

Chemistry Department Assessment Report for 2022-23

Meeting dates: 5/10 and 5/11/2023

Present: Jake Anderson, Shelly Bradley, Andres Caro, Linda Desrochers, Liz Gron, David Hales, Courtney Hatch, Latorya Hicks, Peter Kett

Not present: Kyle Felling (departing), Bill Gunderson (sabbatical)

Assessing Learning Goal 4: *work effectively individually and in groups*

As our students progress through the chemistry curriculum, they perform laboratory work in groups for some courses and individually in others. They are asked to perform certain classroom activities as individuals, and others in groups. We hope and expect this to result in students who are both confident enough in their abilities to approach problems on their own and able to work efficiently and effectively in a team environment.

Direct assessment: faculty rating of Chemistry majors

Our previous SAP (2020) listed independent research papers as the direct assessment tool for this learning goal. We realized it would be nearly impossible to tease out the two components of this learning goal from the quality of those reports because research is typically conducted as a combination of some independent work with some shared group work. Therefore, we devised a new type of measurement. We assessed our Chemistry majors based on our observations of them in upper-level classes and labs. We used the five cohorts that entered in years 2015-2019, which correlates to a total of 31 students graduating in 2019-2023. We included multiple classes of students in the survey this year because it is the first time we have collected such data. In the future, we will add each class of students to this data set as they graduate. An updated SAP is being submitted alongside this report.

Each student was assessed on two Likert-style questions, where they were rated on ability to work effectively 1) *individually* and 2) *in a group*. The scale used was:

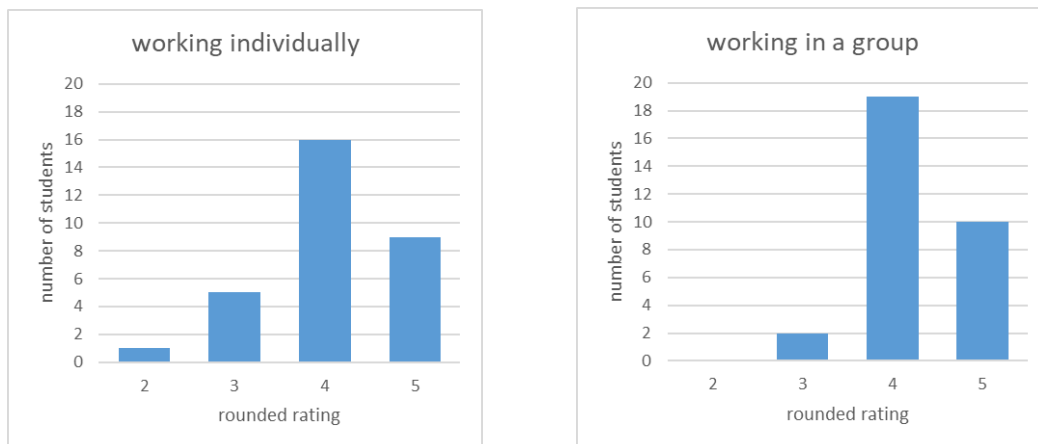
1. Not achieved
2. Developing
3. Competent
4. Proficient
5. Mastered.

The mean rating was calculated for each question on each student. The results can be presented in a few different ways. First, these mean ratings can be combined to yield an overall mean and median for each part of the learning goal.

	working individually	working in groups
mean	4.0	4.2
st. dev.	0.6	0.6
median	4.0	4.2
max	5.0	5.0
min	2.3	2.6

The mean and median values fall at the level described as “proficient,” the next-to-highest category. Thus, we assess our majors as a group as meeting both parts of this learning goal at the “proficient” level.

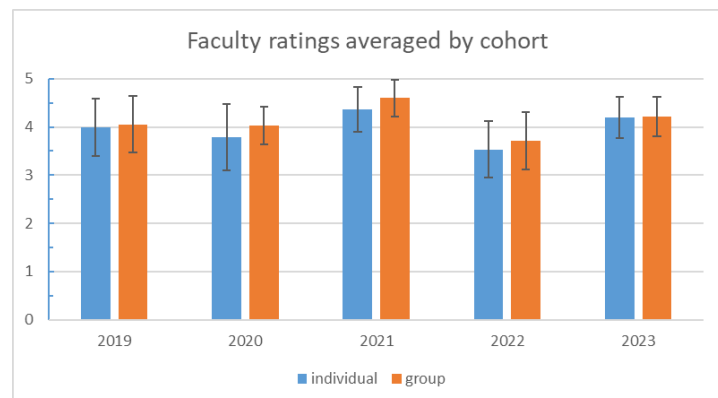
The distribution of our students across categories is also instructive. Each student’s mean rating was *rounded* to the nearest integer, yielding the following plots.



This shows only one student over five years assessed below 2.5 on either part of this learning goal. The fraction of students rounding to 4 or 5 ($x \geq 3.5$) is 81% for working individually and 94% for working in groups.

The results are also consistent from year to year, as shown here. Note that the populations are small in these averages: for 2019 – 2023, the numbers are 6, 6, 9, 6, and 4 students per year. One outlier can shift the average by a meaningful amount, as is the case for 2022.

Whether looking at individual results, averaging over the whole time period, or looking at each cohort, this direct assessment indicates that a large majority of our students are meeting both facets of this learning goal.



Indirect assessment: Senior Survey results

We assess this learning goal with an item in our Senior Survey where students respond to the statement, "I feel the Hendrix College Chemistry curriculum has taught me to work in a group." The responses are on a Likert scale:

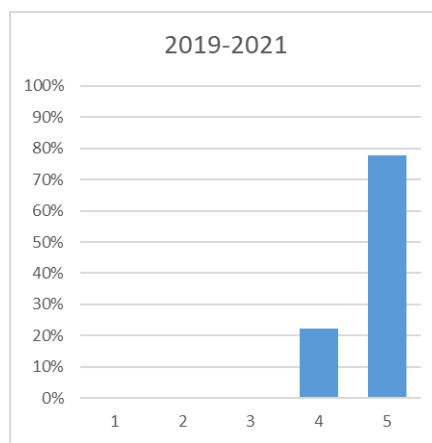
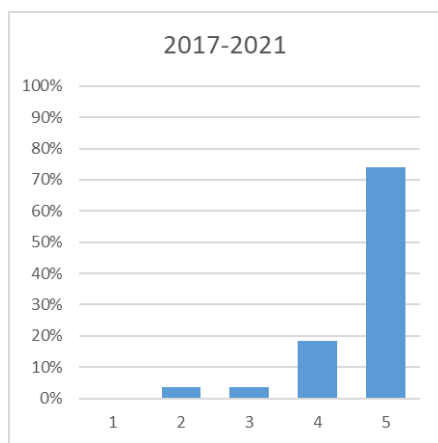
1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree.

We have data for this tool from a different set of years than for the direct assessment tool above because 1) we did not yet have data from this year's Survey when we met and 2) we failed to send out the survey last year. The person who normally oversees the survey was on sabbatical and the rest of us didn't think about it. Because of this, we will present data for the five years 2017-2021 with 2019-2021 broken out separately, since those three years overlap with the five cohorts represented in the direct assessment above. The number of student responses in any given year may differ from the numbers presented above for two reasons: 1) the survey is voluntary, so some students do not complete it; and 2) the Hendrix 5 program means some students we counted in any given cohort above (determined by entry date) may appear in a different one here.

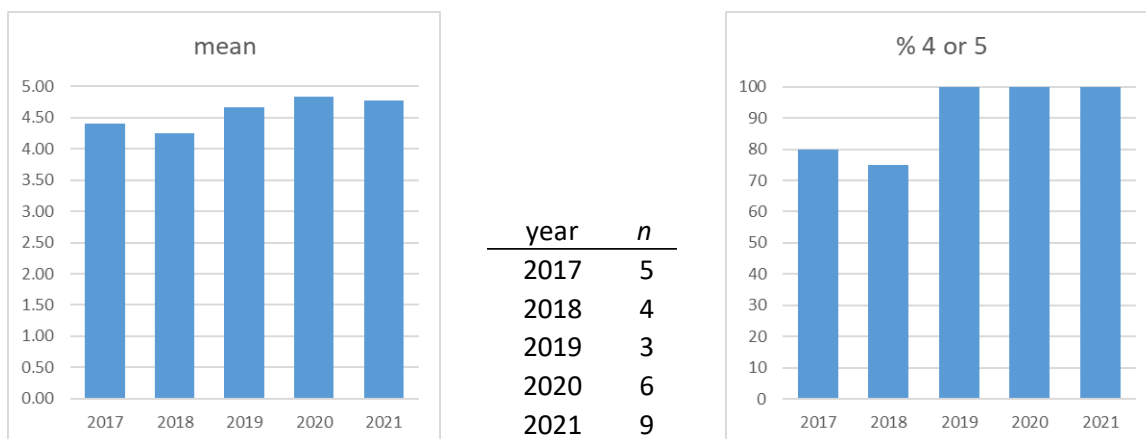
The plots and table here summarize the student responses.

Averaging the responses over years yields the results shown in the table. The averages of 4.6 for 2017-21 and 4.8 for 2019-21 show that our graduates, on the whole, at least "agree" with the survey statement. Only two students in the five cohorts of 2017-21 offered any responses lower than "agree:" one "neutral" and one "disagree." Thus, 93% in 2017-21 (100% in 2019-21) responded "agree" or "strongly agree."

	2017-21	2019-21
<i>n</i>	27	18
mean	4.63	4.78
% 4 or 5	93	100



Averaged responses from individual cohorts show consistently high ratings. In the “% 4 or 5” plot, note that the divergences from 100% for 2017 and 2018 each represent a single student.



It bears mentioning that the 2021 group spent their senior year in remote courses and labs, and yet they still responded favorably to this statement. Our students clearly feel that the Chemistry curriculum has helped them with their ability to work in groups.

Reflection

After discussing these data, we determined that our current strategies are working well. While our students do not universally achieve mastery of the two parts of this learning goal, the large majority of “proficient” and “mastered” ratings indicates that nearly all of them do quite well. The high scores from students in the Senior Survey are particularly gratifying. As a result, we plan to continue with our distribution of individual and group activities in our classroom work and laboratory exercises.

Refinement

In the course of our assessment work this year, we discovered that we have no *indirect* data to assess the portion of the learning goal that deals with working *individually*. Our senior survey has been amended to include a new question analogous to the one about working in groups. That question will be presented to seniors beginning in spring of 2024, so that we will have both direct and indirect data next time we evaluate our performance with respect to this learning goal.