
_____Competency-Based Instruction	_____
_____Combination of Classroom, Assistance Center and Tutoring	_____
_____Other (Specify)_____	_____

V. EVALUATION

15. How is student success of your developmental mathematics courses measured? (Check all that apply)

A = Arithmetic E A = Elementary Algebra I A = Inter. Algebra
T = Trigonometry P G = Plane Geometry PC = Pre-Calculus

DEVELOPMENTAL COURSE	A	E A	I A	T	P G	P
a. Completion of modules/competency based materials						
b. Pre-test/post-test comparison (What kind?)						
c. Post-test only (What kind?)						
d. Course completion						
e. Passing rates in developmental courses (2.0 or above)						
f. Percentage at "C" or above						
g. Percentage who reach minimum competence on a post-test sufficient for college-level course						
h. Successful retention rate in subsequent college level course(s) (2.0 or above)						
i. Academic performance in subsequent college level courses						
j. Program evaluation						

k. _____None of the above.

l. _____Other (Explain:)_____

16. Do you formally or informally evaluate your developmental mathematics program? (please check only one)

_____ Yes (go to 17)

_____ No

17. Which of the following approaches were used in the evaluation of your developmental mathematics program. (please check all that apply)

__ An examination of the policies and practices followed in the developmental mathematics program.

__ An analysis of the effects of the developmental mathematics program on student performance (i.e., grades, retention rates, graduation rates, etc.)

__ Other (please specify)_____

_____

18. What advice would you give to someone about to design or conduct a developmental mathematics program evaluation?

Thank you for completing this survey, please place it in the enclosed self-addressed envelope and mail to:

James J. Lucas
300 Court St.
Sault Ste. Marie, MI 49783

or FAX to: (906) 635-1256

APPENDIX C

LISTING OF AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM COLLEGES AND MAP

1. Bay Mills Community College
   Brimley, MI 49715

2. Blackfeet Community College
   Browning, MT 59417

3. Cheyenne River Comm. College
   Eagle Butte, SD 57625

4. Crownpoint Institute of Tech.
   Crownpoint, NM 87313

5. D-Q University
   Davis, CA 95617

6. Dull Knife Memorial College
   Lame Deer, MT 59043

7. Fond Du Lac Community College
   Cloquet, MN 55720

8. Fort Belknap Community College
   Harlem, MT 59526

9. Fort Berthhold College
   New Town, ND 58763

10. Fort Peck Community College
    Poplar, MT 59255

11. LacCourte Oreilles Ojibwa
    Community College
    Hayward, WI 54843

12. Little Big Horn College
    Crow Agency, MT 59022

13. Little Hoop Community College
    Fort Totten, ND 58335

14. Navajo Community College
    Tsaile, AZ 86556

15. Nebraska Indian Community College
    Winnebago, NE 68071

16. Northwest Indian College
    Bellingham, WA 98226

17. Oglala Lakota College
    Kyle, SD 57752

18. Salish Kootenai College
    Pablo, MT 59855

19. Sinte Gleska University
    Rosebud, SD 57570

20. Sisseton-Wahpeton Comm. College
    Sisseton, SD 57262

21. Standing Rock College
    Fort Yates, ND 58538

22. Stone Child Community College
    Box Elder, MT 59521

23. Turtle Mountain Comm. College
    Belcourt, ND 58316

24. United Tribes Technical College
    Bismarck, ND 58501

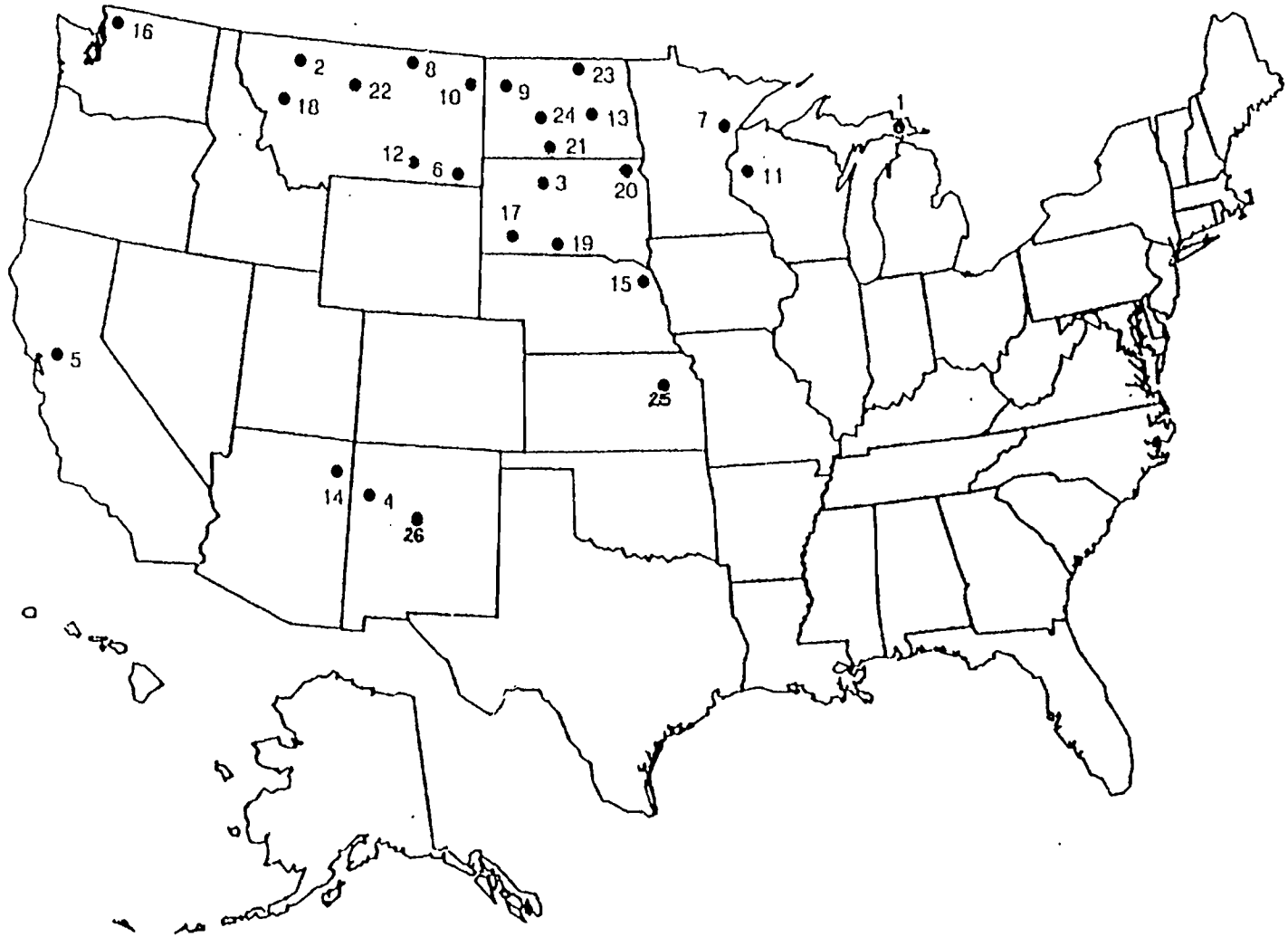
25. Haskell Indian Junior College
    Lawrence, KS 66046

26. Southwest Indian Polytech.Inst.
    Albuquerque, NM 87184

Colleges not shown on map.

Red Crow Community College
Cardstone Alberta Tok-Oko Canada

Saskatchewan Indian Federated College
Regina Saskatchewan, Canada S4S 0A2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APPENDIX D

SURVEY RESULTS

I. FALL 1991 ENROLLMENT

n = 12 Institutions Responding
with 6,270 Student Enrollment

Enrollment population	American Indian		American Non-Indian		Total	
	M	F	M	F	M	F
Full-time Students	1145	1702	55	195	1200	1897
Part-time on campus	354	715	56	171	410	886
Part-time off campus	153	488	46	69	199	557
Other (No Breakdown by enroll-ment)	368	753	00	00	368	753
Total	2020	3658	157	435	2177	4093

M = Male, F = Female

II. ASSESSMENT/PLACEMENT:

Question 1:

Do you test all newly admitted students?

__10__ Yes

__2__ No testing (Go to 3)

Question 2:

What type of students are tested? (Check all that apply)

__9__ All students

__1__ Part-time credit students

_____ Full-time credit students

Question 3:

Please check off which developmental mathematic courses are offered at your college. Indicate if your institution has policies of **mandatory** testing and **mandatory** placement? (Check all that apply)

Fall 1991

QUESTION	COURSE OFFERED		TESTING		PLACE-MENT	
COURSE	YES	NO	YES	NO	YES	NO
ARITHMETIC	11	1	10	2	9	3
ELE. ALGEBRA	10	2	6	6	6	6
INTER. ALGEBRA	9	3	5	7	5	7
TRIGONOM-ETRY	7	5	2	10	2	10
PLANE GEOMETRY	2	10	0	12	0	12
PRE-CALCULUS	8	4	3	9	3	9

Question 4:

What are the cut-off scores at or below which students are recommended for placement in developmental or below college level courses?

Reported Cut-off scores for Arithmetic are listed below*:

TABE	ASSET	College Developed Test
8.9	33	11 out of 30 correct
3- 9.0		2-No Scores Reported
11.0		
11.9		

Reported Cut-off scores for Elementary Algebra are listed below*:

ASSET	College Developed Test
37	17 out of 30 correct
	2-No scores reported

Reported Cut-off scores for Intermediate Algebra are listed below*:

Basic Algebra Test**	College Developed Test
6	22 out of 30 correct
	2-No scores reported

Reported Cut-off scores for Trigonometry are listed below:

College Developed Test

No scores reported

Reported Cut-off scores for Pre-Calculus are listed below:

Calculus Readiness Test	College Developed Test
4	No scores reported

*The number preceding the score indicates the number of colleges which reported that cut-off score.

**The Basic Algebra Test is part of the MAA - Placement Testing Program.

Question 5:

Do you use other methods to identify students who need developmental mathematics?

__9__ YES (Go to 6)

__3__ NO (Go to 7)

Question 6:

If **YES**, please check all that apply:

__9__ College Instructor/Counselor Referral

__4__ Student Referral

__4__ High School Records

__3__ Transfer Records

__2__ ACT or SAT Scores

__1__ Tribal Referral

III. DEVELOPMENTAL MATHEMATICS POPULATIONS

Question 7:

Please identify the number of students by ethnic origin and sex who tested **as needing and placed** in developmental mathematics Fall term, 1991.

Remedial/ Developmental	American Indian		American Non-Indian		Total	
	M	F	M	F	M	F
Arithmetic	139	209	5	8	144	217
Elementary Algebra	45	79	1	2	46	81
Inter. Algebra	14	13	0	0	14	13
Pre-Calculus	1	0	0	0	1	0
Total	199	301	6	10	205	311

M = Male, F = Female

Note: Two colleges did not give a breakdown of students by sex or course listing. These totals are: Native American 196 and American Non-Indian 30.

Question 8:

Please provide an enrollment summary of students by **age** who **tested as needing and were placed in** a developmental mathematics course during Fall term, 1991

Fall 1991

AGE	MEN	WOMEN
Under 18	0	1
18-19	17	18
20-21	44	43
22-24	51	55
25-29	23	84
30-34	39	21
35-39	16	36
40-49	7	13
50-64	5	5
65 and Over	0	0
TOTAL STUDENTS	202	276

M = Male, F = Female

Note: Three colleges did not give a breakdown for a total of 387 students by age groupings.

IV. INSTITUTIONAL POLICIES

Question 9:

Does your institution have an open admissions policy?

12 Yes

____ No

Question 10:

Does your institution allow a student to earn a high school diploma while working on a certificate or associate degree?

9 Yes

3 No

If **YES**, please explain conditions and terms of enrollment.

Written Responses to **YES**.

-- Students must reach at least 9th grade level on TABE test to be eligible for our "Ability to Benefit" GED program. Unfortunately, this excludes many, many students who have low ability in just one area such as math or reading. These students have no opportunity in the community to make up these deficiencies. We are missing a lot of students who need our help and would benefit greatly! Before this policy was in place (1989) we took all students, and some of them went on to be our best students.
-- A high school student who has earned 14 units and has the written approval of the high school counselor prior to registration.
-- If a student scores sufficiently high on the TABE to enter his chosen occupational areas, he can take courses in that area while working on his GED, if he so chooses.
-- Must receive GED by the end of the 1st year or 2 semesters of enrollment.
-- Open enrollment - no specific conditions.
-- GED within 2 quarters.
-- High school senior in good academic standing may enroll in 6 semester hour credits per semester.
-- One semester and no more than 12 credit hours.

Question 11:

Are students at your college required to take one or more college level mathematics course to graduate? (Please check the response that reflects your practice).

__7__ All students are required to take one or more mathematics course.

__5__ Students in certain majors are required to take one or more mathematics courses.

Question 12:

Do students need to pass prescribed developmental course work before they can enroll in college-level mathematics course?

__10__ Yes

__2__ No

Written Responses to **NO**.

-- It is strongly recommended that a student complete prescribed developmental course work, but we will not stop students who decide they can do the work (we have about three students per year who try, and usually one is successful).

-- However, it is strongly recommended that remedial students take basic skills courses, before entering more advanced course work in mathematics.

Question 13:

Which of the following are the major goals of your developmental mathematics courses? (please check all that apply)

__11__ To prepare students for subsequent mathematics courses.

__8__ To prepare students for subsequent science/ technical classes.

__7__ To prepare students to meet a college standard of competency.

Question 14:

Percentage of instruction in developmental mathematics and how it is delivered: (**Note: Each letter indicates a response by a different school)**

Institution	A	B	C	D	E	F	G	H	I	J	K	L
Traditional Classroom (dissimilar)		40		60				80	85			75
Traditional Classroom (similar)		60			30					70	50	10
Paired Courses					30							
Learning Centers	25							10		20		
Computerized Instruction	25		50	20				5		5	50	5
Individual-ized Learning Lab										5		
One-to-One Instruction	25		50	20	40			3				
Competency-Based	25							2				
Combination of above						100	100		15			20

V. EVALUATION

Question 15:

How is student success of your developmental mathematics courses measured? (Check all that apply)

A = Arithmetic
E A = Elementary Algebra
I A = Inter. Algebra
T = Trigonometry
P G = Plane Geometry
P C = Pre-Calculus

DEVELOPMENTAL COURSE	A	E A	I A	T	P G	P C
a. Completion of modules/competency based materials	4	3	2	1		1
b. Pre-test/post-test comparison (What kind?)	5	2				
c. Post-test only (What kind?)	1	1	2	1		1
d. Course completion	9	9	7	5	1	5
e. Passing rates in developmental courses (2.0 or above)	4	4	2	2		3
f. Percentage at "C" or above	4	3	3	2		3
g. Percentage who reach minimum competence on a post-test sufficient for college-level course	1	1	1	1		1
h. Successful retention rate in subsequent college level course(s) (2.0 or above)	2	2	1	1		1
i. Academic performance in subsequent college level courses	2	2	1	1		1
j. Program evaluation	2	3	2	1		2

Question 16:

Do you formally or informally evaluate your developmental mathematics program? (please check only one)

__10__ Yes (go to 17)

__2__ NO

Question 17:

Which of the following approaches were used in the evaluation of your developmental mathematics program. (please check all that apply)

__5__ An examination of the policies and practices followed in the developmental mathematics program.

__8__ An analysis of the effects of the developmental mathematics program on student performance (i.e., grades, retention rates, graduation rates, etc.)

Question 18:

What advice would you give to someone about to design or conduct a developmental mathematics program evaluation?

Question 18 Written Responses

-- We found the smaller the "chunks" of material the easier it was to digest. Our students are so varied in background and ability the way we teach depends on knowing your students and what is best for them. We must be flexible enough to go from an all lecture class to a one-on-one directed class. Instructors are the most important aspect of our developmental program, the wrong instructor one quarter almost ended our whole program. Be sure there are no personality problems and competence is as desired! It is also important our students feel we are always available and eager to help them and a "warm fuzzy" atmosphere surrounds the class and the lab. Don't be scared to scrap the whole thing and start over if it isn't working, it does take time for the student to get used to this.

-- Design it to meet your own objectives, whatever they may be.

-- Examine the policies and practices followed in the developmental mathematics program and an analysis of the effects of the developmental mathematics on student performance.

-- Look high and low for a test that will test the many concepts involved. Develop a questionnaire that will illicit responses of student attitudes toward mathematics. One pre and one post course.

-- Make it relevant.

-- Be realistic when setting goals (think about your students). Provide a lot of "practice" for concepts. Peer tutoring is an excellent tool. If you want to learn something well, teach it to someone else.

-- Make it a little less abstract and a little more application (i.e. geometry, or visual mathematics, not just story problems).

-- Our college is looking at competency based instruction as a tool in developing our math and science courses.