☑ ◀ Show All Possible Responses ▶

⊞ **Response is required**

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1. PROGRAM OVERVIEW

⊞ **Program Title & Code**

Program Title

▌ Astronomy

(Max chars: 100)

Program Code

▌ 1911

(Max chars: 100)

⊞ **1a. Select the Chaffey Goals that directly relate and are MOST relevant to your program.**

Goals are numbered for the purpose of making reference points so that PSR writers can identify and locate which Chaffey Goals relate to their program. Goal numbers do not represent priority numbers.

☑ Goal 1: Equity and Success--Chaffey College will be an equity-driven college that fosters success for all students.

☑ Goal 2: Learning and Completion--Chaffey College will ensure learning and timely completion of students' educational goals.

☑ Goal 3: Community Opportunities and Needs--Chaffey College will develop and maintain programs and services that maximize students' opportunities and reflect community needs.

☑ Goal 4: Technology--Chaffey College will optimize the use of technological tools and infrastructure to advance institutional efficiency and student learning.

☐ Goal 5: Efficiency--Chaffey College will efficiently and effectively manage systems, processes, and resources to maximize capacity.

☐ Goal 6: Agility--Chaffey College will responsively adapt to changes in students' academic and career needs.

☐ Goal 7: Professional Learning--Chaffey College will prioritize and align professional learning for all employees to support the achievement of Chaffey Goals.

⊞ **1b. Describe how your program aligns with the Chaffey Goals. Please provide supporting statements and/or examples.**

Refer back to the Chaffey Goals marked above (e.g., Goal 4: supporting statements of how program aligns with this goal).

Goal 1 - The Astronomy program has developed equity-minded practices across our Department in an economic sense through the adoption of zero-cost textbooks for all Astronomy sections, the removal of all associated fees for our courses, and the establishment of multiple hard copies of textbooks associated with our courses in the library on reserve. We have developed equity-minded access opportunities through the creation of multiple online and hybrid sections for each of our courses (even before Covid-19 forced all courses online), which allows students with time conflicts and transportation challenges to participate in our courses. We have worked toward increased equity for access by high school students through our partnership with the High School Partnerships program, where we have offered Astronomy sections to this demographic over the course of several semesters. We have incorporated equity-minded thinking into our courses at a Program level by offering multiple "equity lens" activities to our Professors to offer students, such as crafted Discussion Activities regarding past inequities in the practice of science, and campus wide activities, such as the "Coded Bias" film that was recently available for students. Finally, our committment to active learning has been shown to help address equity issues in education (1,2).

Goal 2 - The Astronomy program provides General Education courses to Chaffey students, serving as a way to satisfy the General Education for Physical Science requirements for graduation. In the last six years, we have served a total of 5,332 students, in a variety of formats, including in-person, hybrid, and online, to facilitate learning whenever and wherever the student is able to participate. In addition, we offer courses in traditional, late start, and fast track formats. In addition, we help ensure learning through the acquisition of hardware and software that supports quality Astronomy instruction. Specifically, we have upgraded the Planetarium, allowing students to have Astronomy experiences (such as virtually going to other planets or stars) that weren't previously possible. In addition, we have taken significant steps to engage in "Active Learning" in our Instruction, specifically through a professional development on the topic for our Department, offered at the beginning of the Spring 2021 term and supported by ongoing mentoring of Adjunct faculty. A pioneering study by Freeman et al (3) and 5669 subsequent studies clearly demonstrate that an active learning instructional modality achieves far superior results compared to traditional lecturing.

Goal 3 - The ability to offer outreach to the Community through our Planetarium is enormous. After all, who doesn't love a Planetarium show? Our ability to utilize our new Planetarium and its ability to project shows in a manner similar to an IMAX theater lets us offer Planetarium presentations and collaborations with both other Chaffey stakeholders and the public at large. Since our last PSR, we

have offered a full suite of Planetarium shows, open to the general public. These presentations took place over the course of a semester, and had an estimated attendance of 240 members of the Chaffey community and community at large. We also partnered with other Chaffey stakeholders, such as the Theater department, the Wignall Museum, the Administration (for Classified Appreciation Day), our Division (for three different STEM Open House events), the Promise Scholars program, and EOPs to offer presentations to Chaffey members and the public in a multimedia format. We also worked with the Promise Scholars program to create a video presentation on infrared spectroscopy.

Goal 4 - The Astronomy program has (within the last 3 years) received a Digistar 6 projection system and 12 different shows, offering state of the art technology to illustrate the wonders of the Universe to our students. Capable of hosting a classroom of 44 students at a time, with several class times per day, we are able to offer this advanced tool in teaching and demonstration to all Astronomy students (1,132 in 2019 - 2020). We have developed a corpus of materials for our Professors to utilize this wonderful resource, including appropriate Planetarium simulations for each chapter of our textbook.

(1) Lorenzo M, Crouch CH, Mazur E (2006) Reducing the gender gap in the physicsclassroom.Am J Phys74(2):118–122

(2) Haak DC, HilleRisLambers J, Pitre E, Freeman S (2011) Increased structure and activelearning reduce the achievement gap in introductory biology.Science332(6034):1213–1216

(3) Freeman et al. (2014) Active Learning increases student performance in science, engineering, and mathematics. PNAS111(23): 8410-8415

PRIOR VIP GOALS STATUS/PROGRESS

❌ 1c. Please list the program's VIP Goals from the last PSR cycle, and report on the progress (complete, ongoing, etc.).

VIP Goal 1: Increase the role of active learning pedagogy in Astronomy classes to improve student retention and success, and optimize use of new planetarium classroom to support active learning. (Ongoing)

"Active Learning", in the context presented here, means to have students participate in the learning process through class activities that involve interaction with their peers, the Professor, and their own mental processes while in class. (This is opposed to the traditional "passive learning" process, whereby students are presented with information and are tasked with absorbing it through the taking of notes during class.) This can be accomplished via a number of methods, including projects, independent study, and labs.

We have increased the role of the Planetarium in student learning through the purchase of eight new shows (in addition to our original four shows) related to a vareity of topics in Astronomy since our last PSR. These shows align with different portions of our curriculum, and all Professors are encouraged to utilize it. In addition to having the requisite equipment (hardware and software) to engage with students, we've had a number of trainings (before Covid-19) to familiarize Adjunct Professors with the Planetarium, its operation, and how to integrate its abilities into their courses. We have created and curated a set of Astronomy demonstrations for the Planetarium, categorized by textbook chapter, so that all of our Professors may easily find material that corresponds to their curriculum. We have also created a set of online materials to share with Adjunct Professors to promote active learning, such as: online lectures with a suite of potential in-class activities to encourage active learning, or even flipped instruction (the most complete form of active learning). These were also available to facilitate rapid transition to fully online instruction when the Covid-19 pandemic began. Finally, all of our labs could easily be characterized as active learning (but not necessarily flipped learning), based upon how we utilize them in our courses. Specifically, students in lab sections interact with data gleaned from experiments performed in the lab (such as how light behaves), simulators (such as where objects are in the sky), and real astronomical data (such as data on when/how stars brighten and dim) to construct relationships between data and predict future phenomena while interacting with their peers and the Professor.

VIP Goal 2: Increase awareness of Chaffey, the College's Astronomy program, and STEM programs in general through community outreach and the availability of the Planetarium's projection capacity to other Chaffey programs to increase student success and engagement of potential Chaffey students. (Ongoing)

We have had great success (pre-Covid) with the utilization of the Planetarium's abilities to support both instruction and community outreach. Activities conducted since our last PSR include three theatre productions in the Planetarium (in collaboration with the Theater Department), a joint screening presentation with the Wignall Museum, three STEM Open House events, open to public participants of all ages, twelve outreach events for the Promise Scholars program, three Classified Appreciation Day events, an EOPS presentation at the planetarium, a semester of twelve Friday Planetarium presentations for Chaffey students, faculty, and staff, and a video presentation for Chaffey Promise Scholars on infrared spectra. We have also hosted sections from Biology and Earth Science to view our climate change show, which features rich data visualizations that would be difficult to present effectively in any smaller format. Of course, with the campus shut down due to Covid-19, we are unable to utilize the Planetarium for either instruction or outreach at this time.

OTHER RESOURCES REQUESTS

❌ 1d.1 At any point during the past PSR cycle (last three years), did you have "other resources requests" that were funded by the Resource Allocation Committee?

If yes, proceed to questions 1d.2. If no, skip to section 2.

If you have items that were funded by Strong Workforce and Perkins, please mark "yes."

○ Yes
◉ No

1d.2 If yes, did those purchases meet the program's intended purpose. Please explain.

> The items we requested (3 Celestial Globes and a Galaxy and Star Atlas) in the 2019 PSR Update have been submitted to our Division for purchase. However, these items are specifically used during in person instruction, so will most likely become useful as on-campus teaching becomes appropriate.

2. EVIDENCE--EQUITY

The evidence section comprises of the following three distinct subsections: equity, program data (includes CTE data), and learning outcomes.

"Equity" represents the first element of the EVIDENCE component of the PSR evaluation. Please reference the Equity Data file to evaluate the following areas.

✪ 2a.1 Concerning GENDER/IDENTITY, identify important EQUITY developments and trends.

Review data over the last six years.

Response Legend: 1 = Increase 2 = Decrease 3 = No Change (plus or minus 2%) 4 = No or Insufficient Data Available				
	1	**2**	**3**	**4**
Number of enrollments by males	✔			
Number of enrollments by females	✔			
Success rate by males			✔	
Success rate by females	✔			
Retention rate by males			✔	
Retention rate by females		✔		

✪ 2a.2 Concerning RACE/ETHNICITY, identify important EQUITY developments and trends.

Review data over the last six years.

Response Legend: 1 = Increase 2 = Decrease 3 = No Change (plus or minus 2%) 4 = No or Insufficient Data Available				
	1	**2**	**3**	**4**
Number of enrollments by African American	✔			
Number of enrollments by Asian	✔			
Number of enrollments by Caucasian	✔			
Number of enrollments by Hispanic	✔			
Number of enrollments by other race/ethnicity	✔			
Success rate by African American	✔			
Success rate by Asian	✔			
Success rate by Caucasian		✔		
	1	**2**	**3**	**4**
Success rate by Hispanic	✔			

	1	2	3	4
Success rate by other race/ethnicity	✔			
Retention rate by African American		✔		
Retention rate by Caucasian		✔		
Retention rate by Asian		✔		
Retention rate by Hispanic			✔	
Retention rate by other race/ethnicity			✔	

⊗ 2a.3 Concerning AGE GROUP, identify important EQUITY developments and trends.

Review data over the last six years.

Response Legend:
1 = Increase   **2** = Decrease   **3** = No Change (plus or minus 2%)   **4** = No or Insufficient Data Available

	1	2	3	4
Number of enrollments by age group, 19 or younger	✔			
Number of enrollments by age group, 20-24	✔			
Number of enrollments by age group, 25-29	✔			
Number of enrollments by age group, 30-39	✔			
Number of enrollments by age group, 40-49	✔			
Number of enrollments by age group, 50 or older	✔			
Success rate by age group, 19 or younger	✔			
Success rate by age group, 20-24	✔			

	1	2	3	4
Success rate by age group, 25-29	✔			
Success rate by age group, 30-39		✔		
Success rate by age group, 40-49			✔	
Success rate by age group, 50 or older				✔
Retention rate by age group, 19 or younger	✔			
Retention rate by age group, 20-24		✔		
Retention rate by age group, 25-29		✔		
Retention rate by age group, 30-39		✔		
Retention rate by age group, 40-49		✔		
Retention rate by age group, 50 or older				✔

⊗ 2a.4 Concerning OTHER CHARACTERISTICS, identify important EQUITY developments and trends.

Review data over the last six years.

Response Legend:
1 = Increase   **2** = Decrease   **3** = No Change (plus or minus 2%)   **4** = No or Insufficient Data Available

	1	2	3	4
Number of enrollments by students with disabilities	✔			
Number of enrollments by first generation	✔			
Number of enrollments by economically disadvantage	✔			
Success rate by students with disabilities			✔	
Success rate by first generation	✔			
Success rate by economically disadvantage	✔			
Retention rate by students with disabilities			✔	
Retention rate by first generation	✔			
Retention rate by economically disadvantage			✔	

✪ 2a.5 Over the last three years, has the number of course sections offering zero-cost textbooks increased, decreased, or remained the same?

Response Legend: **1** = Increase **2** = Decrease **3** = No Change			
	1	**2**	**3**
Number of sections with zero-cost textbooks			✔

✪ 2b. Considering the evidence provided, elaborate on how the program is providing equity in educational opportunities or support to students and/or identify disparities in equity. Provide specific data that supports your answer.

If there is a disparity in equity, do not discuss responsive strategies in this section. This is addressed in the STRATEGIC PLANNING section (item 7d).

We have displayed substantial growth across all groups, with a stable or increasing success rate across all measurable groups except Causcasian students, students with race/ethnicity identified as "unknown race/ethnicity", and students in the age group 30 - 39. Enrollments by male and female students have increased, as has the success of female students, while the retention and success of male students has remained stable.

Retention presents a more mixed picture, with retention rates increasing for students 19 and younger, first generation students, and students identified with gender "unknown/decline to state". Retention was stable for Hispanic students, students identified as "other race/ethnicity", male students, students with disabilities, and economically disavantaged students. Finally, our retention rate has been decreasing for several demographics, including: African American students, Asian students, Caucasian students, students with an unknown race/ethnicity, female students, students 20 - 24, students 25 - 29, students 30 - 39, and students 40 - 49.

Our hypothesis was that retention rates may be affected by our growth of online sections in the last several years. In an attempt to close the equity gap, in terms of access to instruction, we have significantly increased our number of hybrid and online course sections. However, when IR prepared a summary delineating enrollments, success, and retention by course modality, we found that we have a 122% increase in online enrollments in the last two years, and 233.3% increase in hybrid enrollments in the last five years. Success rates were increased 32.9% in the last two years for fully online sections, and 2.4% in the last five years for hybrid sections. Interestingly, however, retention rates actually increased by 3.1% in the last two years for fully online sections, and 20.1% in the last five years for hybrid sections. Apparently the increase in online course section offerings is not the cause for our drop in retention. We are committed to determining why our retention rates have dropped significantly, but at this time are unsure as to why this has occurred.

Overall we feel that generally increasing success, while experiencing substantial growth, is a positive measure of equity in this program. We are also mindful of the decreased retention of the above listed groups and seek ways not only to keep these students in class, but also to ensure their success. The Astronomy Program has taken action to address two main equity areas: economic equity and gender equity.

In terms of economic equity, we have helped address opportunities in our Department by ensuring students have access to resources to complete our courses. This includes hard copies of textbooks on reserve in the library, utilization of zero textbook cost resources (since even before our last PSR cycle), and allowing students to take classes in a variety of times and modalities (traditional, late start, fast track, hybrid, online).

In terms of gender equity, we have hosted events to promote equity in science, including a Women in STEM panel (Fall 2020), where female scientists in both industy and academia participated in a question and answer session with over 30 Chaffey students.

3. EVIDENCE--PROGRAM DATA

"Program Data" represents the second element of the EVIDENCE component of the PSR evaluation. Please reference the Program Data file to evaluate the following areas.

✖ 3a. Identify important PROGRAM developments and trends.

Review data over the last six years.

Response Legend: 1 = Increase 2 = Decrease 3 = No Change (plus or minus 2%) 4 = N/A 5 = No or Insufficient Data Available					
	1	**2**	**3**	**4**	**5**
Overall Enrollment	✔				
Overall Retention			✔		
Overall Course Success	✔				
FTES	✔				
All ADT degrees awarded				✔	
All AA degrees awarded				✔	
All AS degrees awarded				✔	
All degrees awarded				✔	
	1	**2**	**3**	**4**	**5**
All Certificate Completion				✔	
Average units earned, ADT degree				✔	
Average units earned, AA degree				✔	
Average units earned, AS degree				✔	
Average units earned, all degrees				✔	
Average units earned by certificate(s)				✔	
Overall average # of semesters to award degree(s)				✔	
Overall average # of semesters to award certificate(s)				✔	

✖ 3b. Considering the evidence provided, explicitly identify specific program strengths and provide data/evidence that supports your answer.

This is an assessment of your program's health. Be sure to address any items marked "increase" and/or "no change," if "no change" is a positive reflection of the program (e.g., provide data for stable or increased enrollment, retention, success patterns, or data for increase number of certificates/degrees).

Programs may provide additional information or data that has not been included in their IR files.

> We feel this is a picture of a healthy program! Astronomy is a General Education program, utilizing lecture and laboratory courses to present a compelling overview of our place in the Universe, while introducing students to ideas from many fundamental areas of physical science. Astronomy offers no degrees. This is appropriate because students interested in Astronomy careers are better advised to major in Physics as a preparation for upper division and graduate degrees.
>
> The IR data demonstrates that our enrollment has increased significantly (+11.7% in the last six years), and our success has increased slightly in the last six years as well (+1.3%). Increases in course offerings, both number of sections offered and in modality, has afforded more opportunities for students and increased the robustness of our program. We can see this from both the enrollment increases mentioned and the increase in number of students enrolled in each course modality (Face to face: +23.4% in five years, online: +122.4% in the last two years, hybrid sections: +233.3% in

the last five years). Further, the development of our Planetarium abilities (in terms of hardware, an increased number of shows, training for members of our Department, and providing of supplemental resources) has allowed us to serve as a place for persons interested in Astronomy (in our courses, in the Chaffey community, and in the community at large) to participate in the process of learning Astronomy.

3c. Considering the evidence provided, explicitly identify specific areas in which the program can improve over the next three years. Provide specific data/evidence that supports your answer.

Be sure to address any items marked "decrease" and/or "no change," if "no change" reflects an area needing improvement (e.g., provide data for decreased enrollment patterns or the number of certificates/degrees earned). You are only be asked to identify areas of improvements. You will be asked to address the strategies that the program plans to implement in the STRATEGIC PLANNING section (item 7d).

Programs may provide additional information or data that has not been included in their IR files.

Since we have had a significant increase in both student enrollment and in community engagement, we wouldn't consider those as areas to address improvements. However, our retention rate has dropped in several demographics in the last six years, as noted in Section 2. This drop in retention is somewhat contraindicated by the change in retention amongst those who are classified as "unknown/decline to state" (+14%). (But unknown gender is usually a small group, so this offset may not be statistically significant.) In addition, an examination of this data by age group shows the only demographic to experience improvements in retention is the group "19 or younger" (+2.6%). All other age groups show drops in retention in the last six years, with the most dramatic drop in the age group "40 to 49 years old" (-12.7%).

It is possible that the large drop in retention in the "40 to 49 year old" range is an artifact of a small sample size. We hypothesized that one possibility is that the drop in retention is due to an increased number of hybrid/online sections and unique challenges students in that cohort may face. IR data showed this to most likely not be the cause for the drop in retention rates, since retention rates disaggregated by modality didn't have nearly the level of significance required to account for the retention decrease (online: +3.1% retention in the last two years, hybrid: +20.1% in the last five years).

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4. EVIDENCE--Career & Technical Education (CTE)

4a. Is this a CTE program?

If yes, proceed to questions 4b-4e. If no, skip to section 5.

○ Yes   ● No

Labor Market Information (LMI): Regional Job Outlook (If Applicable)

4b. Identify important CTE PROGRAM developments and trends.

Response Legend: 1 = Middle Skill 2 = Above Middle Skill		
	1	**2**
CTE: Projected Occupational Growth		

4c. Please reflect on projected occupational growth. Are entry-level and median hourly earnings 10% below or 10% above regional living wages? Please explain and provide specific data that supports your answer.

This is an opportunity to discuss middle and above middle occupations and whether these occupations are projected to grow or decline.

Programs may provide additional information or data that has not been included in their IR files.

No answer specified

External Oversight: Advisory Committee Information (If applicable)

Programs that have an active advisory committee must complete this section.

4d. Does your program have an active Advisory Committee (whether on campus or external) that informs the direction and/or operations of the department? If "Yes" Advisory Committee meeting minutes within the LAST 6 MONTHS must be included as an attachment to this form.

○ Yes   ○ No

4e.1 Has the Advisory Committee recommended changes to your program that align with a current or emerging industry?

○ Yes   ○ No

4e.2 If yes, what are the recommendations?

No answer specified

5. External Oversight: External Regulations (If applicable)

External regulations apply to areas with outside accrediting agencies. If you DO NOT have external regulations, answer "no" on question 5a and skip 5b.

✪ 5a. External Agency

Does the program have external regulations?

○ Yes   ● No

5b. External Agency Information

If yes, please provide the following information:
a) Name of Agency
b) Date of last review
c) Recommendations made
d) Any budgetary or institutional impacts from the recommendations
e) Progress on recommendations
f) Date of next review
*Note: more than one external agency can be added in the same field if needed.

No answer specified

6. EVIDENCE--LEARNING OUTCOMES

"Learning Outcomes" represents the third element of the EVIDENCE component of the PSR evaluation.

✪ 6a. Please identify which of the following MANDATORY components have been completed by checking the appropriate boxes.

The Outcomes and Assessment Committee will verify if mandatory components have been fulfilled.
If you have any questions about learning outcomes, please refer to Chaffey College's Outcomes and Assessment website or email Jo Alvarez at jo.alvarez@chaffey.edu

☑ Current COURSE LOs for every course have been entered into Taskstream's "Course Learning Outcomes (CLOs) Workspace" for each course.
☑ Current COURSE LOs have been mapped to Institutional Learning Outcomes into Taskstream's "Course Learning Outcomes (CLOs) Workspace."
☑ Current PROGRAM LOs have been entered into Taskstream's "Program Learning Outcomes (PLOs) Workspace."
☑ Current PROGRAM LOs have been mapped to Institutional Learning Outcomes in the "Program Learning Outcomes (PLOs) Workspace."
☐ Current PROGRAM LOs have been mapped to align courses to Program LOs (Curriculum Map) in Taskstream's "Program Learning Outcomes Workspace."

6b. Have you uploaded a current Chronological Assessment Plan (CAP) into the "Program Learning Outcomes (PLOs) Workspace?"

A CAP is a learning outcomes assessment schedule.

"Current" is defined as two assessment cycles. This means CAPs should project out at least SIX YEARS.

◉ Yes
○ No
○ Comment: [_____]

6c. Three-year cycle

Do you evaluate all courses within the three-year period?

◉ Yes
○ No
○ Other: [_____]

6d. Are all COURSE LO assessment results from fall 2017 through fall 2020 entered into Taskstream?

◉ Yes
○ No
○ Other: [_____]

ASSESSMENT REFLECTION

Look over your learning outcomes assessment results for the various COURSES in your program(s).

6e. Based on learning outcomes assessment results, explicitly identify program strengths. Provide specific data that supports your answer.

Pay special attention to learning outcomes that HAVE been met.

Our objective with student learning outcomes is to have 70% of students complete the relevant assessment with a passing score. We assess a different learning outcome each semester, through an assessment offered to all Astronomy students that varies depending on which course is being taken (Astronomy 26 or Astronomy 35). The breakdown of semesters that we have met that benchmark is:

Astronomy 26:

SLO#1: Understanding science as a way of knowing

Success was attained in the following semesters: Fall 2018, Spring 2019, Fall 2019, Spring 2020, Fall 2020.

SLO #2: Communicating science

Success was attained in the following semester: Fall 2017

SLO #3: Understand current events in Astronomy

Success was attained in the following semester: Spring 2018

Astronomy 35:

SLO#1: Understanding science as a way of knowing

Success was attained in the following semesters: Fall 2019, Fall 2020

SLO #2: Communicating science

Success was attained in the following semesters: Fall 2018, Spring 2019

SLO #3: Understand current events in Astronomy

Success was attained in the following semester: Spring 2018

It appears that most semesters, our students reached the desired benchmark (to have 70% of students correctly answer the assessment). We have focused frequently on the question of how science is distinct from other ways of knowing (it was assessed in Astronomy 26 in five of the last seven semesters, and Astronomy 35 in three of the last seven semesters). And from the results of that assessment, we see that seven out of eight assessments between both courses have been considered successful. Our second most assessed learning outcome, regarding communicating science, has been met three out of the four times it was assessed, also showing strength in our instruction and program.

6f. Based on learning outcomes assessment results, explicitly identify areas in which the program(s) can improve. Provide specific data that supports your answer.

Pay special attention to learning outcomes that HAVE NOT been met.

Based on the last seven cycles of assessment, there have been three occasions where the learning outcome objectives have not been met. This means, with Astronomy 26 and Astronomy 35 combined, 3 out of 14 assessment opportunities have not been successful. These unsuccessful events are spread throughout the courses offered (1 section of Astronomy 26, and 2 sections of Astronomy 35). They are also spread between terms (FA17, SP18, SP20), and between desired outcomes (one event each for learning outcomes 1, 2, and 3). This doesn't seem to show a readily obvious pattern of where to target improvements. One possible hypothesis is that our current assessments aren't capturing data at a granular level to determine where quality improvements can be made.

To improve our assessments, we propose the following:

#1) Improvement of the assessment cycle timing. Specifically, we have assessed learning outcome 1 far more frequently than other outcomes (8/14). Therefore, it may be useful to diversify when we assess each learning outcome to ensure a breadth of meaningful data.

#2) Revisiting and updating the SLOs where needed, and determining quality metrics for assessing them.

#3) Working with IR to determine how we can meaningfully use SLO data to improve our Department.

7. STRATEGIC PLANNING

7a. Do you have any plans to modify a degree or certificate in your program?

☐ Yes
☑ No

7b. Are you planning to initiate a new program?

☐ Yes
☑ No

OVERALL IMPROVEMENT

To help answer 7c and 7d, review the following subsections:

Subsection 2: EVIDENCE--Equity
Subsection 3: EVIDENCE--Program Data
Subsection 4: EVIDENCE--Learning Outcomes

✪ 7c. Identify specific reasons for "why" improvement is needed. Use an evidence-based approach to support your answer.

To help guide your thinking, consider framing improvement in more tangible ways: orientations for new faculty, inefficiencies in office processes, communication gaps (with adjuncts or other departments), tracking errors,
budgeting processes that are not as timely or efficient, coordination with other related areas in other educational units, resource management of supply budgets.

> From the evidence we've seen so far, improvement is needed to assist with retention. While enrollment and success metrics have both increased, retention has decreased. Addressing this involves finding ways across the department to accomplish a few specific objectives that may assist students and lead to increased retention. These include setting clear expectations, humanizing instruction, and directing students to resources they may not know exist. (While we are not certain accomplishing these objectives will lead to increased retention, since we can't be certain why retention has fallen, these are areas that have been shown in many cases to assist students.)

✪ 7d. What is your program's plan to make improvements? An effective plan is descriptive and has well-defined steps. Explain your answer in order of priority; rank highest priority first, followed by second highest priority, and so on.

If there is a disparity in equity, the strategies for implementation should be included in the plan.

> Our previous hypothesis was that our students taking Astronomy courses online may not be retained as much as those taking courses in the traditional format. However, IR data showed this was not the case. It is a challenge to address a decrease in retention without understanding the variables contributing to the decrease.
>
> Without a specific set of causal factors to address, our best plan is to make a generalized, concerted effort to bolster retention. A widely cited study by Lotkowski et al. (1) recommends addressing both academic and non-academic causes for retention drops. Specifically, they state "... successful rentention strategies often use an early alert, assessment, and monitoring system based on academic factors ... such as completed assignments and class attendance". Once a student with a potential to not be retained is identified, the authors suggest "academic advising and workshops in study skills, time management, critical thinking, planning, assertiveness, library use, and cultural awareness. They aim to increase levels of academic competence and confidence, motivation, and goal and institutional commitment through the creation of socially supportive and inclusive environments."
>
> While some of these suggestions are outside of the scope of the Astronomy department, they are certainly not beyond the scope of the college and its resources. Therefore, to address our current retention challenges, we intend to create a set of materials for Professors in our Department to help identify students early in the acadmic process that are struggling, and guide them toward appropriate resources that are available at Chaffey, such as the kinds of courses and support centers mentioned by Lotkowksi. This also involves making all Astronomy faculty aware of Astronomy's retention data, drawing up a reading list addressing ways to increase retention, encouraging faculty to make use of campus resources that could increase retention (such as FSC presentations, students being referred to student success centers, and other campus resources for academic and life issues).
>
> (1) Lotkowski, V. A. et al. (2004). The Role of Academic and Non-Academic Factors in Improving College Retention.

CURRICULUM IMPROVEMENT

As we move toward Guided Pathways, curriculum serves as a central catalyst for the movement. Reflect and provide information on questions 7e and 7f.

Information will be forwarded to the Curriculum Office. There is NO SCORING on curriculum improvement questions, 7e and 7f.

7e. How does (or will) your program incorporate experiential learning components into your curriculum?

> Astronomy 35 is our lab course. This course offers lab exploration of Physics topics related to Astronomy (especially physics of light). We utilize telescopes in some sections (especially evening sections) to give students experience with the night sky. Our online sections of Astronomy 35 offer fully online labs. All labs feature a wide variety of experiential learning, ranging from the use of telescopes and the real-world exploration of properties of light (including the use of spectroscopes and IR cameras) to the use of online data sets and simulations. We feel our offerings of online labs are successful, and during the Covid-19 pandemic were identified by CVC-

7f. How does (or will) your program incorporate career exploration into early courses in your degrees and/or certificates?

> This question isn't really relevant to our department, since we don't offer degrees or certificates in our area. Students who might be interested in a career in Astronomy normally get a degree in Physics (since there are very few Undergraduate degrees in Astronomy as a major). Most Astronomy sections feature activities on Diversity and Equity in Science, which introduce students to role models and professional issues related to equity. While specific examples are drawn from STEM, the broader messages of these activities are applicable to all careers. In our

OEI as a state-wide model for online lab instruction. For example, labs successfully adapted naked-eye observing and home-made spectroscopes to translate quality lab experiences for distant lab students.

We also utilize the Planetarium for most on-campus sections of Astronomy 26 and Astronomy 35. Our planetarium serves as an excellent catalyst for experiential learning. Students in our Astronomy courses are able to visit places throughout the Universe, seeing different types of stars, exoplanets, and even black holes. We have encouraged all Professors in our department to utilize this resource, by making it available throughout the day and evening, having trainings for our Professors on the Planetarium's operation, purchasing a number of shows that highlight portions of our curriculum, and curating a corpus of simulations that augment topics in our textbook.

(Max chars: 5,000)

upcoming curriculum cycle, Astronomy intends to include Diversity and Equity in all Astronomy CORs, to ensure that these topics are addressed in all sections of all courses.

(Max chars: 5,000)

⊞ 7g. Do you have any recommendations for a professional development workshop(s) that will help you or your program execute future plans?

Type N/A in the response field if you are not making any recommendations for professional development.
Information will be forwarded to the Faculty Success Center for future professional development planning. NO SCORE is assigned.

We think that the work of the Faculty Success Center has been outstanding! And we've definitely already benefitted from both their work and the work of Distance Education in creating a number of trainings and workshops. We would just like to suggest that the FSC keep up the great work, and continue with quality professional development related to how to ensure quality instruction (academic integrity, humanizing instruction), and perhaps add a component on how to ensure affective domains like student motivation and metacognition are addressed in online instruction. Further, perhaps professional development targeted twoards retention, encouraging students toward campus resources, and communication that helps students get back on track early in the term.

8. VIP GOALS

⊞ 8a. What are your Three-Year Visionary Improvement Plan Goals (1-3 goals recommended)?

Perhaps the most important piece in the PSR process is the creation of the Visionary Improvement Plan (VIP). The VIP is an opportunity for all program members (not just primary writers) to get together to analyze data, discuss the overall self-study, and identify program improvement goals for the next three years.

VIP Goals should align with the Chaffey Goals, and should be clear, specific, measurable, action-oriented, realistic, and time bound.

VIP Goal 1 - Encourage and support the role of active learning pedagogy in Astronomy classes, with the objective of improving student retention and success. This will be accomplished by providing increased professional development opportunities on active learning strategies to our Professors (1 - 2 events per year), and the availability of course (1 supplemental materials Canvas shell for each course) and Planetarium materials (1 training set of materials).

VIP Goal 2 - Conduct professional development within our department directed toward increasing retention (1 - 2 per year).

VIP Goal 3 - Increase awareness of Chaffey College, the College's Astronomy program, and STEM programs in general through community outreach and the availability of the Planetarium's projection capacity to other Chaffey programs to increase student success and engagement of potential Chaffey students by offering collaborations to at least 2 departments per year.

⊞ 8b. Select the Chaffey Goals that directly relate and are MOST relevant to your VIP GOALS (please select all that apply):

VIP goals should relate to Chaffey Goals.

☐ Goal 1: Equity and Success--Chaffey College will be an equity-driven college that fosters success for all students.
☑ Goal 2: Learning and Completion--Chaffey College will ensure learning and timely completion of students' educational goals.
☑ Goal 3: Community Opportunities and Needs--Chaffey College will develop and maintain programs and services that maximize students' opportunities and reflect community needs.

☑ Goal 4: Technology--Chaffey College will optimize the use of technological tools and infrastructure to advance institutional efficiency and student learning.
☐ Goal 5: Efficiency--Chaffey College will efficiently and effectively manage systems, processes, and resources to maximize capacity.
☐ Goal 6: Agility--Chaffey College will responsively adapt to changes in students' academic and career needs.
☑ Goal 7: Professional Learning--Chaffey College will prioritize and align professional learning for all employees to support the achievement of Chaffey Goals.

⊞ 8c. Explain the rationale that led your program to develop each VIP Goal. How does each VIP Goal align with the Chaffey Goals?

VIP Goal 1--Rationale and how it aligns with the Chaffey Goals
VIP Goal 2--Rationale and how it aligns with the Chaffey Goals
VIP Goal 3--Rationale and how it aligns with the Chaffey Goals

VIP Goal 1 - We believe that assisting students with the process of interacting with Professors, material, each other, and themselves is our primary mission. Active learning has been shown to be pedagogically more sound (1) ensuring students learn and retain course material more effectively, in alignment with that mission. Increasing the use of active learning promises to align with Chaffey's committment to ensure learning and timely completion of students' educational goals.

VIP Goal 2 - IR data from this PSR cycle has shown a decrease in student retention in Astronomy. Our capacity to address this issue (and meet Chaffey Goal #2) depends upon our ability to understand the underlying reasons for the decrease in retention, as well as what is within the scope of our ability to address those reasons. Fulfilling Chaffey Goal #7, with a focus on this issue and how best to improve, allows us to better serve our students with the objective of helping students "stay on the path".

VIP Goal 3 - Expanding access to formal and informal educational opportunities is consistent with our mission at Chaffey College. Technology is one mechanism to assist in this endeavor. In the case of the Planetarium, we have a rare resource that many Chaffey stakeholders may not have experienced previously (or experienced only rarely). Leveraging this wonderful resources is a way to impact our students, staff, and the community at large. In terms of alignment with Chaffey Goals, increasing the utilization of the Chaffey College Planetarium by both other Chaffey stakeholders and the Community aligns with Chaffey Goals #3 and #4.

(1) Freeman et al. (2014) Active Learning increases student performance in science, engineering, and mathematics. PNAS111(23): 8410-8415