Program Evaluation of UTRGV Peer-Led Team Learning (PLTL) – AY 2022

According to The Center for Peer-led Team Learning, PLTL "is a nationally recognized model of teaching and learning that originated in a chemistry course at the City College of New York in 1991. In PLTL, students who have done well are recruited to be peer-leaders: students who facilitate small-group learning as an integral part of the course. Each week, the peer-leaders meet with their group to engage in problem solving and discussion of course material. The PLTL model has been adapted to many institutions nationwide across all STEM disciplines, and an extensive body of research has demonstrated that PLTL improves student learning."

The program was developed based on educational best practices and some of the documented benefits to this type of program include:

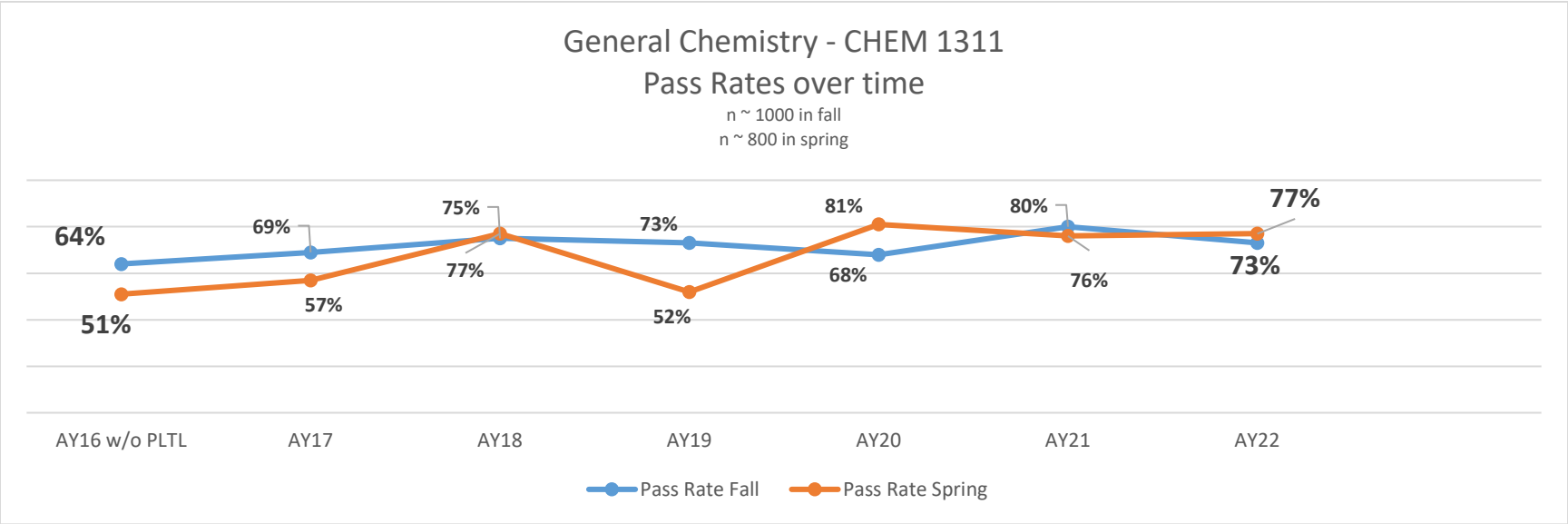
- the ability for the leader to articulate faculty and course expectations in student terms.
- additional time to focus on specific tasks, whether that be approach to learning, content, or both.
- additional time to practice, apply, and discuss.
- immediate and personalized feedback.
- development of peer relationships (with other students and with peer leaders) and strengthens peer learning communities.
- enhances critical thinking, teamwork, and individual accountability.

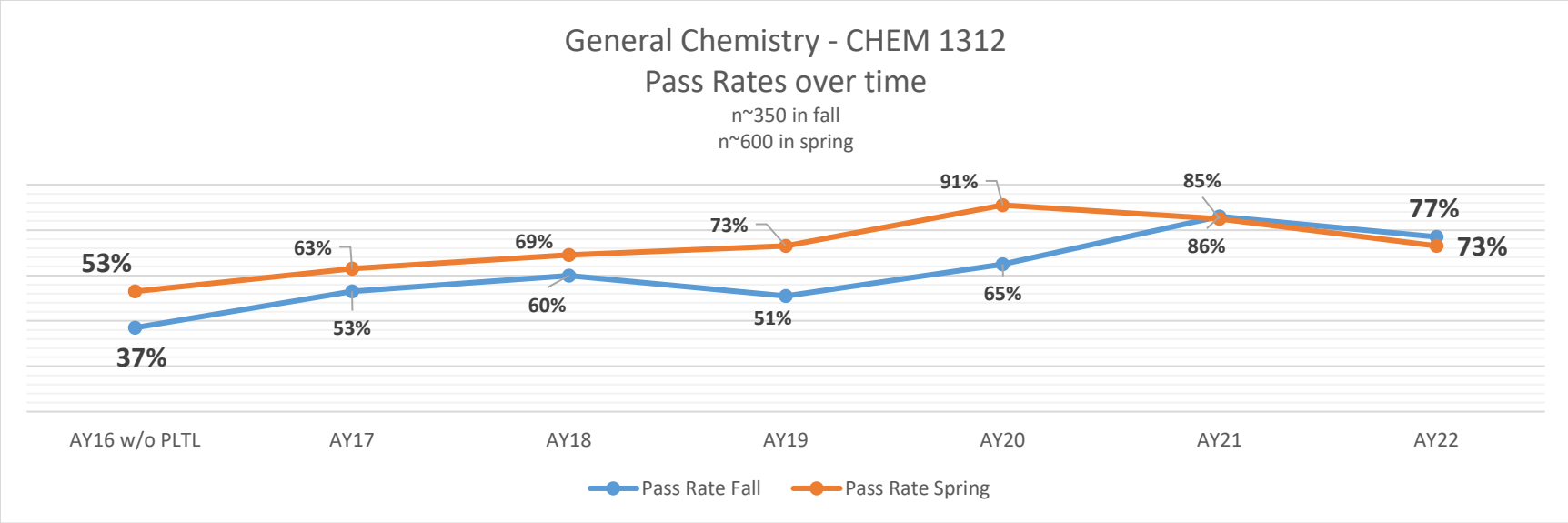
The UTRGV PLTL program is a collaboration between the Learning Center and college departments with the goal of providing an alternative learning approach to that offered via lecture as a means of positively impacting student success through increased learning as indicated by improved course pass rates as well as through department designated outcome measurements. The model design calls for mandatory student participation of all students enrolled in the respective courses in PLTL sessions for a total of two and a half hours per week with participation tied to a percentage of the course grade. PLTL sessions are built into the course schedule by the department chair or director and the registrar's office works with the Learning Center to determine dedicated space on campus to hold the PLTL sessions.

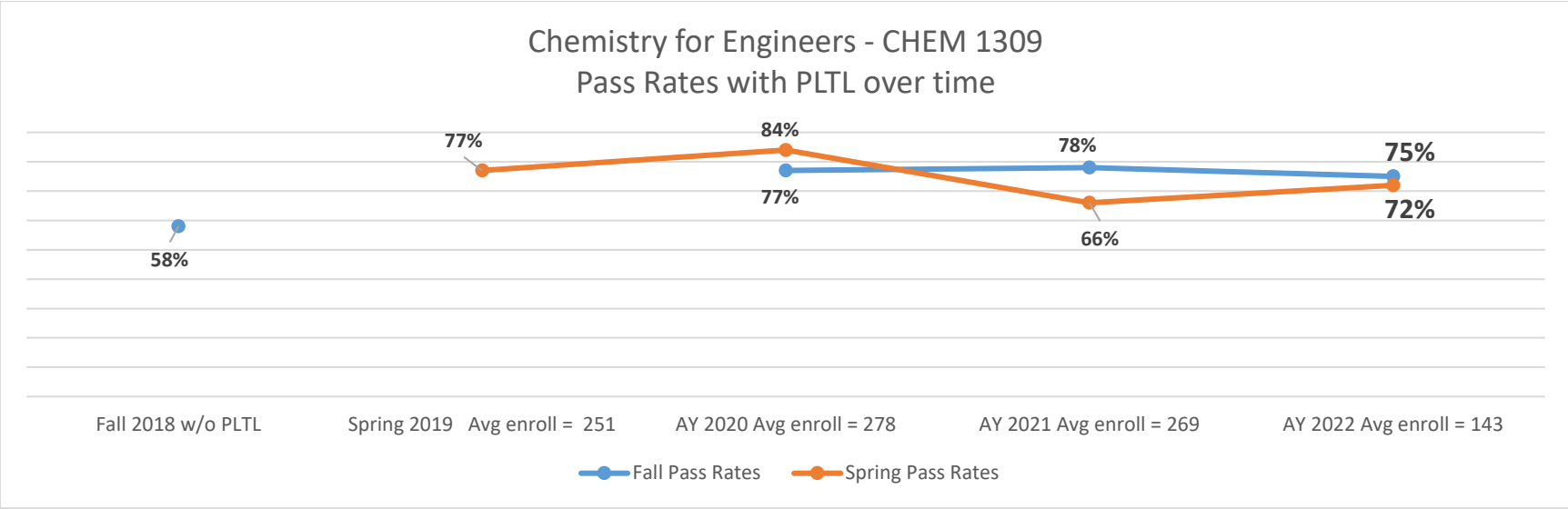
Peer-Led Team Learning Impact on Student Success Over Time

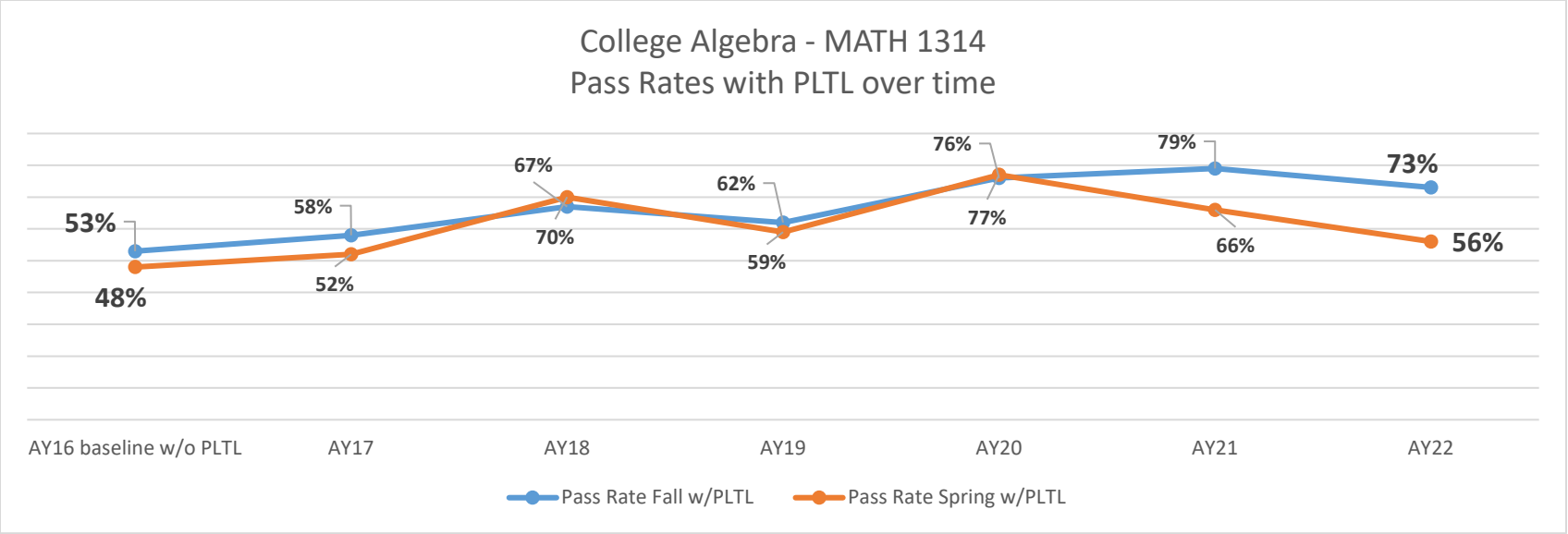
In addition to comparing baseline (no PLTL) to PLTL, it is important to monitor the pass rates overtime to determine if there is consistency and to compare relative to more recent semesters. As the graphs below depict, the pass rates for each of the courses including PLTL have fairly consistently improved when comparing fall to fall semesters and spring to spring semesters.

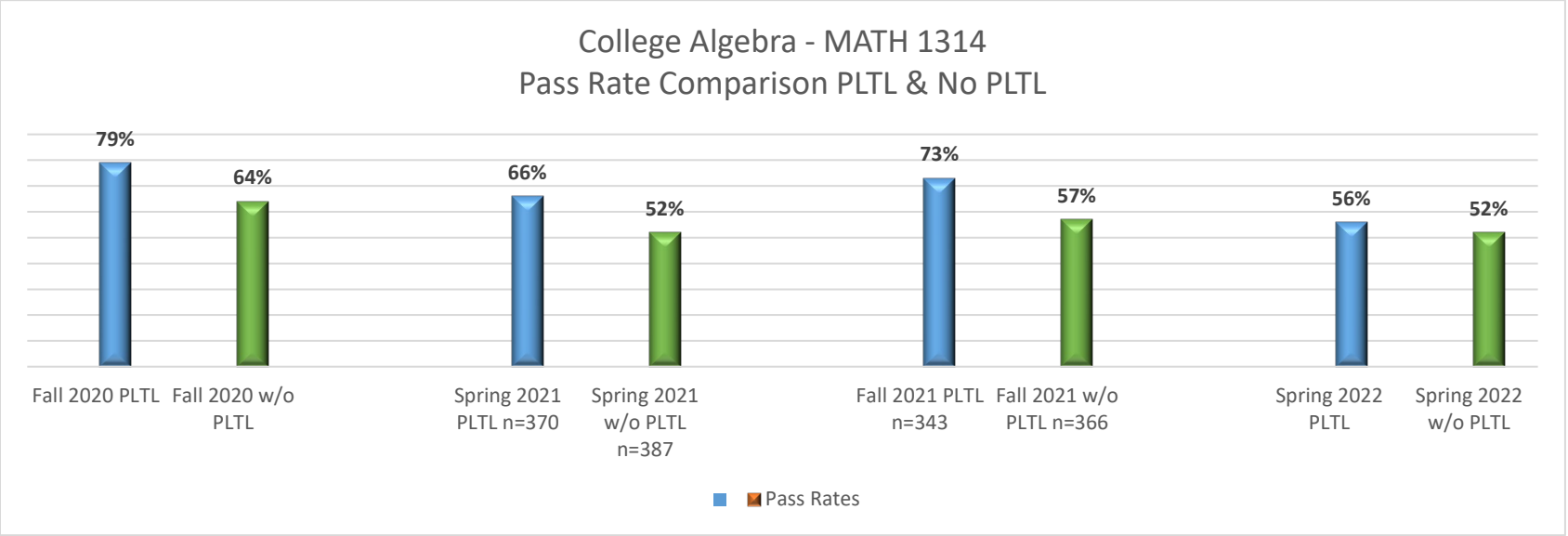
In addition to pass rate improvement, the grade distribution reveals that more students are earning As and Bs at a higher level when compared to previous fall semesters. With an increase in pass rates, there is a significant drop in DFWs and drops.

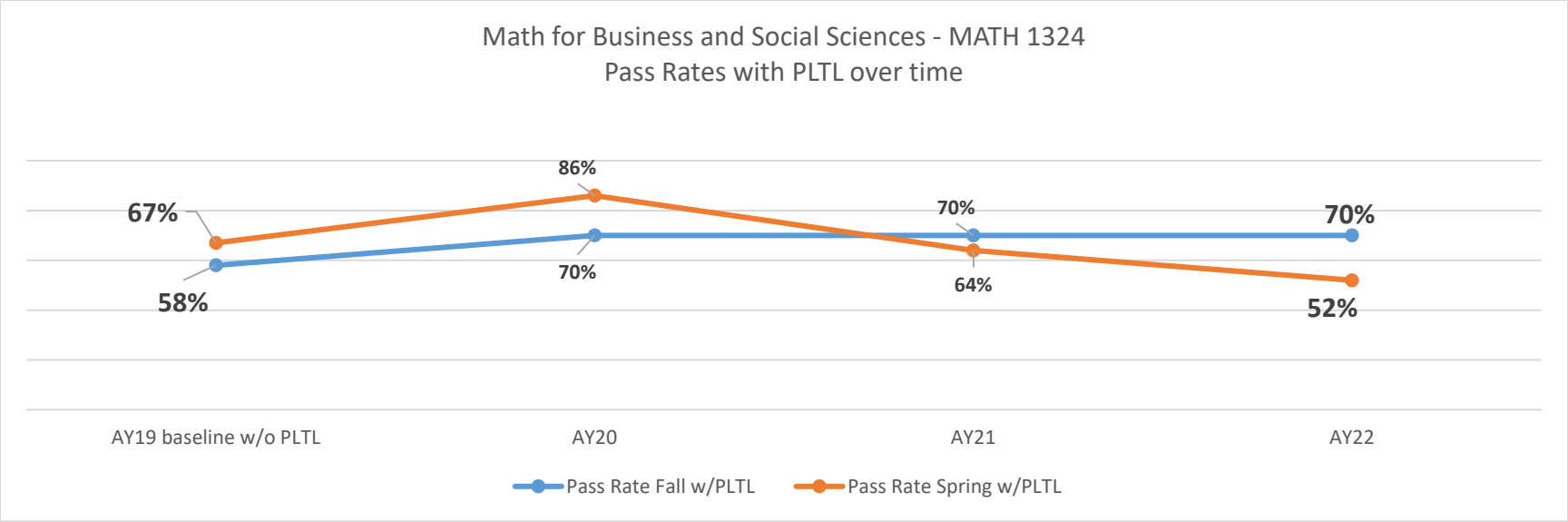



General Chemistry - CHEM 1312
Pass Rates over time
n~350 in fall
n~600 in spring
53%
63%
69%
73%
91%
85%
77%
37%
53%
60%
51%
65%
86%
73%
AY16 w/o PLTL
AY17
AY18
AY19
AY20
AY21
AY22
Pass Rate Fall
Pass Rate Spring


Chemistry for Engineers - CHEM 1309
Pass Rates with PLTL over time
58%
77%
84%
77%
78%
66%
75%
72%
Fall 2018 w/o PLTL
Spring 2019 Avg enroll = 251
AY 2020 Avg enroll = 278
AY 2021 Avg enroll = 269
AY 2022 Avg enroll = 143
Fall Pass Rates
Spring Pass Rates


College Algebra - MATH 1314
Pass Rates with PLTL over time
53%
48%
58%
52%
67%
70%
62%
59%
76%
77%
79%
66%
73%
56%
AY16 baseline w/o PLTL
AY17
AY18
AY19
AY20
AY21
AY22
Pass Rate Fall w/PLTL
Pass Rate Spring w/PLTL


College Algebra - MATH 1314
Pass Rate Comparison PLTL & No PLTL
79%
64%
66%
52%
73%
57%
56%
52%
Fall 2020 PLTL
Fall 2020 w/o PLTL
Spring 2021 PLTL n=370
Spring 2021 w/o PLTL n=387
Fall 2021 PLTL n=343
Fall 2021 w/o PLTL n=366
Spring 2022 PLTL
Spring 2022 w/o PLTL
Pass Rates



In 2021-2022, the UTRGV PLTL program employed 50 Chemistry peer leaders (student employees) who worked with 16 Chemistry faculty and serviced 1505 students in Chemistry I (1178) and Chemistry II (327). Thirteen peer leaders were hired to facilitate the College Algebra PLTL, and they worked with 10 math faculty to service 688 students.

Fall 2015 was the first semester of UTRGV and therefore part of the transition period. The PLTL program was not implemented in Fall 2015 or Spring 2016 and therefore this inaugural year served as a baseline. However, a deeper look into the data has revealed that demographics vary between fall semesters (data shared under retention and repeater rates) and therefore this needs to be taken into consideration in comparing data. Additionally, AY16 , as mentioned previously, was the first semester of launching a new university and this too, should be taken into consideration.

Course Pass Rates and Percentage Point Differences between Baseline (w/o PLTL) and AY22

As the table below reveals, there is a significant percentage point increase when comparing baseline data (non-PLTL) to the AY22 data (PLTL).

Course	Semester	Baseline Pass Rate	AY22 PLTL Pass Rate	Percentage Point Difference
CHEM 1311	Fall	64%	73%	+9
	Spring	51%	77%	+26
CHEM 1312	Fall	37%	77%	+40
	Spring	53%	73%	+20
CHEM 1309	Fall	58%	75%	+27
	Spring	57%	72%	+15
MATH 1314	Fall	53%	73%	+20
	Spring	48%	56%	+8
MATH 1324	Fall	58%	70%	+12
	Spring	67%	52%	-15

With a goal of increasing course pass rates by 10-20 percentage points, the program has yielded those results in all courses consistently except General Chemistry I (CHEM 1311), College Algebra (MATH 1314), and Math for Business and Social Sciences (MATH 1324). These are three courses we will need to take a deeper dive into both quantitative and qualitative data to understand why and where we may be able to improve. The rest of the PLTL courses appear to be strongly correlated with increased student success.

Student Learning Outcome Measures

As increased course pass rates are an indicator of increased student success, there are other measures that can provide us with a more in depth look at increased student learning. These measures typically differ from discipline to discipline and even course to course and are often aligned with student learning outcomes.

General Chemistry I & II

The Chemistry department decided to set expected outcomes that included student learning outcomes to be measured by the American Chemical Society (ACS) paired questions exams I and II as pre and post. The assessment measures concept obtainment per topic covered in each of the two courses. The goal is to be able to determine by course topic where students are increasing their knowledge and in what topics they are not or to what degree that increase is. The American Chemical Society has set very strict restrictions in administering the ACS assessment, one of which being there is no online version. Therefore, the assessment was not administered in Fall 2021 as most classes were meeting primarily online (due to COVID-19) and was not administered as a pretest for Spring 2022 as faculty, students, and staff were transitioning back to in person classes. The Peer Collaborative Learning team will analyze the Spring 2022 posttest data by doing a posttest comparison with posttest scores from previous Spring semesters (as the pandemic did likely have an impact on the most immediate spring semesters) to determine if we can draw any conclusions that may help us understand the concept obtainment of students enrolled in these courses during this most recent spring semester. In the absence of this data, an example of, previous results revealed an increase in concept obtainment for each of the 13 topics in CHEM 1312 except for the periodic table. In meeting with the faculty to review the data and discuss recommendations for improving, we learned that the periodic table is covered in CHEM 1311 and not really reviewed in CHEM 1312. The faculty concluded that a review at the beginning of the semester could be beneficial.

In addition to measuring concept obtainment of chemistry topics covered in Chemistry I & II, the chemistry department is also interested in measuring student interest in and self-efficacy of chemistry. The assessment measures four areas: (1) Initial Interest in Chemistry; (2) Maintained Interest in Chemistry; (3) Self-Efficacy; and (4) Effort Beliefs. According to Bandura (1997), self-efficacy is cognitive and causes self-regulating decisions that determine behavior, effort, and persistence. It is logical that there should be a relationship between interest, effort belief, and self-efficacy. The instrument used measures all four to allow for us to investigate the relationship. To avoid over assessing students, we administer the self-efficacy assessment to students enrolled in CHEM 1311 in the fall semesters and to students enrolled in CHEM 1312 in the spring semesters. The results of the self-efficacy assessment for AY22 are as follows:

Scale	Fall difference between pre and post (CHEM 1311)	Spring difference between pre and post (CHEM 1312)
Initial Interest Scale	-.20	-.11
Maintained Interest Scale	-.17	-.10
Self-Efficacy	+.78	+.27
Effort Beliefs	-.15	-.10

Conclusions and Recommendations: *Once AY22 data has been completely analyzed, the team will debrief with stakeholders, draw conclusions, and make recommendations for improvement.

College Algebra

The Mathematics department decided to use pre and post assessments for concept obtainment and self-efficacy specific to mathematics as well. The data are still being analyzed for the pre and post knowledge survey data (student self-reported self-confidence to solve specific mathematical problems) and the pre and post diagnostic survey. The diagnostic survey includes the same mathematical problems as the knowledge survey and measures the ability of the students to solve the problems. The mathematics department developed both instruments. The Learning Center administers the surveys, collects, organizes, and analyzes the data before sharing the results with the mathematics director and faculty involved. Together, the team determines improvements to be implemented for the following year.

At the surface level, the knowledge survey (self-confidence) and the diagnostic survey (actual ability) provided the following results:

Course	Fall 2021 - Knowledge	Fall 2021 - Diagnostic	Spring 2022 - Knowledge	Spring 2022 - Diagnostic
College Algebra – MATH 1314	83% In-person 80% online	50% in-person 82.3% online	* Data are being organized and analyzed	*Data are being organized and analyzed
Math for Business and Social Sciences – MATH 1324	85.3% in-person 85% online	73.33% in-person 70% online	* Data are being organized and analyzed	*Data are being organized and analyzed

Conclusions and Recommendations: *Once AY22 data has been completely analyzed, the team will debrief with stakeholders, draw conclusions, and make recommendations for improvement.

Student and Peer Leader feedback

The student satisfaction survey administered in Spring 2022 provided the following results:

Discipline	Q1-Leader Knowledgeable	Q2-Worksheets Helpful	Q3-Small group to Whole group sharing	Q4-Group Work Helpful	Q5-Positive Impact on Grade	Q6-Improve Study Skills/Knowledge
Chemistry	97%	88%	83%	83%	76%	72%
Math	89%	88%	79%	82%	74%	75%

As AY22 qualitative data is still being analyzed, previous survey and focus group data will serve as an indication of previous effectiveness of the program implementation and will be replaced with AY22 upon completion of analysis. A larger analysis of qualitative data over the past few years will likely provide some insight on how students perceived the program in terms of having a positive impact during the pandemic and with the numerous program adaptations. For now, a return to the qualitative data from pre-pandemic times will serve as the consistency baseline we strive for as we return to a more traditional, yet adapted, higher education learning environment.

Using student survey data from AY 19 and AY 20, 592 (72%) of 819 students indicated they felt their study skills and knowledge in the subject increased because of participating in PLTL. The following are direct quotes from students in relation to their participation in PLTL and how it helped them to be more successful.

"Most of the time, right after class, I don't study right away. I actually should be studying as the material is fresh in my mind. The PLTL session forced me to do that and keep the material in my head while I was learning it and practicing it. This helped for better retention later on and throughout the semester. It forced me to not put off my work and to study more."

"My PLTL leader was very good at explaining the various modules of the course and encouraged students to solve problems. My leader also used several methods of explaining the topics which were fun, captivating, and impactful."

"PLTL sessions were able to help enforce the concepts and mathematical questions related to chemistry. This is because through practice and repetition, I was able to understand the course material better. Therefore, active learning played a vital role in my success in the course."

"Going to PLTL sessions has helped me study for tests for that class and keep me motivated."

"The PLTL problems did help because they were a bit more difficult than the questions we practice in class. That forces us to think about concepts in different ways and learn more!"

In addition to student benefit, student employees, or Peer Leaders, also benefit from serving in this employment opportunity. Of the 521 unique peer leaders employed from Fall 2017 through Fall 2021, 94% have a 3.0+ GPA and 70% of those have 3.5+ GPA. Ninety-seven (97%) percent of peer leaders employed in AY 17-18 have graduated from UTRGV. Seventy-six (76%) percent of the peer leaders employed in AY 18-19 have graduated. Fifty-one (51%) percent of the peer leaders employed AY 19-20 have graduated. Peer leader feedback related to their employment and interactions with students include:

> "I have had several students tell me they would not have been able to pass without my help, it gives me a great sense of accomplishment knowing that I could help them understand the material better and encourage them to take an active part in their own learning."
>
> "An unexpectedly positive experience that happened during the semester was that many of my students came to see me during my office hours. This is the first time I work here, and I was glad that my students came to me for help."
>
> "Working for the Learning Center and being a PLTL Leader for chem has benefited me because it has gotten me to be more proficient and skilled in chemistry (which is my major). It has helped me in my advanced chemistry courses and has helped me better understand material for my MCAT."
>
> "I find the PLTL sessions to be very synergetic to what the course is themselves. It's almost like studying while I am on the job because it is related to all the courses that I am currently taking and that's why PLTL is a great job for students who major in Biology or Chemistry because you are cementing the material all over again and it saved my butt because of it."

Scaling PLTL into other courses

From an institutional perspective, AY 22 was a year of transition back to what was considered normal with a mix of what came from the pandemic (online learning). The realization that a good portion, and many of our underclassmen, had not experienced higher education in the traditional learning environment, led to an urgency to get safeguards via academic support in place. As PLTL targets the course and normalizes participating in academic support, along with the consistent and significantly positive gains in student success, the plan to quickly scale the program became the priority.

In Fall 2021, I was asked to introduce the PLTL program to all of the Deans and Chairs at the request of the Provost. The Learning Center team then met with the Associate Deans of each college and Department Chairs to discuss scaling the program into other courses. After evaluating the requests in alignment with our criteria of high enrollment and high DFW rate courses, we determined the courses to include PLTL for the spring semester. When scaling a program, best practices include (1) having institutional support, (2) faculty buy-in, (3) appropriate design and planning time, and (4) a comprehensive assessment and evaluation plan to meet stakeholder needs. Typically, it takes 6 months to a year to properly plan and implement the PLTL program designed specifically to address the learning barriers experienced by students in each of the courses. In just a

few months, we implemented PLTL in eight courses: Anatomy & Physiology I (BIOL 2401), Statics (MECE 2301), Computer Science II (CSCI 2380), Elementary Statistics (MATH 1342), Precalculus (MATH 2412), Calculus I (MATH 2413), Calculus II (MATH 2414), and Science for Elementary Students (EDCI 3333). Recruitment of peer leaders to cover all sections of all courses was not possible, and therefore there will be control and comparison data to evaluate and inform us on how we may need to improve the program as we spend the summer working with faculty to get their buy-in and develop content and measures.