

Science Program Review 2013-2015

1. Mission and Goals:

a. Science Department Mission:

The mission of the Science Department is to deliver a contemporary, rigorous curriculum in all disciplines at every level in order to prepare the students for transfer and the workforce, and to deliver teaching with a student-friendly and learning-centered approach so the students will achieve their goals and will meet and exceed established educational and industry standards.

MCC Mission: It is the mission of Mohave Community College to be a learning-centered college, serving all constituencies, inspiring excellence through innovative learning methodologies and empowering students to succeed.

The Science program strives to serve all constituencies by varying class times, modalities, and frequent offerings. The science faculty maintains learner-centered environments and uses the most up-to-date learning methodologies in order to empower students to succeed.

This program review targets primarily the science prefixes of Biology (BIO) and Chemistry (CHM). This department also includes the disciplines of Environmental Science (ENV), Geology (GLG), Geography (GHY), and Physics (PHY). The Science Program at MCC offers several degrees: Associates of Science (AS) degrees in Chemistry, Geology, Life Science, and General Science. It is important to notify that the Science department's classes are also prerequisites for the Allied Health programs. For example, CHM 130, BIO 100, BIO 201 and BIO 202 are designated as Nursing and Allied Health prerequisites, while BIO 100 is additionally the prerequisite for almost all 200-level Biology courses at the college. In addition, the 100-level courses offered by the Science department are essential in fulfilling the Physical and Biological Sciences requirement of the Arizona General Education Curriculum (AGEC) for the transfer degrees offered at the College. This review does not focus on any particular degree program. It is more of a departmental review.

2. Program Data and Trend Analysis (see appendix D for data)

2.1. Key Performance Indicators (KPI)

KPI	Trend
Enrollment	Downward, as expected based on overall enrollment figures for the college.
Total FTSE	Downward, as expected based on overall enrollment figures for the college.
Sections	Downward, as expected based on overall enrollment figures for the college.
Fill Rate	Downward, but is now increasing, probably because we are offering fewer sections.
Retention	Graduation rate increasing and retention decreasing as one would expect.
Success	Fairly constant at 84-87% success.

2.2. Achievement Gap

Indicate achievement gap for each of the groups listed below. (Attach to Appendix the Success and Retention by Ethnicity Data as identified by Institutional Research.) Biology, Natural Science, and Chemistry Graduates

Group	% Retention	% Graduation
Males		3
Females		16
Asian-American		1
African-American		1
Filipino		
Hispanic		
Native American		
Other Non-White		15
Pacific Islander		
White		
2 or more races		2
Range (Max-Min)		

In the table above, the mainly downward trends for the Science department reflect the overall college trends, based on data presented to the Governing Board. According to the data provided, the Science department does appear to show a drop in enrollment, as indicated also by the fill rates for the different sections. The drop in the fill rate has since then been addressed by combining sections; as fewer sections were offered, the number of students enrolled in the sections naturally increased. The success data looks quite positive, but comparative data from other departments is needed in order to get the full picture. The Sciences graduation rate, is not 100%. The retention data presented is only for those students taking a biology or a physical science class. The decrease in overall retention for the college does not necessarily reflect only upon the ability of the science department, because students usually take more than just science classes. Therefore, the method of defining retention and graduation as hallmarks of a program's success is suspect, unless the program evaluated leads directly to an Associate of Science degree. In addition, the data only compares the retention for students enrolled in other science classes. Furthermore, any science retention/completion data should indicate whether or not students might be enrolled in any of the Allied Health programs offered by MCC, whether or not they have completed their science prerequisites, or have decided not to return to the college. Another suggestion is to implement exit surveys of students completing or withdrawing from a science course in order to determine their future plans and how the Science department can assist them in following through with their stated goals. Oftentimes, students have external factors which may affect their educational and career goals. If such issues can be identified early in the process, it is possible that the students can be assisted by referral to an appropriate department for intervention.

It must be taken into consideration that overwhelming majority of students enrolled in science classes at MCC take them as a component of some other terminal degree or certificate program especially those that are part of the Allied Health programs (Nursing, Dental Hygiene, Physical Therapist Assistant, Surgical Technology, Pharmacy, etc.) Therefore, measuring the effectiveness of the science

program must include some assessment of their success in these programs. At this time, limited access has been provided to such data, and therefore no significant evaluation can be made. One suggestion is to have embedded assessment mechanisms within the terminal programs that would enable the Science Department to objectively evaluate its own performance in how they are helping the students that sign up for these programs. For example, it would be helpful to have data from the Test of Essential Academic Skills (TEAS), which is used as part of the admissions process by the Nursing Department, and correlate the students' success on the science section of the test to their success in the science prerequisites. Additionally, it would be interesting to see the students' academic standing in respective science classes and how it actually benefit their performance in the Allied Health Programs. The lack of such information makes it hard to discover what aspects of the Science Program need to improve, modify or change (i.e. modality, laboratory activities, lectures, difficulty of the program, size of the classes, course offerings and times, etc.) Attempts should be made to increase collaboration between the faculty of Allied Health Programs and the Science Program faculty. Additional information would be to have access to acceptance data to the various other programs for which science classes are prerequisites.

2.3 Other Data

Table 1. The number of students taking Bio 205 or Chem 130 from fall 2012-fall 2014 broken down by declared major.

Declared MAJOR	Grad 2014FA				Grand Total
	Graduated		Not a Grad		
	2014	Not 2014	2014	Not 2014	
Accounting				1	1
Administration of Justice			1	2	3
AGEC-A Arts				1	1
Art			1	1	2
Art, Visual Communications				1	1
Bus and Entrprnshp			1		1
Business Admin.			3	1	4
Chemistry			1	2	3
CIS Administration	1	1	1		3
Computer Science			1	1	2
Dental Assisting		1			1
Dental Hygiene	3		12	1	16
Education: Elem/Middle School			2		2
Education: Emph in Early Childhood			1		1
Elem Ed: Early Chldhd Emph			1		1
Elem Ed: Science Content				1	1
Engineering			2		2
English			1		1
Fire Science			1		1
General Studies	2		91	70	163
General Technology				1	1
Geology			1		1

Healthcare Information Tech			1		1
Liberal Arts	2		52	31	85
Life Science			2	4	6
Mathematics			2		2
Medical Assisting			4	2	6
Non Degree Seeking		2	7		9
Nursing	2	1	52	4	59
Pharmacy Technology			1		1
Practical Nursing			2		2
Programing & Game Development				1	1
Radiologic Technology			1		1
Science			5	4	9
Social Behavioral Science			5		5
Surgical Technoloev			1		1
Systems Admin.		1	2		3
(blank)				2	2
Grand Total	10	6	258	131	405

According to the data at Table 1, out of 405 students who have taken two of the Nursing or Allied Health feeder courses (Bio 205 or Chem 130 –B&C) since the fall of 2012, 107 of them (Table 2) had majors that pertained to the science/health fields. This has been taken as an indicator of their acceptance into the science program. Taking this into consideration, the percentage of students that graduated or have been enrolled between Fall 2012 and Fall 2014 is 68.75%. This indicates a much higher number than when clustering all of the biology classes together, and also it is a more realistic measure of retention for the science program. The BIO 205 has been chosen to measure success instead of BIO 100 simply because BIO 100 appeals to a larger population of students that need two lab sciences to fulfill the AGECE science requirement for associate degrees. This larger population includes students that tend to be less focused on their future than many of the allied health and pre-nursing students about their future goals, and may drop out for reasons not related to their success in the sciences. The graduation rate is low (data not shown), but based on a given program's applicant pool size, there could be a delay of up to three years between the completion of a student's B&C classes, and his/her acceptance into the program, and currently there is no measurement for that at this time. Another possibility for a more accurate measurement of the success rate of the students from the science program would be to be able to follow up on transfer students who may not have received degrees from MCC, by using a national database. Currently, the only available information is anecdotal information from personal connections with students that have transferred to 4-year universities or that have been accepted into other programs, such as pharmacy school; these students should also be documented as completers.

Table 2. The number of students taking Bio 205 or Chem 130 from fall 2012-fall 2014 in a declared major related to science or health.

Count of ID_NUM	Grad 2014FA		
	Graduated	Not a Grad	Grand Total

Declared MAJOR	2014		Not 2014		
	2014	Not 2014	2014	Not 2014	
Accounting				1	1
Administration of Justice			1	2	3
AGEC-A Arts				1	1
Art			1	1	2
Art, Visual Communications				1	1
Bus and Entrprnshp			1		1
Business Admin.			3	1	4
Chemistry			1	2	3
CIS Administration	1	1	1		3
Computer Science			1	1	2
Dental Assisting		1			1
Dental Hygiene	3		12	1	16
Education: Elem/Middle School			2		2
Education: Emph in Early Childhood			1		1

26.4% of students who took Bio 205 or Chem 130, went on to be nursing, allied health, or science majors

Table 3. Retention data for students taking Bio 205 or Chem 130 in the fall of 2012.

Semester	2012FA		2014FA			
	Grad		Not a Grad		Grand Total	
	2014	Not 2014	2014	Not 2014		
Administration of Justice			1		1	
Business Admin.			1	1	2	
Computer Science			1		1	
Dental Hygiene			2		2	
Engineering			1		1	
English			1		1	
General Studies			5	12	17	
Liberal Arts			4	4	8	
Life Science			1		1	
Medical Assisting			2		2	
Non Degree Seeking		1	1		2	
Nursing	1	1	19		21	
Practical Nursing			1		1	
Science				1	1	
Social Behavioral Science			2		2	
Surgical Technology			1		1	
Grand Total	1	2	43	18	64	

Since Fall 2012, 68.8% of the students have been retained. We lost 70% of GS and 50% of LA majors.

The data in Table 3 demonstrates that of the Fall 2012 cohort of B&C students, 68.75% of the students were retained. The college has (or had) a history of categorizing pre-allied health or pre-nursing students as general studies (GS) or liberal arts (LA) when they first enrolled at the college. Students have

to have a major declared prior to being granted financial aid. A weakness of this study and the subsequent analysis lies in the assumption that the degree declaration reflects a student's acceptance into his/her declared program. The data in Table 3 demonstrates that there is a particular trend with respect to being able to identify students more likely to be completers. Based on the data presented in these tables, 70% of the general studies students and 50% of the liberal arts students from this cohort did not complete their education. This might suggest that these students were not accepted into their terminal programs of choice, or were not successful in several of their courses, and thus left the college. Accordingly, the retention rate for just the Nursing, Allied Health, or Science (NAS) declared majors, is 92.5%.

Table 4 contains the Spring 2012 retention data. Once again, the Allied Health, Nursing, and Science majors demonstrated a high retention rate of 80.8%, while a significant majority (69.5%) of the GS and LA students were lost.

Table 5 shows us retention for Fall 2013. Overall retention was, 56.6%. The loss of the GS and LA majors was at 55.5% . In addition, retention of the NAS majors was 75%.

In Table 6, Spring 2013, the overall retention rate is 61%. GS and LA students demonstrated a loss of 39.6% while NAS majors retained 78.9%.

Table 4. Retention data for students taking Bio 205 or Chem 130 in the spring of 2012.

Semester	2012SP		2014FA			
	Grad		Not a Grad		Grand Total	
	2014	Not 2014	2014	Not 2014		
Accounting				1	1	
AGEC-A Arts				1	1	
Art				1	1	
Art, Visual Communications				1	1	
Bus and Entrprnshp			1		1	
Chemistry				1	1	
CIS Administration		1			1	
Dental Hygiene			5		5	
Engineering			1		1	
General Studies			9	23	32	
Liberal Arts	1		4	9	14	
Life Science			1	2	3	
Mathematics			1		1	
Medical Assisting			1		1	
Non Degree Seeking		1			1	
Nursing	1		13	1	15	
Pharmacy Technology			1		1	
Practical Nursing			1		1	
Programming & Game Development				1	1	
Science				1	1	
Grand Total	2	2	38	42	84	

Since Spring 2012, 80.8% of the students have been retained. 69.5% of GS and LA majors were lost.

Table 5. Retention data for students taking Bio 205 or Chem 130 in the fall of 2013.

Semester	2013FA		2014FA			
	Grad		Not a Grad		Grand Total	
	Graduated		Not a Grad			
Declared MAJOR	2014	Not 2014	2014	Not 2014		
Business Admin.			1		1	
Chemistry				1	1	
Dental Hygiene	2		2		4	
Education: Emph in Early Childhood			1		1	
Fire Science			1		1	
General Studies			15	19	34	
General Technology				1	1	
Healthcare Information Tech			1		1	
Liberal Arts			9	11	20	
Non Degree Seeking			1		1	
Nursing			11	3	14	
Radiologic Technology			1		1	
Science			1	2	3	
Social Behavioral Science			2		2	
Systems Admin.		1	1		2	
Grand Total	2	1	47	37	87	

Since Fall 2013, 56.3% of the students have been retained. 55.5% of GS and LA majors were lost.

Table 6. Retention data for students taking Bio 205 or Chem 130 in the spring of 2013.

Semester	2013SP		2014FA			
	Grad		Not a Grad		Grand Total	
	Graduated		Not a Grad			
Declared MAJOR	2014	Not 2014	2014	Not 2014		
Administration of Justice				2	2	
Art			1		1	
Computer Science				1	1	
Dental Assisting		1			1	
Dental Hygiene	1		3	1	5	
Elem Ed: Science Content				1	1	
General Studies			22	16	38	
Geology			1		1	
Liberal Arts	1		12	7	20	
Life Science				2	2	
Medical Assisting			1	2	3	
Non Degree Seeking			2		2	
Nursing			9		9	
Science			1		1	
(blank)				1	1	
Grand Total	2	1	52	33	88	

Since Spring 2013, 61.4% of the students have been retained. 39.7% of GS and LA majors were lost.

Table 6. Number of students who have taken any science class (on ground or dual enrollment), that have declared a degree in nursing or allied health since the fall of 2012. This table essentially represents a 12.1% “acceptance rate” into the student’s program of choice.

Year	Number of students
2012	12
2013	43
2014	200
Not Nursing or Allied Health	1846
Grand Total	2101

Table 6 represents the number of students who have taken any science class (on ground or dual enrollment), that have declared a degree in nursing or allied health since the fall of 2012. The expectations were to see this number increase each year as this represents the number of students that have been accepted into their terminal allied health or terminal program. The percentage of students retained is 12.1%. This is lower than the 65% second year retention rate for all majors. Thus, the 12.1% is more indicative of acceptance rate, since not all students who take bio 100

classes are going in to science or related fields but they disperse in many different fields.

In order to understand why the GS and LA students were not retained, the success data might bring better clarification. For Chem 130, Tables 7 and 8 show that of there are 7.5 times more GS and LA majors that are unsuccessful when compared to NAS majors. Tables 9 and 10 represent the same analysis with Bio 205. It is obvious from the presented data, that GS and LA majors are 6.3 times more unsuccessful compared to NAS majors.

Table 7. Success of Students in Chem 130 from 2012-2013 broken down by major.

Declared Major	Success		Grand Total
	No	Yes	
Accounting	1		1
Administration of Justice	1	2	3
AGEC-A Arts		1	1
Art		2	2
Art, Visual Communications		1	1
Bus and Entrprnshp		1	1
Business Admin.		3	3
Chemistry	1	1	2
CIS Administration		1	1
Computer Science		2	2
Dental Assisting		1	1
Dental Hygiene		16	16
Education: Emph in Early Childhood	1		1
Elem Ed: Science Content	1		1
Engineering		2	2
English		1	1
Fire Science		1	1
General Studies	36	87	123
General Technology	1		1

Geology		1	1
Healthcare Information Tech		1	1
Liberal Arts	9	54	63
Life Science		6	6
Mathematics		1	1
Medical Assisting	2	4	6
Non Degree Seeking	1	5	6
Nursing	3	56	59
Pharmacy Technology		1	1
Practical Nursing	1	1	2
Programming & Game Development		1	1
Radiologic Technology		1	1
Science	1	5	6
Social Behavioral Science		4	4
Surgical Technology		1	1
Systems Admin.		2	2
(blank)		1	1
Grand Total		59	267
			326

GS and LA students are 7.5 times more unsuccessful in their Chem 130 classes.

Table 8. Success of Students in Chem 130 since 2012 broken narrowed down to fields related to science or health.

Declared Major	Success		
	No	Yes	Grand Total
Chemistry	1	1	2
Dental Assisting		1	1
Dental Hygiene		16	16
Geology		1	1
Healthcare Information Tech		1	1
Life Science		6	6
Medical Assisting	2	4	6
Nursing	3	56	59
Pharmacy Technology		1	1
Practical Nursing	1	1	2
Radiologic Technology		1	1
Science	1	5	6
Surgical Technology		1	1
Grand Total	8	95	103

Table 9. Success of students taking Bio 205 from 2012-2013 broken down by major.

Declared Major	Success		Grand Total
	0	1	
Administration of Justice		2	2
CIS Administration		1	1
Computer Science		1	1
Dental Assisting		2	2
Dental Hygiene	1	17	18

General	2	1	3
General Studies	23	116	139
Liberal Arts	6	48	54
Life Science		2	2
Mathematics		1	1
Medical Assisting	3	9	12
Non Degree Seeking	1	6	7
Nursing		90	90
Paralegal		1	1
Phys. Therapist Assist		2	2
Practical Nursing	1	1	2
Radiologic Technology		2	2
Science	1	11	12
Social Behavioral Science		3	3
Surgical Technology		10	10
Grand Total	38	326	364

GS and LA students are 6.3 times more unsuccessful in their Bio 205 classes.

Table 10. Success of Students in Bio 205 since 2012 broken narrowed down to fields related to science or health.

Declared Degree	Success		Grand Total
	0	1	
Dental Assisting		2	2
Dental Hygiene	1	17	18
Life Science		2	2
Medical Assisting	3	9	12
Nursing		90	90
Phys. Therapist Assist		2	2
Practical Nursing	1	1	2
Radiologic Technology		2	2
Science	1	11	12
Surgical Technology		10	10
Grand Total	6	146	152

The following figures are surveys from Spring 2012.

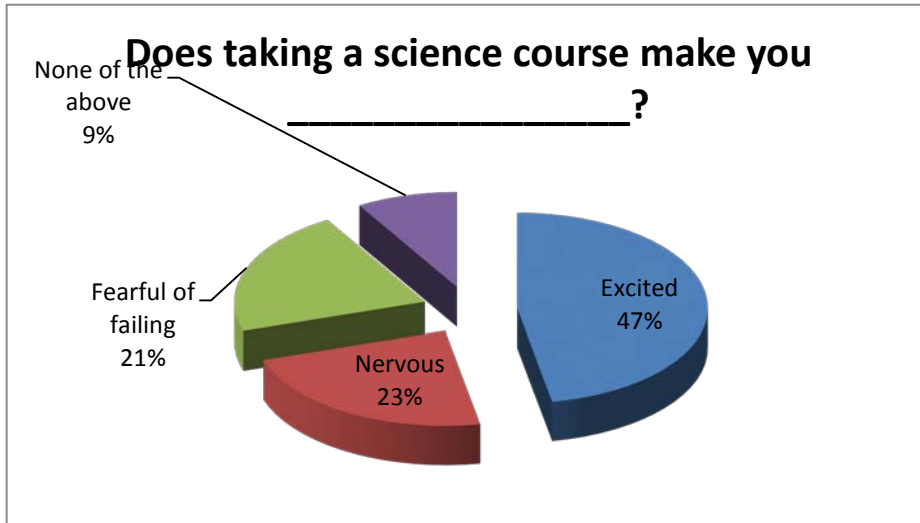


Figure 1. This demonstrates the attitudes of students when they enter a science class.

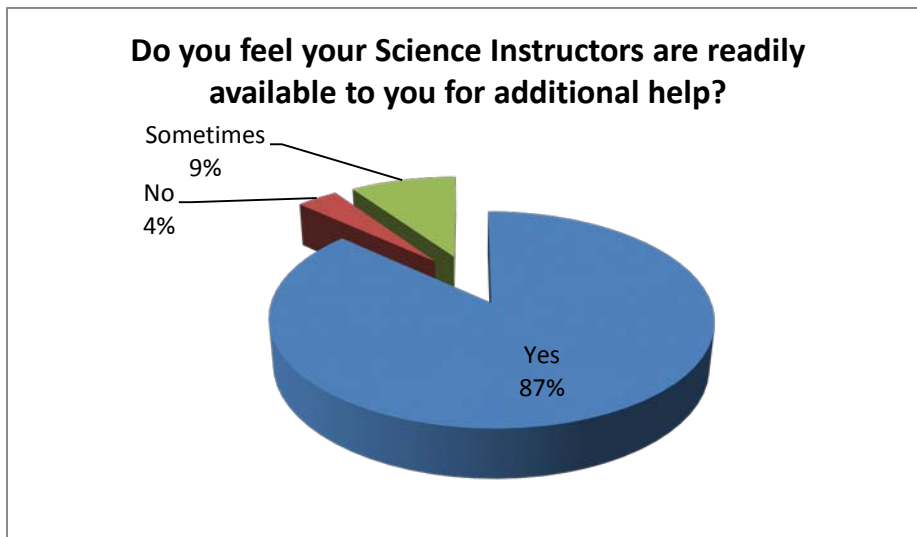


Figure 2. This was an assessment of instructor availability.



Figure 3.

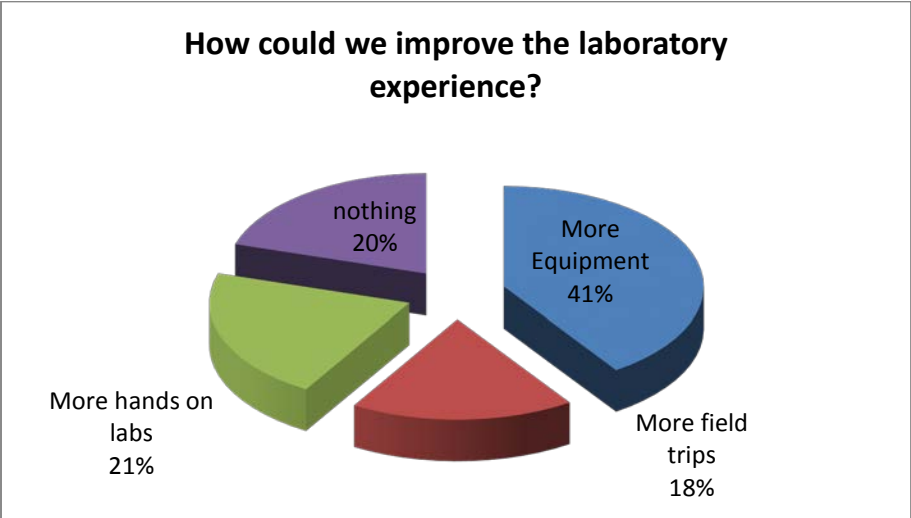


Figure 4.

Figures 3 and 4 are related to the ability to run a successful laboratory. In Figure 4, 62% of students want more hands on lab or more equipment in the laboratory.

2.5 Strengths, Weaknesses, Opportunities, Threats (SWOT)

Strengths (highlight these)	Weaknesses (mitigate these)
Well qualified faculty Teach at various times with frequent offerings throughout the year.	Lack of data Student success in terminal programs Student transfers

Willing to teach overload. Creation of laboratory coordinator position. High student success. Upgraded laboratories.	Student learning Inadequate advising of students Little face-to-face faculty interaction More faculty input on institutional projects
Opportunities (exploit these)	Threats (defend against these)
STEM Money New connections in Mohave County will give students alternative career paths. Loss of jobs in Mohave County (mine closing) will create a new student pool.	Expansion of online science classes in the state Lack of a qualified associate faculty pool Addition of ASU-Havasú High Mohave County Unemployment Rate Lack of science jobs in Mohave County Decreased state funding

Threats

A potential threat to the Science department is the expansion of online science classes in the state. Students do like the flexibility to take classes online. If they are taking these online classes as their lab courses, then it needs to be ensured that they are getting the laboratory skills to satisfy this requirement. Proper assessments and evaluations need to be performed to maintain excellence. There have also been discussions about changing prerequisite requirements for nursing. For instance, the removal of Bio 205 and integrating it into the nursing program. This would definitely hurt enrollment in Science classes and the laboratory fee accrual. Another problem is the lack of qualified adjunct faculty pool.

Figure 1 demonstrates the attitudes of students when they enter a science class. While there is no benchmark for this number, it is interesting to notice that 44% of students stated they are nervous or fearful of taking a science class. Perhaps having faculty members partake in professional development on strategies for smoothing the transition into the sciences would alleviate student fears. This would be beneficial for the 100 level science classes or any prerequisite for that matter. It is important to mention that a survey of the students who did not succeed would be beneficial in order to find out where the weaknesses are, or how their needs were not met, and if it is caught up early, then the chances are better to help them out. In addition, it is valid to see how long it was since they last took a science class. Are they returning students from many years ago? This information can then be used to be more open minded to these issues moving forward. For example, the science faculty can also work with the Student Success center or devote a study hall type system for students to work in the laboratory.

The addition of the ASU-Havasú campus also poses a threat by dipping into our pool of science students. They offer a BS in Life Sciences and also Life Science with an emphasis in Environmental Science. The partnership that was planned, has not been carried out as anticipated. In figure 4, 62% of students want more hands on lab or more equipment in the laboratory. It is expected for the majority of the students to respond with no change required. It needs to be ensured to stay competitive with the other community colleges, at least in Arizona, when it comes to lab activities and equipment.

The unemployment rate for Mohave County has dropped from 13.1% in January of 2010 to 7.9% in December of 2014. The unemployment rate for Arizona is still 6.7% (US Department of Labor, 2015). While that drop is impressive, it still needs to be lower. Secondly, another look at the total jobs available in Mohave County reveals that healthcare and social assistance are the fields with the highest percentage of jobs at 21.9%. Government and Retail Trade are the only other areas in double digits at 19.6% and 13.1% respectively (Economic Profile System-Human Dimensions Toolkit, 2013). Besides the obvious health care positions that MCC students can feed into after completion of their NAH program, forestry, fishing and related activities accounts for only 0.1% of the jobs. Hopefully some people can get on with the government, but many of those jobs still require bachelor's degrees specifically: engineers, epidemiologists, community health specialists, and nutrition and health managers (Mohave County, 2015). There is not a real field for science majors in Mohave County. An enforcement is needed for transfer agreements between MCC and other places in order to push students to go for their bachelor's degree. For example, transfer agreements with UNLV, should be encouraged as well, since it is so close. The job growth for Mohave County is 0.43% compared to US job growth of 1.18%. The unemployment rate for new graduates in Life and Physical Science majors is 7.7% for new graduates. While this is lower compared to the Arts (12.9%) or architecture (13.9%), this can still deter students from majoring in life or physical science. The lowest new graduate unemployment rate was nursing at 4.0% (Anthony P. Carnevale, 2012).

External funding from the State of Arizona is dwindling. The newest budget passed "cuts state funding of the 3 public universities, and it cuts all funding for Maricopa and Pima community college systems" (AZPM Staff, 2015). MCC was not as greatly affected, but it is pointless to hope that this will not eventually happen to MCC as well. If the laboratories are built now, it ensures better preparedness in the future.

Opportunities

The allotted \$50,000 of STEM money at the end of 2014 to add material and technology for the laboratories help tremendously since otherwise it cannot be afforded. One great thing is that the new microscopes were purchased for the labs. Although the STEM money cannot be expected to be available all the time, it was demonstrated by the Science department that there were put for a good use and it made a dramatic impact on the student laboratory satisfaction. The student laboratory satisfaction will continue to be monitored.

With the state of the economy, it is important to look at new populations of students and new areas to recruit students. Kingman Regional Hospital was recently approached to work towards sending students to the Medical Technology Field. This is one example that the science focus needs to be updated from time to time as to not forget for opportunities that are out there. Especially with the emergence of online degrees that increase accessibility to students, there is a need to go out and look for other career paths to offer students.

It is imperative to stress the silver lining with misfortune. For example, with the mine closed in Mohave County, maybe a tuition assistance or something else can be offered to help them

focus their skills into another career. Once they get into MCC, it is easy to show them many different avenues they can pursue in science.

Weaknesses

The major weakness is the lack of data. The overwhelming majority of student's enrolled in science classes at MCC are taking them as a component of some other terminal degree/certificate program (Nursing, Dental Hygiene, Physical Therapist Assistant, Surgical Technology, Pharmacy, etc.). Going forward, there is a need of embedded assessment mechanisms within terminal programs so that it would be possible to objectively evaluate the department's performance in helping prepare students for success in those programs. This might be a better gauge of success. Also, since the majority of the students are going into allied health and nursing fields, it is significant to see if they are successful in their programs as well. One suggestion of assessing this would be to look at registry/licensing exam pass rates for students taking their prerequisites through the Science department. In addition, contacting students to see if they were properly prepared for their program would be helpful. This way, it is easier to find the weaknesses within the Science program and work to remediate those. A better communication and collaboration with the program directors and science faculty is imperative in order to hear their input on the preparation of the students and see if the focus needs to be switched to any particular concepts, as to improve the success of the students.

Furthermore, there is a dire need to work closely with the advisors. Now that the nursing department has changed their requirements so they will also accept Bio 181 in lieu of Bio 100, it needs to be ensured that the students know that these are not identical classes, and that Bio 181 is a SUN course and it quite a bit more difficult. Another proposition is to have more departmental retreats. Many times these retreats are only for one hour or so, which is piggy backed on another event. Maybe a more formal event for departmental meetings would be beneficial. It ensures a better face to face communication and a lot of ideas, SLO's, best practices and curriculum improvements can be shared. It would also increase participation in syllabi review and evaluation. Many new instructors have been hired in the past year and they often do not have time to get adjusted. This might create a more open and inviting environment and help introduce them to the nuances of everything the department has been working on. It would also encourage the new instructors to be more active, to look more into evaluating the courses themselves and get together in a friendly environment. Open Educational Resources (OER) has been established recently and official evaluation of those classes is necessary, not just anecdotal evidence. Another way to gather data would be to conduct focus groups of current students to talk about curriculum, advising, and services available to them.

There are also ways that can be used to better track student learning and ensure that the GE students are getting a well-rounded education. Similar to course mapping, a map can be developed of instructional models to ensure that MCC is really learner-centered and work together to gather more evidence of student performance across the sections: interviews, common exams, oral presentations, writing assignments, field experiences, or case analysis (California Lutheran University, 2015). Even though only one class was assessed via WACm this does not mean that signature assessments should not be developed. Not everyone is great at taking exams and maybe if the assessment tools are varied, it would provide a better understanding of the educational effectiveness. Since the program outcomes are formed, it allows to map those throughout the classes and match them to the GE SLOs. These can be

added to the department goals, as one map for each Science program: AS Chemistry, AS Science, AS Geology and AS Life Science to ensure that no matter which classes they take they will meet all of the outcomes.

The program review should not be limited to the committee members assigned to the task. The department should get together as a group and all of them should pitch with ideas on what to include. One idea would be to have a brainstorming session for the SWOT analysis (Austin Community College District, 2014). Then once all of the ideas are collected, the members are the ones to assemble the report, but it is important to state that all of the faculty would have had input. Departmental retreats would be good to help with all institutional projects if they are handled face-to-face instead of over email.

Strengths

The strengths of the science department are that the courses are required for the allied health programs offered by the school. This ensures a steady stream of demand for the science classes. The average fill rate is 75%, but this is due to the flexible schedule that are offered. Based on the previous surveys of the students when they have been asked for the times and days they would like to take classes (see Appendix E), it is clear what the preferences are: Bullhead overwhelmingly for mid-morning to early afternoon and night classes one or two days a week; Kingman and Lake Havasu preferred morning or mid-morning two days a week. The Science department listens to the needs of the community and offers classes at varying times to cover all bases. Looking at the matrix in appendix B table 1, it shows the wide variety of classes that are offered each semester. This allows students to start their sequence of classes at any time, and to graduate or enter their terminal program each semester. Although the desire of the MCC is to have a common matrix for all of the campuses, it is imperative to establish the variety of the classes independently for each campus, as to allow the expression of the student's will. After some initial hesitation, in the last year, quality controlled online science classes have been offered to increase access to education to students who might not have been able to take them before. One of the missions of the college is, "serving all constituencies" at the department level. This will defend against the outside threat of students leaving and taking online classes elsewhere. These online classes have been offered at all of the southern campuses to allow students from anywhere to take on ground classes if they choose. Many of our classes are offered also during the summer term as well. Since many of the other colleges around (for example College of Southern Nevada, Palo Verde College etc.) are not offering any summer classes, this allows MCC to tap on a niche that would otherwise not be available and drag more students in.

Participation in group advising has been established as well. As it was mentioned earlier, in the threat analysis, the outlook for science majors does not look bright for Mohave County. Hopefully with additional research of other career paths as it was discussed in the opportunities, by using group advising more students can be reached in a shorter amount of time and earlier in their studies to help show them their options. These different options should be marketed to the public instead of waiting for the public to come and see for themselves.

In addition, many of the science faculty have PhDs and serve as great content experts. This can be used to draw more grants toward MCC if the process of writing grants is somewhat simplified. In addition, since there is a lack of qualified associate faculty, many resident faculty will gratefully teach on overload each semester to ensure fidelity of the classes and decrease reliance on associate faculty. Science faculty have kept all of the course packages up-to-date and they keep monitoring them on a rotating basis. Students find it easier to have the same lab and lecture instruction. Science faculty go above and beyond to try to serve the students in this capacity. Although the filling rate of 75% might be considered as a bad thing, on the other sides, it decreases the student to teacher ratio and it allows for a more personal and one-to-one attention with students during class. The science classes are usually held in rooms that have the capacity to hold 24 or more, but that detracts from a major selling point of the community college.

The success data shows that 85% of the students succeed in science classes. This is something to be proud over and can be attributed to the fact that the science classes are predominately being taught by highly qualified resident faculty. Figure 2 demonstrates an assessment of instructor availability. It is significant to mention that overwhelming majority of students responded that their instructors were available to them. This also provides rationale to remain with the five schedule office hours and two supplemental instruction hours, as already required.

Since the last program review, many of the department's laboratories have been upgraded. This allows to do many more things in the science labs and provides a more enjoyable experience than before the renovation. It is imperative to state that 60% of students feel that they have everything they need for their lab. This demonstrates the department is prepared for lab, but there is a flaw in this line of questioning. The students are only offered materials that can be afforded. Since the last program review, a budget of roughly \$10,000 was given across the board for the southern campuses. This delivers a better opportunity to provide the students with a proper college-level science class learning experience. ATF contacts have been questioned in order to find out what their laboratory standards were and how they compare to the standards at MCC. Since transferrable courses are offered, the department wants to offer a similar standard as it can be found on other places and colleges across Arizona. CELT bought new iPad Air's for the science department. In addition, many upgrades have been made in the quality of the laboratory experience in the last four years.

	Science Program Outcomes					MCC General Education Philosophies					
	Perspectives and value of Science	Scientific Literacy	Communicate understanding of scientific principles	Critical thinking	Recognize important contributions of science in	Aesthetic Sensibilities	Communication Skills	Critical Thinking Skills and Problem- Solving	Cultural Diversity and Global Awareness	Techniques of Inquiry	Technological Literacy
Chemistry											
Chm 130											
Chm 151											
Chm 152				FE				R, FE	R, FE	I, FE	
Chm 235											
Chm 236											
Physics											
Phys 111											
Phys 112											
Phys 115											
Phys 116											
Biology											
Bio 100				FE				I, FE	R, FE		I, FD
Bio 181				FE			R,RP	I, FE	I, FE	R, FE	
Bio 182				FE			R,FE	R, FE	R, FE		R, FE
Bio 201							R, W				
Bio 202							R, W				
Bio 205							R, W				
Bio 290						FD					
Bio 291						FD					
Geography											
Ghy 212											
Ghy 231											
Ghy 240											
Geology											
Glg 101											
Glg 102											
Glg 110											
Glg 140											

Key: FE = Final Exam, CG = Course Grade, W = Written Assignment, OP = Oral Presentation, RP = Research Paper, GP = Group Projects, GH = Graded Homework, Field Experiences= FD, R=Reinforce, I= Introduction

Modified from (California Lutheran University, 2015)

3. Student Learning Outcomes Assessment:

3.1. What percentage of courses have identified SLOs? (comment of progress/lack of progress)

All of the science courses have identified SLOs, per the course packages.

3.2. What percentage of courses have ongoing SLO assessment? (comment on progress/lack of progress)

Only 15% of the science classes are undergoing SLO assessment. There is a writing across the curriculum assessment project. Almost all of the science courses participate in writing across the curriculum. However, they are not part of the assessment.

3.3. How has assessment of course level SLOs led to improvements in student learning and achievement?

They identified a disparity between sections. Therefore, it needs to be ensured that the students will receive the same or similar experience campus wide. This can be solved by having the faculty across the campuses meet and share their ideas on what works with one particular topic versus another.

3.4. How has assessment of course-level SLOs led to improvements in transfer or certificate/degree awards?

This assessment started recently, so no data has been collected yet.

3.5. What challenges remain to make course SLO more effective?

It requires more instructor involvement in order to get a better idea of student learning across the campuses. Also, additional experience is needed in choosing and implementing an assessment that will better provide the data. Right now, this can be considered as a "trial run" phase.

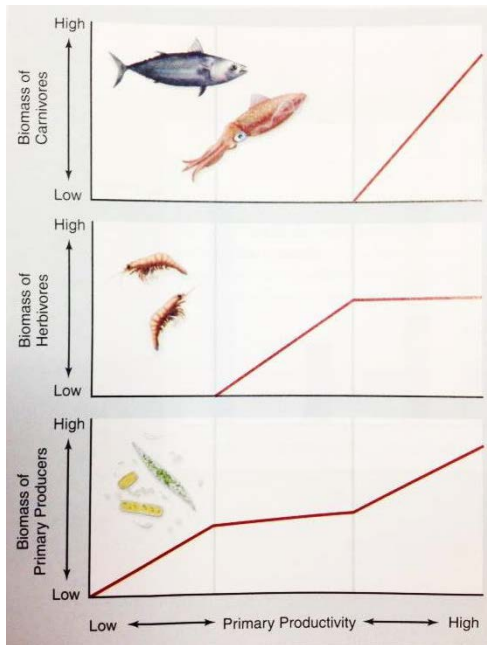
Biology 100, 181, and 182 has been chosen to be assessed. These classes are taught by resident faculty of all of the campuses and 181 and 182 also represent dual enrollment. Bio 100 is also taught online. Also, since there is a smaller number of instructors, this also decreases the error rate of the assessment. The data collected in the past had some unreliable assessment data (e.g. instructor forgetting, changing answers, and wrong answers).

See appendix A for the full assessments.

Course Objective and GE SLO Mapping:

Program outcomes	Course	Course Outcomes	General Education Outcomes	Levels	Emphasis
1	Bio 182	I.B. List the evidence for macroevolution that supports Darwin's Theory of Evolution	Techniques of Inquiry 5.5	I	High
<p>The theory of evolution by natural selection is a good example of how science proceeds because</p> <ul style="list-style-type: none"> a. it rationalizes a large body of observations b. it makes predictions that have been tested by a variety of approaches c. it represents Darwin's belief of how life has changed over time. d. Both a and b. <p>Answer: D</p>					
2	Bio 182	IV. D. Demonstrate proper use of compound microscope	Technological Competency 6.1	R	Medium
<p>Which objective allows you to see the most detail?</p> <ul style="list-style-type: none"> a. 4x b. 10x c. 40x d. 100x <p>Answer: D</p>					
3	Bio 182	III. B. Discuss Interactions within communities: competition, symbiotic relationships, predator-prey cycles and patterns of succession	Communication Skills 2.2	R	Medium

Ecologists often worry about the potential effects of the loss of species (e.g. due to pollution, habitat degradation, or other human-induced factors) on an ecosystem for reasons other than just the direct loss of the species. Using the figure below, explain why. Please answer in grammatically correct complete sentences. **As the figure suggests, trophic structure and dynamics are interrelated and are primary determinants of ecosystem characteristics and behavior. For example, if a particularly abundant herbivore is threatened, energy is relatively unavailable to higher trophic levels (e.g. carnivores). That is, the cascading effects, whether they are driven from the bottom up or from the top down are a characteristic of energy transfer in ecosystems, and that translates into the reality that effects on a particular species are unlikely to be limited to that species itself.**



III. B. Discuss Interactions within communities: competition, symbiotic relationships, predator-prey cycles and patterns of succession

4	Bio 182	II. F. Explain why the fungi are not classified with the plants and how they are fundamentally different from other living organisms.	Critical Thinking Skills and Problem-Solving 3.3	R	Medium
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Heterotrophic eukaryotes that digest their food externally and absorb the small molecules are referred to as

- a. bacteria
- b. fungi
- c. plants
- d. multicellular algae

Answer: B

5	Bio 182	I. B. List the evidence for macroevolution that supports Darwin's theory of evolution	Cultural Diversity and Global Awareness 4.6	I	High
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Darwin's finches are a noteworthy case study of evolution by natural selection because evidence suggests

- a. They are descendants of many different species that colonized the Galapagos.
- b. They radiated from a single species that colonized the Galapagos.
- c. They are more closely related to mainland species than to one another.
- d. None of the above.

Answer: D

Program outcomes	Course	Course Outcomes	General Education Outcomes	Levels	Emphasis
1	Bio 181	7.2 Describe the mechanisms for generating ATP	Critical Thinking Skills and Problem-Solving 3.4	I	High

A chemical agent that makes holes in the inner membrane of the mitochondria would

- a. Stop the movement of electrons down the electron transport chain
- b. Stop ATP synthesis
- c. Stop the Krebs cycle
- d. All of the above

Answer: B

2	Bio 181	4.4 Describe the four major groups of biologic macromolecules, and how they are important in living organisms.	Critical Thinking Skills and Problem-Solving 3.3 Communication Skills 2.4	I	High
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How do the four biological macromolecules differ from one another? How does the structure of each relate to its function? **The four biological macromolecules all have different structure and function. In comparing carbohydrates, nucleic acids and proteins, we can think of these as being polymers with different monomers. In the case of carbohydrates, the polymers are all polymers of the simple sugar glucose. These are energy storage molecules (with many C-H bonds) and structural molecules such as cellulose that make tough fibers. Nucleic acids are formed of nucleotide monomers, each of which consists of ribose, phosphate, and a nitrogenous base. These molecules are informational molecules that encode information in the sequence of bases. The bases interact in specific ways: A base pairs with T and G base pairs with C. This is the basis for their informational storage.**

Proteins are formed of amino acid polymers. There are 20 different amino acids, and thus an incredible number of different proteins. These can have an almost unlimited number of functions. These functions arise from the amazing flexibility in structure of protein chains.

<p>Lipids are made up from two kinds of molecules: fatty acids and glycerol. Fatty acids can have many C-H bonds that serve as long-term energy storage. They are essential in membrane formation.</p>					
3	Bio 181	6.3 Explain the significance of the mitochondria to energy production in eukaryotes and 8.6	Cultural Diversity and Global Awareness 4.2	I	Medium
<p>Certain cultures regularly marry relatives. From a genetic disease standpoint, what is the potential hazard?</p> <p>a. It will increase genetic diversity, leading to healthier offspring b. It will decrease genetic diversity, leading to healthier offspring c. It will increase genetic diversity, leading to unhealthier offspring d. It will decrease genetic diversity, leading to unhealthier offspring</p> <p>Answer: D</p>					
4	Bio 181	8.6 Explain the concept of inheritance	Critical Thinking Skills and Problem-Solving 3.3 Communication Skills 2.2	I	Medium
<p>Is it possible to have a calico cat that is male? Why or why not? Male calico cats are very rare. The coloration that is associated with calico cats is the product of X inactivation. X inactivation only occurs in female as a response to dosage levels of the X-linked genes. The only way to get a male calico is to be heterozygous for the color gene and to be the equivalent of a Klinefelters male (XXY)</p>					
1	Bio 100	Demonstrate the processes involved in scientific discovery	Techniques of Inquiry 5.4	R	High
<p>Which of following would not be considered a proper component of the scientific method?</p> <p>a. a hypothesis b. a documented experimental method c. results based on a biased data set d. an evidence based conclusion</p> <p>Answer: C</p>					
2	Bio 100	Describe possible origins and distinguishing characteristics of life	Cultural Diversity and Global Awareness 4.6	I	Medium
<p>There are several characteristics that define all life, as we currently understand it. Which of the following is NOT one of them?</p>					

- a. Metabolism
- b. Reproduction
- c. Organization
- d. Meiosis

Answer: D

3	Bio 100	Describe the structure and function of nucleic acids	Critical Thinking Skills and Problem-Solving 3.2	I	High
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If one strand of DNA is CGGTAC, the corresponding DNA strand would be

- a. GCCATG
- b. GGGUAC
- c. CGGTAC
- d. TAAGCT

Answer: A

4	Bio 100	Describe the hierarchy of organization in living things and Describe the basic structure and functioning of cells	Cultural Diversity and Global Awareness 4.6	R	Low
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What is the likely origin of chloroplasts?

- a. mitochondria that had a mutation for photosynthesis
- b. a combination of mitochondria and Golgi bodies
- c. photosynthetic prokaryotes that lived inside eukaryotic cells
- d. eukaryotes that engulfed photosynthetic fungi

Answer: D

5	Bio 100	Describe and Analyze the events and processes involved in Mendelian inheritance	Critical Thinking Skills and Problem-Solving 3.3	I	High
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In what state does the phenotype NOT reflect the entire genotype?

- a. Homozygous state
- b. Heterozygous state
- c. Both
- d. Neither

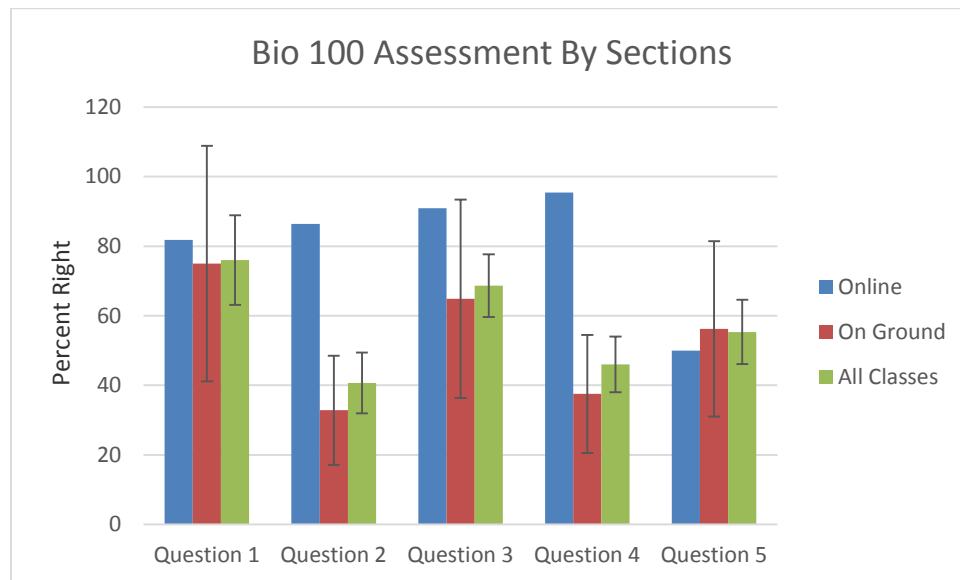
Answer: B

Biology 182 Assessment

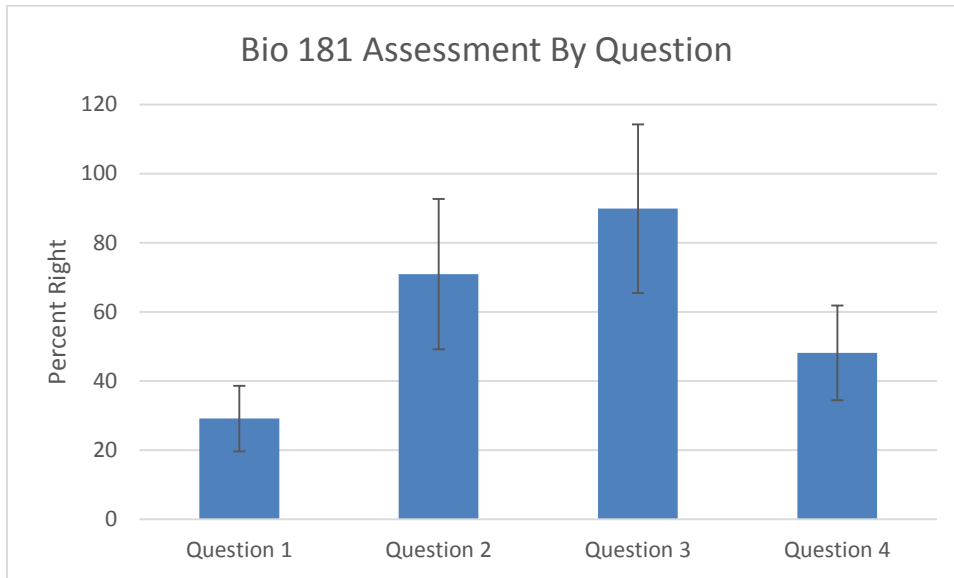
Two out of the four instructors teaching this class participated in the assessment. Instructor 1 was a dual enrollment instructor. Their average was 83.7%, n=44 (questions right out of 7: 5.86 ± 1.21). The second instructor was resident faculty. Their average was 61.6%, n=12 (questions right out of 7: 4.33 ± 0.79). If D is calculated as 60 and above, then all of the students except for 3 passed the assessment, 2 on ground and 1 dual enrollment. So, it is disturbing that there was almost a 20% difference from the on-ground to the dual enrollment class ($p < 0.001$). It should be taken into consideration that the process of evaluation needs to be either improved or organized better to ensure that a more leveled experience would be provided across all of the classes. Discussion of this with the instructors involved at the retreat might benefit the students.

Biology 100 Assessment

The decision was to break down the data by question, not by student. The Bio 100 assessment was significant since it compared both online and on ground sections. Pooling the classes together, the amount of students answering correctly for questions 1 through 5, respectively, are: 76%, 41%, 69%, 46%, and 55%. This means that only 3 out of 5 competencies were met (assuming 60% and above is met). The interesting thing is looking at the online versus on ground averages. The averages are 97% vs. 82 ($p > 0.05$), 42% vs. 86% ($p < 0.001$), 83% vs. 91% ($p < 0.001$), 48% vs. 96% ($p < 0.001$), and 73 vs 50% ($p > 0.05$) (student's 2-tailed T test with unequal variance). The averages by instructor also varied widely, average of $68.4 \pm 14\%$. Four of the five instructors had averages that would be considered as meeting the goal. To improve student learning, other opportunities should be taken into consideration, such as using materials like MasteringBiology or other adaptive learning to help the on ground students navigate better through the material. Another suggestion is to require a mandatory tutoring if a student falls below a certain average. Also, it has been decided to include Bio 100 and Chem 130 in the Assessment of Gen Ed Philosophies project. The number of the questions will be increased to 10 and every attempt will be made in order to clear any ambiguity that may exist in any of the questions.



Bio 181 Assessment



The main problem was with the question choice. Some of the questions had two parts answers. In most of the cases, students failed to answer the second part of the question (questions 2 and 4). These were writing questions. If the students did not answer both parts then the answer was keyed as incorrect. The averages on the four questions, respectively, were: 29%, 71%, 24%, and 14%. So, glancing at the data it seems that only 2 out of 4 learning outcomes were met. The first question was really hurt by the dual enrollment group, everyone except one person answered all of the above. The averages by instructors also varied widely, average of $61 \pm 19\%$. Only 2 of the 4 classes had averages that would be considered as meeting the goal. Once again, it might be appropriate in order to help the students, to require mandatory tutoring or other supplemental learning opportunities to help with the large amount of material. Some of this is already addressed in the long term goals of training the faculty to help students transition to the sciences and provide them, the students with the study skills in order to be successful, not only in Bio 100 classes but in their future education.

Development of Program Outcomes:

1. Introduce students to the perspectives and values of science and the major principles and theories upon which these are based.
2. Promote scientific literacy using the developments, methods, and technologies of science.
3. Demonstrate the ability to communicate an understanding of the interrelationships between biological principles and concepts.
4. Facilitate critical thinking skills through direct experience with the methods and processes of inquiry (the scientific method).
5. Recognize the important contributions that science has made and continues to make in today's society.

The ongoing process is incorporation of the program outcomes into the science classes and correlating them with the GE philosophies. (See under weaknesses in the SWOT analysis).

4. Evaluation of Progress Toward Previous Goals

Data in Appendix B.

Goals	Action Item	Outcome
Streamline and clarify the pre-requisite sequence for science offerings needed in other terminal degree programs.	Creation and publication of pre-requisite grid developed by the science faculty and relevant program heads. Survey students to identify problems with choosing proper courses to take.	A course matrix has been created and it has been provided to the Office of Instruction. 69% did not find it difficult, 20% did, and 11% were unsure. Working with student services on group advising should clear up both the unsure and yes group. See Appendix B, figure 1 and table 1.
Continue to introduce innovative technology in the science educational experience.	To integrate at least one new technology related exercise in each course.	<p><u>Bio100/181</u></p> <p>iPad Applications:</p> <p>iCell app- a 3D rendering of plant, animal, and bacterial cells. Illustrates cell structure and function</p> <p>NOVA elements app- used to augment understanding of the periodic table and element structures</p> <p>Molecules app- used to show structures of proteins, carbohydrates, DNA, and lipids</p> <p>Mitosis simulation App- an interactive simulation of mitosis</p> <p>Meiosis simulation app and building a cell membrane app</p> <p><u>Microbiology</u></p> <p>iPad Applications:</p> <p>Use iPads for taking pictures and notes of unknown bacteria, which is ongoing</p>

		<p>throughout the semester.</p> <p>HHMI bacterial ID lab- interactive simulation of extracting DNA and sequencing unknown bacteria</p> <p>The increased funds presented the opportunity to provide the students with more supplies for a more hands on approach. They were able to become more proficient in aseptic technique, streak isolation, and biochemical testing for unknowns. In order to increase the safety of the students, the previously compromised Bunsen burners and tubing has been replaced with new and safe equipment. New staining bottles, glassware, and inoculating loops has been purchased to improve the collection and ensure proper functioning of the lab. Continued financial support will provide the students with gel electrophoresis equipment in order to be able to analyze DNA profiles of various microbes.</p>
Improve Availability of Course Information	Confirm that all course information is easily accessed after registration. A simple survey of whether the student can easily identify their text ISBN before the first day of class.	94% of students surveyed in Spring 2013 could find their materials before the first day of class. See Appendix B, figure 2.
Increase Student Satisfaction	Assess student satisfaction through a "science student satisfaction" survey at the end of each semester.	The students have been surveyed on if they felt that their science instructors were available to them for additional help? 87% Yes, 4% No, 9% Sometimes See Appendix B, figure 1 and table 1.

Increase our attendance at science meetings around the state	Attendance of at least one science meeting per year by at least one science faculty member on each campus.	There seems to be a core group of faculty that attends the meetings. Efforts should be made in order to include all of the science faculty. Also, additional work is required in order to expand the professional development.
Apply for National Science Foundation's Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES) Grant		With the help of Dan Lara, the application for the STEM grant has been sent in August of 2014.
Update all course packages by the end of the academic year	Develop a cyclical rotation to update course packages.	All course packages are up to date.

5. Program Goals and Plan

5.1 Short term goals

Based on the above data and analyses, identify two or more concrete goals, measurable outcomes, and activities that you would anticipate resulting in improvements to the program in the next 2-year cycle

- i. Increase student laboratory satisfaction in the sciences.
 - a. Measurable outcome: student satisfaction survey with 80% or higher
 - b. Plan: With the addition of the STEM money, the science department needs to meet and come to consensus on how the labs are run and which experiments (tied to learning objectives) will be done. It should foster a more uniformed experience for students across all campuses. Coordination with all of the faculty members would ensure these funds are being used in ways that would be directly tied to increasing student satisfaction. Students will be vigorously monitored via feedback during each laboratory session. This data would be collected and analyzed. The collected data would help to clarify where to focus the financial resources in the future.

- ii. Modify the current assessment projects.
 - a. Measurable outcome: A score of 70% or greater on the assessment would be considered met.
 - b. Plan: During a faculty retreat, all of the science courses would be mapped to GE SLOs and the science program SLOs. All of the faculty teaching each section will develop an assessment to be used across all the sections. A variation of the type of assessment should be ensured instead of just using only multiple choice questions on an exam. The assessments will run for one semester, where the faculty will then reconvene and

discuss strengths and weaknesses of the assessment and revise as appropriate. Then these will be used as the course assessments to monitor student learning and educational effectiveness.

- c. Responsible Parties: All faculty.

5.1.1. What specific aspects of these goals can be accomplished without additional financial resources? Goals 1 and 2 can be done without financial resources, although approved travel would be needed to gather at one location.

5.2. Long-term Goals (six year cycle)

5.2.1. Based on the above data and analyses, identify two or more concrete goals, measurable outcomes, and activities that you would anticipate resulting in improvements to the program within the next six years.

- i. Develop embedded questions for the programs at MCC to ensure students have maintained concepts learned in their science classes.
 - a. Measurable Outcome: 70% or higher on the assessment
 - b. Plan: Work with the program directors to devise questions and instructions on how to deliver the assessment.
 - c. Responsible Party(ies): One lead faculty from each class (Lead Bio 100, Lead Bio 181, Lead Chem 130, Lead Bio 201, Lead Bio 202, Lead Bio 205) and the program directors. If one person teaches multiple classes, then they can serve as lead for many classes. Only assess the classes if they were prerequisites for the program. Ensure that the students that are assessed did take these classes at MCC.
- ii. Increase success and retention in Biology Classes
 - a. Measurable Outcome: Increase success rate to 90%
 - b. Plan: Program review showed that students that were not successful in science classes did not go on to their program of choice. Identifying these students early on, can bring better opportunities to help them become successful. Professional development is proposed as it will provide them with skills to ease student anxiety, develop study skills for science class, and improve education in the different types of learners.
 - c. Responsible Party(ies): Lead faculty from each campus will develop the professional development or see outside counsel.

5.2.2. What specific aspects of these goals can be accomplished without additional financial resources? Goal 1 can be done without financial resources. Goal 2 would need financial resources to develop the professional development, attend conferences, or invite speakers. These sessions can be recorded to be shown to the new faculty that come on board.

6. Requests for Resources

For any specific aspect of a goal listed in 5.0 that would require additional financial resources, complete the form below.

Type of Resource	Requested Amount	Potential Funding Source
Personnel		
Facilities		

Equipment		
Supplies		
Computer Hardware		
Computer Software		
Training	\$12000 over 6 years	Hopefully, state STEM Money. If not then laboratory fees.
Other		
Total Requested Amount		

6.1. Describe the resource request. Long Term goal 2 can be done with the use of the STEM money from the state or laboratory fees.

6.2. What program outcome(s) does the resource request address? Outcomes 2-4 all hinder on student success in the class. If the instructors are more educated in dealing with different types of students, then they can increase their reach and help more students. Also, it should be looked only for study skills that strictly pertain to the sciences.

6.3. What measurable outcome(s) will result from filling this resource request? This will increase the success rate in the science classes and then can also help with the graduation rate.

7. Executive Summary

A look at the KPI table reveals that the science department mainly follows along with the college, based on data that the president has presented in several of his speeches. These are mainly downward trends. There was a drop in the enrollment, but there are many sections that have been offered at this time. Once the number of the sections is somewhat decreased, then the fill rate should increase. However, it is important to mention that decreasing too many classes may jeopardize the stability of the student pool, as if the classes are not offered, students may go to other colleges. The retention in the science classes was around 85%, but the goal is to increase that number to 90%. In addition, the method used to describe retention is not accurate for the science classes. Since there are not many students that graduate with an A.S. in a science, an embedded assessment in the terminal allied health and nursing programs here at MCC needs to be provided to objectively evaluate the science student's success. It was decided to use Bio 205 and Chem 130 as proxies of student success in the science program. The student's degree declaration can be used as indicators of their acceptance into their program of choice. Looking at these two classes, 66.8% of students have been retained since Fall 2012. On the contrary, only 12.1% of students taking any science class go on to enroll in a nursing or allied health program. Either they do not get accepted, but it is worth mentioning that a lot of these are Bio 100 students or other GE students taking their science requirements, and as a consequence, this is not a real indicator of their success. In addition, the general studies and liberal arts students that were taking Chem 130 were 7.5 times more unsuccessful than nursing or allied health students and 6.3 times more unsuccessful for Bio 205.

In student satisfaction surveys, 44% of students were nervous or had a fear of failing their science class. Professional development for the faculty has been proposed, so they can learn study skills and other techniques to help ease student fears and provide them the tools to be successful in their science classes.

Over the last year, the science course objectives has been mapped to the general education student learning outcomes (Bio 100, 181, 182, and Chem 152). In addition, we discovered that the questions that have been used in the assessments were not fully answered by the students which may give a skewed picture of the reality. The questions are currently revised and tested before they will be send to the Office of Instruction for inclusion into the institutional GE assessment project. Furthermore, the plan is to map all of the science program outcomes with the GE SLOs. The easiest way to do this would be at a departmental retreat, which can be also used to share best practices, evaluate classes, evaluate syllabi, and basically get everyone's input on the assessments and teaching methodologies.

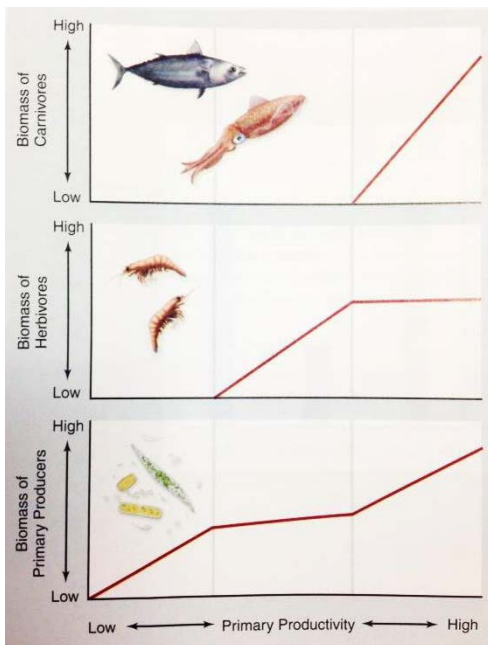
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Appendix A: Course Mapping Assessments

Bio 182 Common Assessment

1. The theory of evolution by natural selection is a good example of how science proceeds because
 - a. it rationalizes a large body of observations
 - b. it makes predictions that have been tested by a variety of approaches
 - c. it represents Darwin's belief of how life has changed over time.
 - d. Both a and b.
2. Darwin's finches are a noteworthy case study of evolution by natural selection because evidence suggests
 - a. They are descendants of many different species that colonized the Galapagos.
 - b. They radiated from a single species that colonized the Galapagos.
 - c. They are more closely related to mainland species than to one another.
 - d. None of the above.
3. Which objective allows you to see the most detail?
 - a. 4x
 - b. 10x
 - c. 40x
 - d. 100x
4. Ecologists often worry about the potential effects of the loss of species (e.g. due to pollution, habitat degradation, or other human-induced factors) on an ecosystem for reasons other than just the direct loss of the species. Using the figure below, explain why. Please answer in



grammatically correct complete sentences.

6. Heterotrophic eukaryotes that digest their food externally and absorb the small molecules are referred to as
- a. bacteria
 - b. fungi
 - c. plants
 - d. multicellular algae

Appendix B: Data towards previous goals

Appendix B

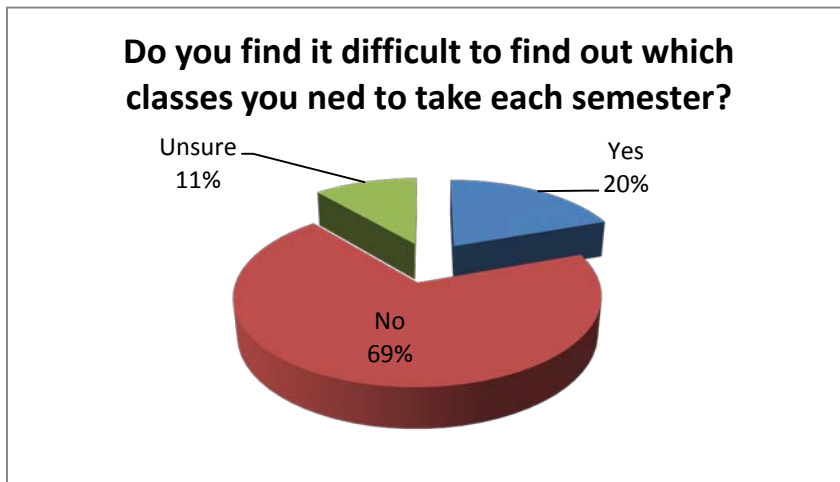


Figure 1.

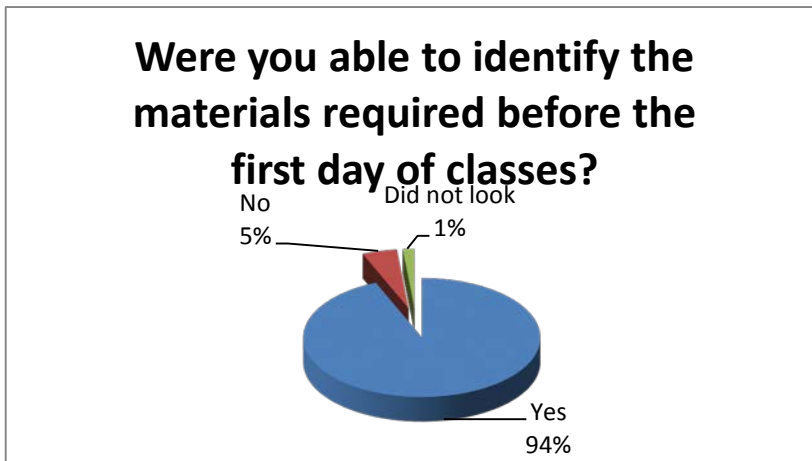


Figure 2.

Appendix C.

Table 1.

COURSE MATRIX 2012-2015									
B = Bullhead E = Extended Campus K = Kingman L = Havasu N = North									
	FA12	SP13	SU13	FA13	SP14	SU14	FA14	SP15	SU15
AST									
AST 101									
BIO									
BIO 100	K L B N	K L B N		K L B N	K L B N		K L B N	K L B N	
BIO 181	K L B D(BKLN)	L		K L B D(BKLN)	L		K L B D(BKLN)	L	
BIO 182		K L B D(LBN)			K L B D(LBN)			K L B D(LBN)	
BIO 201	K L B N D	K L B N D(B)		K L B N D	K L B N D(B)		K L B N D	K L B N D(B)	
BIO 202	K L B N	K L B N D(L)		K L B N	K L B N D(L)		K L B N	K L B N D(L)	
BIO 205	K B L N	K L B N		K B L N	K L B N		K B L N	K L B N	
BIO 290	B			B			B		
BIO 291		B			B			B	
CHM									
CHM 130	K L B N	K L B N D(N)		K L B N	K L B N		K L B N	K L B N	
CHM 151	K L B			K L B			K L B		
CHM 152		L K B			L K B			L K B	
CHM 235	K B			L			K B		
CHM 236		K B			L			K B	
ENV									
ENV 101	D(B)	L D(B)			L			L	
GHY									
GHY 212	E	E		E	E		E	E	
GHY 213									
GHY 240	E	E		E	E		E	E	
GLG									
GLG 101	B L			BL			BL		

GLG 110	E	BLE		E	BLE		E	BLE	
GLG 140	E	E		E	E		E	E	
PHY									
PHY 107					B				
PHY 111				K			B		
PHY 112					K			B	
PHY 115		E			E				
PHY 116				E			E		

Appendix D: KPI Raw Data

Table 1. Success data for all science classes

Year	NO	Success	Total	%Success
2009	384	2,499	2,883	87%
2010	497	2,651	3,148	84%
2011	446	2,382	2,828	84%
2012	375	2,337	2,712	86%
2013	185	1,022	1,207	85%
Total	1,887	10,891	12,778	85%

Table 2. Retention by Percent Returned and Percent Graduated by Cohort and Future Year

Cohort	%Ret2ndYr	%Grad2nd Yr	%Ret3rdYr	%Grad3rdYr	%Ret4thYr	%Grad4thYr
2009	70%	7%	46%	27%	29%	31%
2010	67%	8%	41%	20%	24%	32%
2011	64%	10%	39%	19%		22%
2012	65%	9%		11%		

Table 3.

2.3 Achievement Gap Data from IPEDS

CIPCODE	Award Level	Major	Gender	Non Resident Alien	Hispanic / Latino	American Indian or Alaska Native	Asian	Black or African American	Native Hawaiian or Other Pacific Islander	White	Two or more Races	Race/ ethnicity unknown	Total	distance education program	
30.1801 Natural Sciences	2 - Awards of at least 1 but less than 2 academic years	1	Men	0	0	0	1	0	0	0	0	0	1		
			Women	0	0	0	0	0	2	1	0	0	3		
			Total	0	0	0	1	0	0	2	1	0	0	4	No
40.0501 Chemistry, General	3 - Associate's degree	1	Men	0	0	0	0	0	0	0	0	0	0		
			Women	0	0	0	0	0	0	1	1	0	0	2	
			Total	0	0	0	0	0	0	1	1	0	0	2	No
26.9999 Biological and Biomedical Sciences, Other	3 - Associate's degree	1	Men	0	0	0	0	0	1	0	1	0	0	2	
			Women	0	0	0	0	0	0	0	11	0	0	11	
			Total	0	0	0	0	0	0	1	0	12	0	0	13

Appendix E.

Table 1. Survey of when students would like to take classes. March 2014.

My FIRST preference to take classes would be...				What time would you prefer second to take classes?			
	BHC	LHC	NCK		BHC	LHC	NCK
Answer Choices –	Responses			Answer Choices	Responses		
	–			–	–		
8a or 9a (Daylight savings 7 or 8)	16.67%	21.43%	30.43%	8a or 9a (Daylight savings 7 or 8)	4.17%	10.71%	21.74%
	8	6	7		2	3	5
10a or 11a (Daylight savings 9 or 10)	25%	32%	26.09%	10a or 11a (Daylight savings 9 or 10)	14.58%	21.43	39.13
	12	9	6		7	6	9
12p or 1p (Daylight savings 11 or 12)	10.42%	10.71%	13.04%	12p or 1p (Daylight savings 11 or 12)	12.50%	14.29%	13.04%
	5	3	3		6	4	3
2p or 3p (Daylight savings 1 or 2)	8.33%	7.14%	4.35	2p or 3p (Daylight savings 1 or 2)	10.42%	14.29	8.7
	4	2	1		5	4	2
4p or 5p (Daylight savings 3 or 4)	18.75%	10.71%	13.04%	4p or 5p (Daylight savings 3 or 4)	18.75%	21.43	4.35
	9	3	3		9	6	1
6p or 7p (Daylight savings 5 or 6)	16.67%	14.29%	13.04%	6p or 7p (Daylight savings 5 or 6)	22.92%	14.29	13.04
	8	4	3		11	4	3
8p or 9p (Daylight savings 7 or 8)	4.17%	3.57%	0%	8p or 9p (Daylight savings 7 or 8)	16.67%	3.57	0
	2	1	0		8	1	0
Total	48	28	23	Total	48	28	23

Table 2.

I prefer courses offered...				I would rather NOT take classes...			
	BHC	LHC	NCK		BHC	LHC	NCK
Answer Choices –	Responses –			Answer Choices –	Responses –		
One day a week	72.92%	28.57%	42.48%	One day a week	8.33%	28.57%	21.74%
	35	8	10		4	8	5
2 days a week (M/W or T/TH)	27.08%	60.71%	56.52	2 days a week (M/W or T/TH)	6.25%	0.00%	13.04%
	13	17	13		3	0	3
3 days a week (M/W & F)	0%	11%	0	3 days a week (M/W & F)	85.42%	71.43%	65.22
	0	3	0		41	20	15
Total	48	28	23	Total	48	28	23

Table 3.

If I need multiple science courses (i.e. Chem and Bio or Bio 201 and 205), I would like my science courses scheduled...			
	BHC	LHC	NCK
Answer Choices –	Responses –		
on the same days, close together (i.e. back-to-back or an hour apart chem and bio).	29.17%	39.29%	21.74%
	14	11	5
on the same days, further apart (i. e. one in morning and one 5 hours later).	8.33%	10.71%	4.35%
	4	3	1
on different days.	33.33%	32.14	56.52
	16	9	13
no preference.	29.17%	32.14	17.39
	14	5	4
Total	48	28	23