

Stem Learning Communities

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Abstract

This study examined one of the strategies that were set in place to increase enrollment, retention, and graduation in the STEM disciplines. The STEM Learning Communities (SLC) was an innovative, “inquiry-based” educational strategy which has been adopted at Fayetteville State University. All incoming freshmen with an intended STEM major was required to enroll in SLC, which would be a yearlong. There is significant body of research supporting learning communities for boosting students’ learning and academic achievement. Data collected, analyzed, and documented in this report includes: Accelerated Math 129/130 course grades, STEM advisement Workshop survey data/results, a comparative case design between the STEM Accelerated Math 129 course at the beginning of the semester, during midterm, and at the end of the semester. Also a comparative case design between the STEM Accelerated Math 129 course and a an eight week Math 129 course that was not a part of the STEM Learning Communities Results from this study indicate that students who were in the STEM Learning Communities Accelerated Math 129/130 Course outperformed their peers that were in the Math 129 eight weeks course.

Introduction

The majority of new students entering higher education leave their initial college of choice without completing a degree (Tinto, 1993), and national attrition rates have been increasing since the early 1980s at two-year and four-year institutions, both public and private (Postsecondary Education Opportunity, 2002). The most critical period or stage of vulnerability for student attrition continues to be the first year of college—at all types of higher education institutions, including highly selective colleges and universities (“Learning Slope,” 1991). More than half of all students who withdraw from college do so during their first year (Consortium for Student Retention Data Exchange, 1999), resulting in a first-year attrition rate of more than 25% at four-year institutions, and approximately 50% at two-year institutions (ACT, 2001). The STEM Learning Communities was designed to boost student’s learning and academic achievement. Learning Communities provide an affordable and comprehensive method of addressing a variety of issues such as improving student retention, promoting student engagement and success, promoting curricular coherence, building a sense of community, and promoting student learning.

Incoming freshmen students that are intended STEM majors will be enrolled in one of two clusters (see table 4) based on their disciplines: math/computer science (STEM LC Cluster I) and chemical/biological sciences (STEM LC Cluster II) within the STEM Learning Communities. Mathematics is the basic knowledge required for all STEM majors and a high level of academic preparedness in mathematics for first-time freshmen interested in STEM is paramount for success in the major. An Accelerated Math course within the STEM Learning Communities was designed to improve student retention. Within the STEM Learning Communities, thirty-five students were placed in Dr. Bila’s Accelerated Pre-Calculus I/II (Math 129/130) Course. One of the objectives that the ISAS program focuses was on improving the STEM students’ academic success in this course through the STEM Academic Enrichment Center (SAEC). Our goal for the Accelerated Pre-Calculus I/II (Math 129/130) Course is that at least 85% of the students pass the course with the help given by our Intrusive STEM Peer Tutoring, STEM Collaborative Learning Study Halls, and STEM Intrusive Academic Advising.

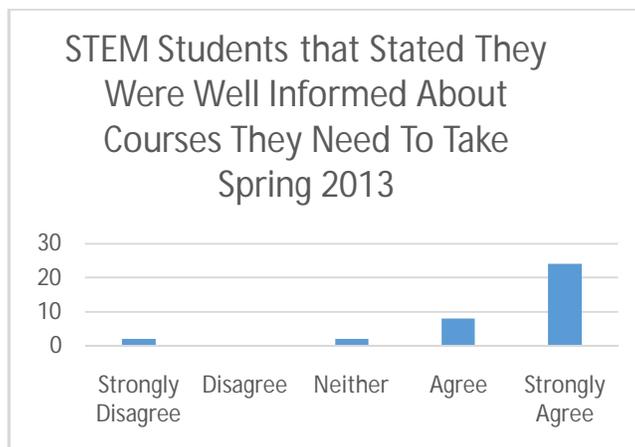
"Academic Advising is the only structured activity on the campus in which all students have the opportunity for one-to-one interaction with a concerned representative of the institution" (Habley, 1994). According to Tinto (1987), effective retention programs that have academic advising are the very core of successful institutional efforts in educating and retaining students. For this reason, academic advising, as described by Wes Habley, should be viewed as the "hub of the wheel" and not just one of the various isolated services provided for students. Academic advisors provide students with the needed connection to the various campus services and supply the essential academic connection between these services and the students. In addition, academic advisors offer students the personal connection to the institution that the research indicates is vital to student retention and student success. The Advisement Workshop that was held in the STEM Learning Communities was a success. Thirty – eight students attended the workshop and received academic advisement in designing their class schedules for the spring semester. This was one of the key tools to improve students' retention by reviewing and helping them with their schedules to ensure student success. This study begins to examine how the STEM Learning Communities impact student success within their lower level courses in STEM, retention, graduation, an increase of enrollment.

Method

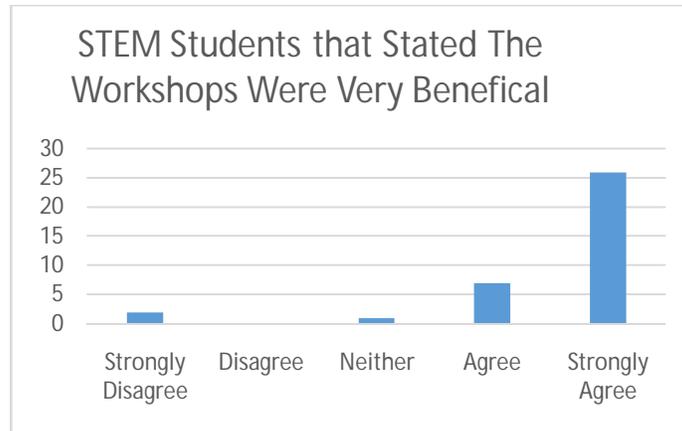
One of the methods that were used to improve retention within the STEM community was conducting a STEM Advisement Workshop. The **ISAS Program** conducted a **Freshmen STEM Advisement Workshop** for the students here at Fayetteville State University in which thirty-eight students attended this workshop. The STEM students were split up in groups according to their majors to provide more time for each student to ask any questions and to thoroughly review the courses the students need to take. There were a total of five groups which included: Computer Science, Forensic Science, Biology, Chemistry, and Mathematics. During this advisement workshop, students were provided a Fayetteville State University Advisement Verification Form. These students had to with the help of faculty members, a retention counselor, and advisors; select the courses they needed to take for the spring semester and write it down on the verification form. After completing the form, students receive a signature from a faculty member and or advisor/ retention counselor indicating that it was reviewed. After that the students were instructed to also schedule a meeting with their assigned advisors to receive final approval of the courses listed on form. The Students were given a Major Requirements Packet that was retrieved from the **2012-2013 Undergraduate Catalogs** to review and keep so they can be aware of the courses they need to take in order to graduate on time.

ISAS Informational STEM Meeting

The second method that was used to improve retention with the STEM Community was conducting an Informational STEM Meeting. The **ISAS Program** conducted a **STEM Freshmen Informational Meeting** where the incoming STEM freshmen students were able to receive imperative information on the major of their choice. 30 Students attended the meeting. Faculty member from the Computer Science and Mathematics Department, Biological Sciences Department, and Chemistry & Physics Department did a ten to fifteen-minute power-point presentation on their department within the STEM Field.

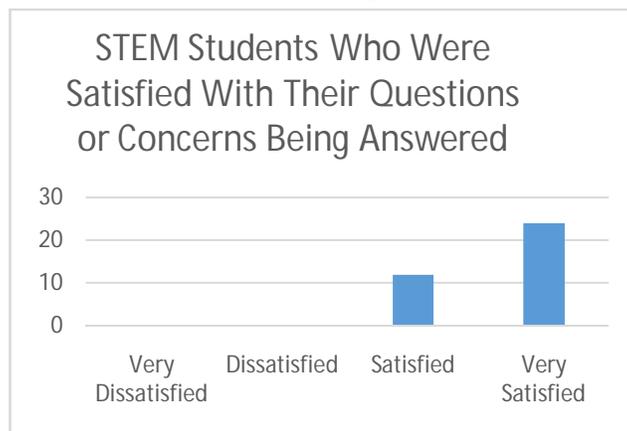


Students were informed of different job opportunities in the STEM Field, why STEM is very important, and were also provided information from various STEM Research Programs and Clubs at Fayetteville State University. Students were informed about the tutoring services that are provided here for them to utilize if they find courses to be a bit of a challenge. Sometimes students tend to not continue in STEM because of not being able to understand the material and later find it very difficult. A total of thirty-five STEM students attended the informational meeting.

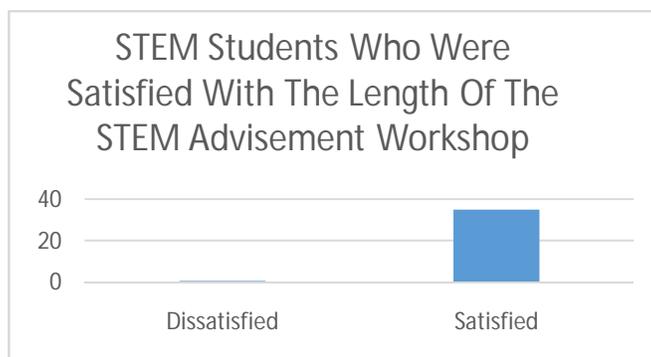


STEM Learning Communities

The students received the STEM Learning Communities sheet at the STEM Advisement Workshop that indicated the courses that they will need to register for. The Computer Science and Mathematics majors will register for Dr. Bila’s Univ 102-41 course which is a (STEM –Freshmen Seminar Course strictly for Computer Science and Mathematics majors). The Biology and Chemistry majors will register for Dr. White’s Univ 102-14 course which is a (STEM – Freshmen Seminar Course strictly for Biology and Chemistry majors). The Students that did not take PHIL 110 in the fall semester will register for Mr. Richard Hall’s PHIL 110-14 course which is a (STEM – Critical Thinking Course strictly for STEM majors) for spring 2013.



E-mails were sent out to students that are STEM majors to notify them about registering for Dr. Bila’s and Mr. Richard Hall’s course that are within the STEM Learning Communities. Ongoing communication with the University College Dean about the Phil 110-14 course being in the STEM learning communities was taking place. It was stated that it would be labeled as a STEM PHIL 110-14 course so the students could be aware when registering for the course that the section is STEM. The section was not labeled STEM as stated through communication with University College Dean and a lot of students did not know which section to register for in PHIL 110. Notification was then sent out to students that were not in a STEM Freshmen Seminar Course to register for Dr. Bila’s section as a Computer Science and Mathematics major. Notification was sent out to their current Freshmen Seminar instructor to make sure that the students did make the necessary changes in schedule and register for Dr. Bila’s course. The Freshmen Seminar advisors of the students did not want to encourage the students to do so because they thought it was best that these STEM students should stay in their class.

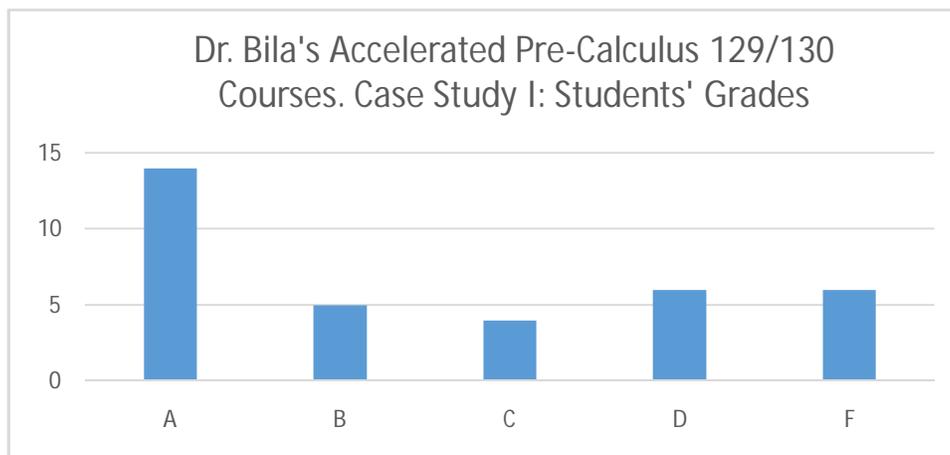


Notification was sent out to the University College Dean about this situation with Dr. Bila's course in Univ 102-14 and the Dean stated that the students need to make the changes but still no success in doing so. Only five students ended up registering for Dr. Bila's section in Spring 2013. A final notification was sent out to the students that still did not register for Dr. Bila's Univ 102-14 course on January 9, 2013 before the deadline of the add and drop period but still no success. These efforts were made after the STEM Advisement Workshop to make sure that students that did not attend workshop made these changes. A lot of students that were at the STEM Advisement workshop went back to their freshmen seminar advisors and discuss with them their Advisement Verification Form and stressed how they need to make these changes but most of their advisors stated that they did not need to and to keep schedule as instructed by their advisors outside of the STEM learning communities.

Data Collection/Results

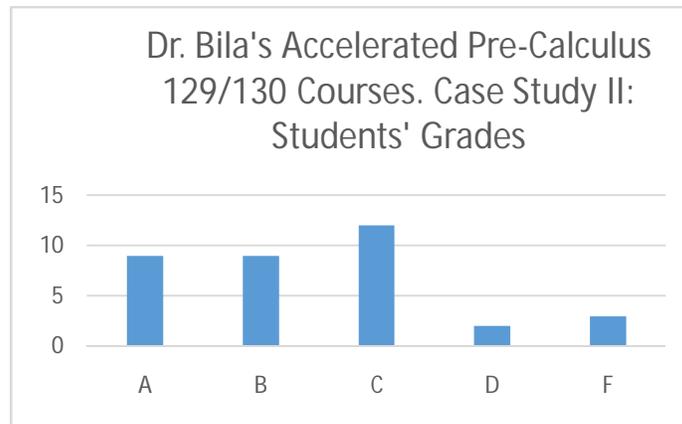
Dr. Bila's Accelerated Math 129 Case Study I

On the month of September 7, 2012, a study was done on Dr. Bila's class to see how many students were failing the course with the help of our STEM Academic Enrichment Center (SAEC). 40% of the student's grades were an A, 14.3% grades were a B, 11.4% grades were a C, and 34.3 % grades were a D or F. out of 35 students; only 12 were failing the course. Through our STEM Academic Enrichment Center, students were immediately notified through e-mails that were sent to their advisors and them to meet with one of our STEM Intrusive staff members so immediate action could be taken place to help improve their grades.



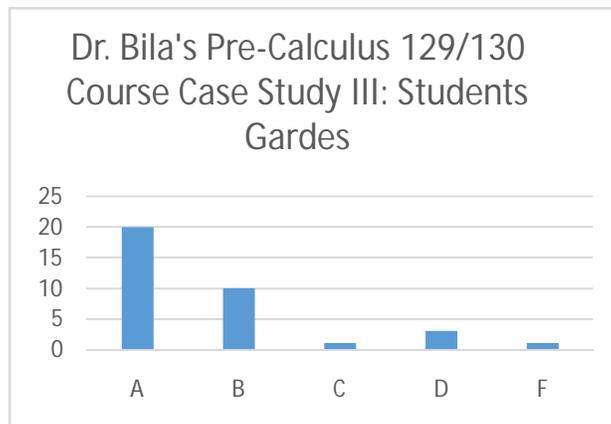
Dr. Bila's Accelerated Math 129 Case Study II

On the month of October 3, 2012 another study was done on Dr. Bila's class to see how many students were failing the course with the help of our STEM Academic Enrichment Center (SAEC). 25.7% of the student's grades were an A, 25.7% grades were a B, 34.2% grades were a C, and 14.2% grades were a D or F. Out of 35 students only 5 were failing the course. Continuous notification of these students took place and students received advisement from one of our STEM Intrusive staff members

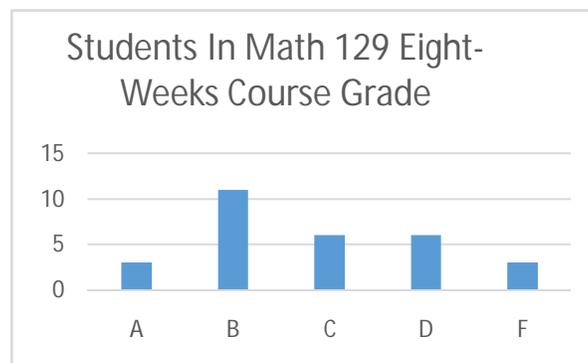


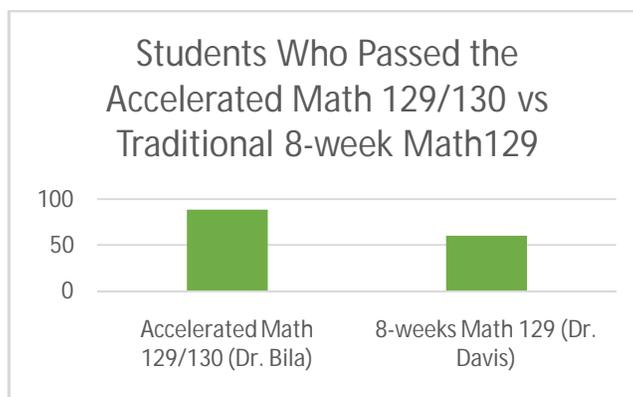
Dr. Bila’s Accelerated Math 129 Case Study III

At the end of the Accelerated Pre- Calculus I/II (Math 129/130) 8- week’s course, a final study was done on Dr. Bila’s class to see how many students were failing the course with the help of our STEM Academic Enrichment Center (SAEC). 57.1% of the student’s grades were an A, 28.5% grades were a B, 2.8% grades were a C, and 11.3% grades were a D or F. Out of 35 students only 4 were failing the course. The 4 students who failed the 8-weeks Math 129 Course received more advisement from one of our STEM Intrusive staff members. The Department Chair was notified to have students placed in the Math 129 16-weeks course to continue the course to try and improve their failing grades.



A comparison was made between Dr. Bila’s Accelerated Pre-Calculus I/II (Math 129/130) Course and Dr. Davis Math 129 8- weeks course. 88.57% of the students in Dr. Bila’s course passed and only 60.60% of the students in Dr. Davis’s course passed. By strategically addressing the challenges of differences in content knowledge of incoming students and lecture-based formats that do not keep students engaged in introductory mathematics courses, over 87 % the students that were in Dr. Bila’s Accelerated Pre-Calculus I/II (Math 129/130) Course passed. Our STEM Academic Enrichment Center shows how student’s success in introductory mathematics courses is strongly improving.





Discussion and Conclusion

STEM Integrated into the Learning Communities is very critical. Students will be notified and placed in the STEM Learning Communities early on the semester. It is very difficult trying to place students in the STEM Learning Communities in their second semester of school. In the fall Semester, the ISAS Program will take part of the Freshmen Orientation Week where we are able to identify the students before they start their school semester and we have a much better chance in placing them within the STEM Learning Communities before 1st day of classes. We will also attend the first-steps sessions and have a STEM Learning Communities schedule for these students to go by so they can register for their proper courses. The Accelerated Math 129/130 course that was taught within the STEM Learning Communities demonstrated enormous success. Results reflected the necessity of a STEM Academic Enrichment Center in successfully improving retention, increase in enrollment, and graduation in the STEM field. Dr. Bile's and Mr. Hall's class was added on in the Spring semester of 2013 and it was difficult trying to implement these changes later on in the semester and a lot of the STEM students were in different freshmen seminar courses due to a limited amount being able to be in Dr. White's course in Fall 2012. Exceptional progress is being made in the learning communities in spite of a couple of minor setbacks along the way. We now have Dr. Bile's Freshmen Course in place and Mr. Hall's PHIL 110 course in place for it to be implementing in the fall of 2013.50 incoming freshmen students indicated that they were interested in research and over 100 STEM students declared their major in STEM. These are ongoing progress that is taking place in the STEM learning communities.

References:

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