



The Effectiveness of Developmental Educational Programs at Community Colleges

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Abstract:

This study examines the literature regarding the origin and the history of developmental education. It also inspects the developmental students, their characteristics, and components of the current community college developmental programs that help or hinder their success specifically for mathematics courses. The literature review also provides strategies to enhance the effectiveness of classroom teaching and the developmental program as a whole. The data in this paper emerged from a bigger study that exclusively studied the developmental mathematics students, their attitude towards the course material, study habits, and utilization of resources available, at a small rural community college in Florida.

Keywords: Developmental program, Mathematics, Study habits

Introduction

United States Department of education defines developmental education as "curriculum and services for entering postsecondary students who are not academically prepared to perform college-level work" (US Department of Education, 2006) Participants of developmental education include recent high school graduates and returning students as well. The major purpose of developmental education is for the student to acquire skills necessary for success at the college level courses.

Historically, higher education in the United States has provided some level of assistance for under-prepared students and remediation has been a function of colleges since early colonial days, beginning with Harvard. At the end of the 19th century, educators at Harvard saw the need for remediation especially in the area of writing, which gave birth to the concept of remedial or developmental courses. (Casazza, Martha, 5). Developmental education is holistic development of the student and is based on the developmental psychology whereas the commonly used term remedial courses apply exclusively to courses considered to be pre-college level. (Boylan, Bonham, White, 87-88). Moreover, developmental education considers factors such as social and emotional development in addition to intellectual development. National Association of Developmental Education



(NADE) describes developmental education as "a field of practice and research with a theoretical foundation in developmental psychology and learning theory, that promotes the cognitive and affective growth of all learners, at all levels of the learning continuum. It is sensitive and responsive to the individual differences and special needs among learners (Casazza.)" Since the late 20th century the formal trend for remediation of any subject area is to provide it through a formally organized program, hence developmental education. Developmental education includes formally organized courses in reading, writing, mathematics, study strategies, learning labs, advisement, tutoring and special services as needed. Boylan, Bonham, and White, (1996, 87-88) states that "according to the National Center for Education Statistics (NCES), remedial courses are found in about 75 percent of the nation's universities and nearly 100 percent of its community colleges." Additionally, research shows that about a billion dollar is spent yearly on developmental programs at community colleges for over a million students (Boylan, Saxon.)

The U.S. higher education system is notorious for providing all students with equal opportunities. "Educational opportunity means more than the right to meet minimal standards; it means the right to develop one's talents to the maximum effectiveness (Markus, Theodore, Zeitlin, 171.)" One of the distinctive features of American Higher Education is the support provided for the students at all levels. For nearly two centuries, the institutions of higher education are providing the remediation for these under-prepared students. With the passage of time, the number of students in this category increased giving rise to formal developmental education. Markus pointed out that by the early 1960s, two-thirds of freshman lacked reading skills and 95% lacked study skills which is still visible today. Starting in the 1970s, a majority of students that were previously under-represented at institutions of higher education were present there in a larger number. This, in turn, led to a higher need of remediation for these under-prepared students. The problem of remediation is still present since then, but the nature of students and demographics has changed. This has resulted in the change of developmental education especially due to the multicultural nature of today's society. "According to 1996 NCES report just under 30% of student entering American colleges and universities require development in English, Reading or Mathematics (Boylan, 1999.)" Based on research in some cases 50-75% of entering freshman at an institute usually a community college, has to take a minimum of one developmental course. Consequently participating in developmental education before entering college-level course work at a community college equalizes the opportunity for under-prepared students to be educated and successful. This, in turn, opens the door for more economic and social opportunities.

However, on the other hand, critics argue that the above-mentioned approach is too expensive and an inappropriate function for institutions of higher education. The argument includes the rationale that the society is paying for the same schooling twice and the debate is to eliminate or minimize developmental education. Community colleges that provide remediation, recognize a tension between access and standards goals, which is high heightened by the presence of the majority of under-prepared entrants. However, research shows that there is little evidence of



any savings from the elimination of remedial education. "A recent report from the Brookings Institute (Breneman, 1998), for instance, points out that the total national expenditure for remedial courses in a given years is less than 1% of expenditures for public higher education in the United States (Boylan, 2, 1999.)" Since this remediation is not only for recent high school graduates, the benefits of the remedial education outweigh the cost. The alternatives to these services could be unemployment, low wages jobs, and high participation in welfare programs, which could result in even higher cost.

Characteristic of Developmental Students

Students who enter developmental education are usually under-prepared for the college level work which is assessed using either a state-mandated or local standardized test. These students typically fall in the bottom half of the distribution for these assessment tests. Most of these students attend college with the intention of obtaining a Bachelors or an Associates degree. According to different researchers, a majority of these students are white, one-third of them are the minority, comprising mainly of African American and Hispanics. Slightly more than half of these students are women, and the ages of these students range from 16-60 with one-third being younger than 25 years of age. According to Boylan, Bonham, and White (1999, 89) developmental students usually have made poor academic decisions in the past. In some cases, they attended college without any clear objectives or goals in mind and have severe emotional, psychological or social problems that have prevented them to be academically successful in the past.

Developmental Mathematics Student

Developmental Mathematics students are the students in need of remediation at least in the area of mathematics. These students in some cases already have college-level skills in the area of reading and writing. Based on the structure of the developmental programs if the student only has need of remediation in the area of mathematics they are sometimes allowed to take their college-level courses that do not require college-level mathematics skills.

Developmental Mathematics

Developmental mathematics consists of the requisites mathematical skills to successfully complete mathematics at the college level. According to the University of Chicago developmental mathematics program, one of the goals of the program is to enhance the students' mathematics background and abilities and to help them become independent learners in the area of mathematics. Most developmental students face more difficulty in the area of mathematics compare to reading or writing. Research shows that completion rate at community college for developmental mathematics courses is 74% compared to 77% for reading and 79% in writing. NCES confirms that the highest dropout rate is in remedial mathematics courses, where the dropout rate for remedial courses for all institution was shown to be at 25%. According to one research, the completion of developmental mathematics requirement is a substantial indicator of future completion of a degree. Majority of developmental students have deficiencies in the area of mathematics because of the lack of preparation in High school.



Success in Developmental Mathematics Courses

The success of a developmental student depends on a variety of factors. A major factor of student success is the method of instruction used. All students have a learning style preference but for the less academically successful students, it is important to accommodate their style to ensure success. According to Dunn and Dunn (1993), "learning styles refer to the way students concentrate on, process, internalize, and remember new information (Rochford, 666, 2003.)" Research that experimented with instructional treatments based on the learning styles preference shows a positive relationship between the usage of proper learning styles with the student's achievement. Rochford suggests that to increase the student's performance the teacher should involve the student in the design of learning material which will also promote independent self-teaching. This is a critical skill needed in college but is lacked by a majority of developmental students. Based on the results of a study that examined the factors influencing success in developmental mathematics by Smith et al. 1996, some of recommendations were: to make students aware of the relationship between attendance and performance, encouraging interaction between teacher and students, having smaller class size in an effort to provide the needed attention, and finally allowing students to start developmental mathematics courses in a semester with lower course load to be able to provide the needed attention to the subject matter. Based on Wyacaster's (2001) study on the factors impacting the success in developmental mathematics, students' achievement is highly influenced by attendance pattern. Unlike most of the research, this did not show a high correlation between the type of instruction and student's performance but still suggested the use of at least two different modes of instructions for developmental mathematics courses. Concurrent enrollment of a developmental student in a college-level course along with a developmental course results in low performance, especially if the required remediation is in the area of mathematics. This is due to the fact that academic under development may not be limited to deficiencies in that subject area but also include factors such as lack of successful study skills, academic motivation, time management, and financial resources.

The present research does not concentrate on the learning theory or style best suited for developmental students specifically in the critical area of mathematics. Moreover, there is a lack of evidence of the usefulness of the different learning resources that are already in place. Current research suggests the following recommendations to enhance the developmental education program:

1. Implement mandatory assessment and placement.
2. Promote an institutional commitment to developmental education.
3. Provide a comprehensive approach to developmental education courses and services.
4. Establish a series of ongoing orientation courses and activities.
5. Enforce strict attendance policies for developmental courses.
6. Abolish late registration.



7. Provide a centralized structure for developmental education courses and services.
8. Encourage professional development for those who work with developmental students.
9. Implement classroom assessment techniques in developmental courses.
10. Engage in regular and systematic program evaluation and allow for alterations in the program protocol.
11. Focus on the development of metacognitive skills.
12. Frequent assessment.
13. Use a theory-based approach to teaching developmental courses.
14. Integrate classroom, learning assistance, and laboratory activities.
15. Using technology to make the teaching-learning process better.
16. Provide an environment of a classroom community.

Some of the means to achieve the above-mentioned goals are to bridge the gap between high schools, colleges and universities, and allowing best practice and ideas to be shared between institutions.

Developmental Instructors

Central to the success of any developmental student is the properly trained individuals that are involved in the process of educating them including the teachers, tutors, etc. In order to provide successful faculty developmental programs, institutions need to have strong administrative support, including appropriate rewards for instructors. According to Kozeracki (2005, 48), the most important areas that the developmental faculty should receive training in are instruction on how to teach basics, pedagogical information on lesson planning, presentation skills and finally strategies for recognizing and working with students and students with learning disabilities. Three different ways the faculty development takes place in a community college setting are formal college-wide programs, official departmental meetings and activities and informal conversations among colleagues. Research shows that most of the faculty development and learning results from informal contacts with colleagues. Keeping in mind the importance of faculty development and to provide better services to the developmental students there is a need for structured programs organized by the faculty themselves instead of administrators or outside entities.

Providers of Developmental Educations

Developmental courses allow the under-prepared student the same opportunities as to a college-ready student. The individuals who serve these under-prepared students should be recognized for their skills in teaching these students. The major providers of developmental education are the community and technical colleges. Universities and four-year colleges also provide these services. A growing number of these services are being provided through community agencies, business, and industries and also through public schools. Kolajo (2004) explains that 90% of



community colleges and about 70% of four-year schools provide developmental education and these programs offer an array of services including course in reading, writing, and mathematics. These courses teach skills and concepts that are not taught in high school and are not prerequisites to a specific course but are necessary for student development. Some of the services included in developmental education are tutoring, individualized instruction in the learning labs instead of a formal classroom setting, counseling, academic and personal advisement. According to Boylan, these services are offered in three different ways. All the developmental courses are taught through a developmental department that also provides other services. Sometimes these courses are offered through academic departments and are supported by learning labs. Finally in research institutes, the developmental courses are not offered, but instead, under-prepared students are served through a comprehensive learning assistance center. All developmental programs are not equal and some are more effective than others.

Possible Effects of Available Resources on Student Success

The success of a student in developmental mathematics class is contingent upon students' attitude toward the class, instructional style, availability and usage of resource and the efforts put forth to the course material. This study captured all this information through the use of the qualitative and quantities methods of interviewing and survey respectively.

Methods and Materials

This study was carried out at a small rural community college to measure the effectiveness of the services offered for developmental mathematics students. A pilot survey was carried out with a different section of developmental mathematics course at the community college. The feedback from the pilot study was used in clarifying survey questions. The revised survey was administered at five different sections of the developmental mathematics class. There were 38 students who participated in the survey. The survey was carried out towards the latter half of the semester so that the students are fully aware of the resources available and have a set pattern of using it.

Instrumentation

The survey asked eight questions up to thirty-seven items, covering the amount of usage of available resources on campus, the amount of time spend on the course outside the class setting and the expected grade. The resources captured in the survey and interview are labs, office hours, math lab, tutors, computer software, websites, and worksheets. The survey also asked the students to rate the helpfulness of each resource mentioned above and reasoning for the rating provided. A list of questions and the frequency of responses for each can be seen at the end of the paper. At the end of the study for all the students that provided with their name or student Id numbers were used to model the study patterns as shown below.



Results and Discussion

This study was an effort to gather more information about the needs of developmental mathematics students and how could the available resources be improved or used better to enhance students' performance.

The first factor considered in the study was the number of hours spent on the course material outside of the class and the correlation with the grade.

Table-1.

	Grade of A	Grade of B	Grade of C	Grade of D	Grade not Identified
Less than 2 hours	5	4	2	1	2
2- 4 hours	1	6	4	0	1
4-8 hours	2	1	2	0	1
8-12 hours	2	2	0	0	1
More than 12 hours	0	0	0	0	0

As evident from the above data, none of the students fall in the category of studying more than 12 hours a week and only five in the category of 8-12 hours a week. This is indicative of the fact that the majority of students did not study the number of hours necessary for success in the class. According to the college success formula that states that for each hour of class time the successful students study two-three hours outside of class, out of all the respondents only thirteen percent studied 8-12 hours in an out of the class environment. Data above shows that a majority of students are not spending enough time on the course material.

As mentioned earlier the on-campus outside class resources of high importance are labs and instructors office hours. Office hours are more helpful compared to separate tutoring due to the same style of teaching, expectation, and awareness of the course curriculum. Ideally, during office hours students should receive individual attention but in case of a large volume of students using office hour the instructor could help students in groups. It is one of the resources more widely used compare to others by the study participants and the following data shows the pattern of usage.

Table-2.

	Grade of A	Grade of B	Grade of C	Grade of D	Grade not Identified
Occasionally	9	10	5	1	3
Once a week	1	1	2	0	1
Twice a week	0	1	0	0	1
Thrice a week	0	0	0	0	0
More than 3 times a week	0	0	1	0	0



Even though office hours were the most widely used resource, it is apparent from the data that majority of students used office hours sparingly, which could range from never using the office hours to using it once in two weeks. Five students used office hours once a week and have different grades. One student went to office hours more than three times a week and received a grade of B. Two students used office hours twice per week one of them received a grade of B.

Following was reflective of the pattern for the use of math lab and tutoring: one student using the Math lab received an A, two students received a B, none received a C and one received a grade of D. Three students whose grade could not be traced used the math lab also. The one student who used extra tutoring also used the Math lab received an A. Two students who earned a grade of B received outside tutoring out of which one also used the Math lab. Two students who received a grade of C used outside tutoring but did not use the Math lab. Overall only 18% of the respondents utilize the math lab tutoring and 15% used a noncampus tutor. Half of the students using outside tutoring used the campus related tutors as well.

Group studying includes studying in groups of two to three students where students can share their knowledge of the material. In terms of a group studying there were only three students who studied in groups. Two of these students received a grade of B and one received an A. All three of these participants studied the least amount of hours or used office hours the least but earned a grade higher than average. Even in this small sample, there is an indication of the positive effects of group studying.

Nontraditional recourses as computer software, website, etc were not commonly used by this group.

The qualitative part of the study was the interview conducted with the five students. These students also took part in the surveys. Results of the interview closely mirror the result of the survey. Only one out of the five students interviewed studied about eight hours a week showing the lack of outside class activities. Only one student received tutoring affiliated with or without school. None of these students made use of resources as the computer software or the website.

The survey and the interview questions reflect the usage of available on-campus resources among students. As expected the data analysis shows that students are not utilizing resources to the sufficient degree to successfully complete the course work. However, there were few students who did spend considerable time outside of class on the course material and utilized the resources but did not receive satisfactory grades. These students might indicate those who need more time and help than an average student. These students could benefit more from non-traditional, hands-on teaching style.

With this study, it comes to light that the majority of the successful strategies for developmental programs such as strict attendance policy, mandatory and frequent assessment, are implemented for this developmental mathematics course. However, details of the implementation process show the signs of improper cohesion of classroom learning, learning assistance, and lab assistants. The needed resources



are available to the students but data shows students are not using it to its fullest capacity. Students themselves do not see the need for the resources in which case the user should be enforced under the course policy keeping in mind the variety of learning needs and style the developmental students bring with them. If students had used these resources it could have had a positive effect on their class performance. Interview questions concerning the recommended change in resources or class structure also coincide with the survey results. Students were happy with the available resources and did not suggest any changes for resources. Most of the suggestions were directed toward the physical orientation of the room or allowing more time for review periodically. There were certain resources that students rated high for being helpful but did not make use of it which could be the case that they were not aware of its availability.

Summary and Recommendations:

This study was an effort to gather more information about the needs of the developmental mathematics students and how could the available resources be improved or used better to enhance students' performance.

Looking at the problem comprehensively which involves the history of developmental education, the current research in the area and the problem at hand of the availability and usage of out of the class resource, the next step is recommended suggestions. Previous research has shown that the comprehensive approach to the developmental courses accounts for a higher success rate. According to Boylan, Bonham, and White (1999) the integration of resources is necessary to provide synergistic benefits. Following are a few of the recommendations for the out-of-class resource integration to ensure student success in the developmental mathematics classes by using them:

1. Design the course to make the use of the tutoring services or office hours a part of the students grade.
2. Include lessons that will teach students to use the website associated with the book or the course
3. Plan lessons that will teach and require them to use the services as Math lab either for the purpose of the computer software availability or tutoring.
4. Plan in-class group activities which in turn will encourage group work outside of the class as well.
5. Encourage the use of extra worksheets by allowing them credit for this work to provide opportunities for practice which is necessary for developmental students.

Keeping in mind the very nature of developmental students and the mission of any learning institute we cannot only provide developmental students with these tools. There is a need to teach these students the correct way of making use of the available resources to help maximize their learning. By enforcing and teaching the developmental students the use of these out-of-class resources they are forming a habit which will serve them in future education and their role workforce.



Focus on the following:

- The data emerged from a bigger study
- The trend found in the survey
- Information about how long is the front/back of the survey
- Students' expectation/results to be such but because of their study habits from the survey, the results are different.

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