

# CHEM-201 Placement: Survey of CHEM-151 Students Fall 2022 RB#235

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## ***Introduction***

At the request of the Chemistry Faculty Inquiry Group on alternative placement in general chemistry using multiple measures, the office of Institutional Research, Planning & Institutional Effectiveness (IRPIE) administered a survey to Introduction to Chemistry (CHEM-151) students. Self-reported data on students' academic experience including high school GPA and prior experience with Chemistry courses was collected with the goal of assessing the association between high school measures, and success in CHEM-151.

### **Background on Chemistry 201 Assessment**

Prior to 2019, there were three approaches for students to place into CHEM-201: a passing grade in preparatory general chemistry (CHEM-151), receiving a passing score on a chemistry placement exam, or a successful pre-requisite challenge. Currently the department no longer offers the chemistry placement exam, and eligibility options for CHEM-201 are reduced to passing CHEM-151 or submitting a successful pre-requisite challenge to be eligible for enrollment in CHEM-201.

## ***Methodology***

The weblink to the online survey was distributed via CHEM-151 instructors who were provided the url and had the option to have students scan a QR code that directed them to the survey. A total of 141 students completed the survey out of the 357 enrolled in fall 2022 yielding a 39% response rate.

Additionally, in order to correlate the self-reported measure with High school background (HS GPA, recency of High school experience) as well as experience with previous Chemistry coursework (e.g. grade earned in last Chemistry course, recency of course), with performance in CHEM-151, students' IDs were collected and the student grade report from Informer was used.

After matching the survey responses to the course information for 141 students, and after limiting to students' first attempts in CHEM-151, a total of 127 students' data are used in analyses pertaining to the correlation of self-reported High school measures and course success/retention.

**Course Success:** defined as the percent of students successful in courses out of total enrolled in courses: Numerator = Number of students (duplicated) with A, B, C, CR/P; Denominator = Number of students (duplicated) with A, B, C, D, F, FW, CR/P, NC/NP, W, I. (This analysis uses the RP Group definition, which facilitates statewide comparisons.)

## ***Results***

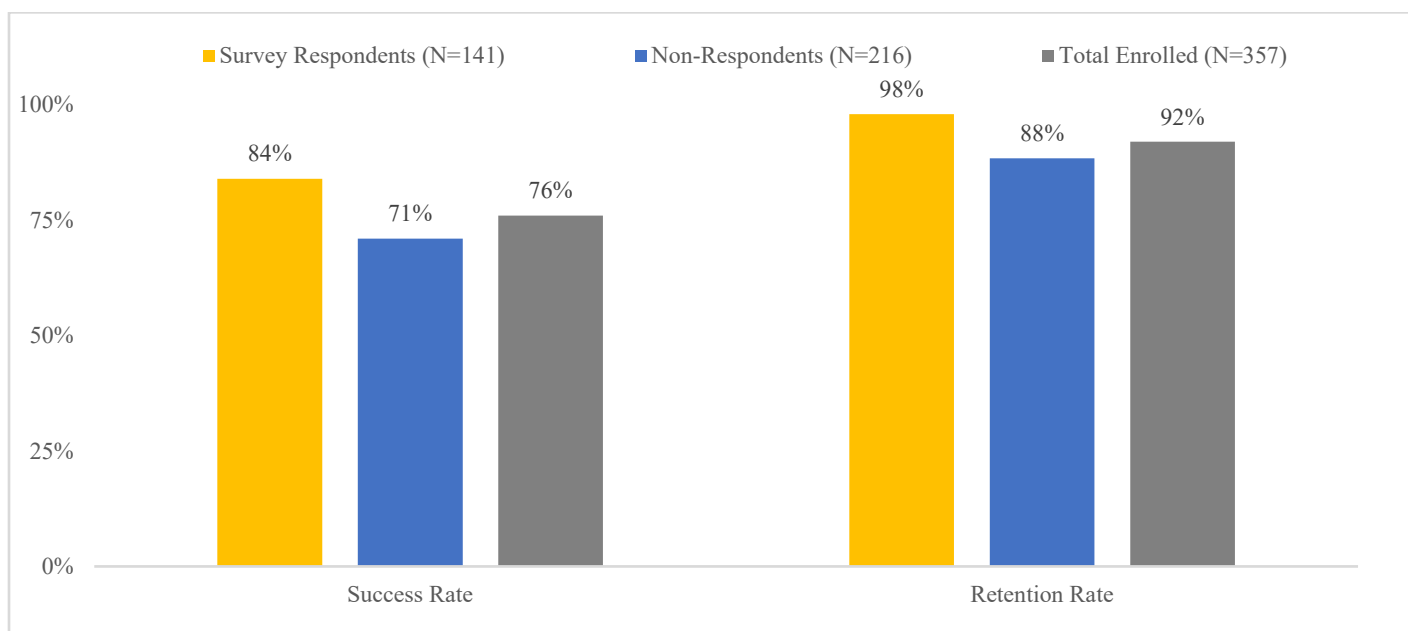
### ***Survey Respondents vs. Non-Respondents***

With regard to race/ethnicity, African American/Black students and Asian/Filipino/a/x students are slightly over-represented among survey respondents than the overall student population enrolled in CHEM-151 in fall 2022. Female students and students aged 20-24 had a higher representation among survey respondents (Table 1). Additionally, students who responded to the survey had higher course success and retention rates on average than non-respondents (success, 84% vs. 71%; retention 98% vs. 88%) (*Figure 1*).

Table 1. Demographics comparing all students enrolled in CHEM-151 to survey respondents (Fall 2022)

	Total Enrolled	Survey Respondents		Total Enrolled	Survey Respondents
Number of Students (N)	357	141	Number of Students (N)	357	141
<b>Ethnicity</b>			<b>Age</b>		
African-American/Black	0.5%	2.1%	19 yrs. or less	70.8%	66.0%
Hispanic/Latinx	15.3%	14.9%	20-24 yrs.	16.2%	24.1%
Asian/Filipino/a/x	58.8%	61.0%	25-29 yrs.	5.1%	5.0%
White	19.9%	17.0%	30-34 yrs.	3.2%	2.1%
Two or more Races	5.1%	4.3%	35-39 yrs.	2.3%	1.4%
Unknown	0.5%	0.7%	40+ yrs.	2.3%	1.4%
<b>Gender</b>					
Male	43.1%	34.0%			
Female	56.5%	66.0%			
Unknown	0.5%	0.0%			

Figure 1. CHEM-151 Course Success and Retention Rates: Survey respondents vs. Non-Respondents vs. Total Enrolled



### High School Measures and Success in CHEM-151

To assess the impact of high school performance measures on success in CHEM-151, the survey asked students to self-report their high school GPA, recency of high school experience, whether they had enrolled in a Chemistry course in high

school, and the grade that they earned in it. Distributions for all survey questions are provided in Appendix B. Table 2 provides the summary success and retention rates for each group identified as well as the rates for a combination of factors.

Overall the CHEM-151 course success rate for first-time students in fall 2022 was 86%. Using this as the benchmark, prior experience with Chemistry, which 90% of the students reported, lead to a success rate of 87%. More specifically, completing Chemistry with a grade of A or B, increased the rate to 90%. With regard to high school GPA, most survey respondents (87%) self-reported a GPA level of 3.0 or higher (*mean*=3.6, *sd*=.60). The average success rate for students with a high school GPA of below 3.5 was 76.5%, and this increased to 93% among students who had a high school GPA of 3.5 or higher. With regard to recency, overall success rates differed between students who were in high school within the last 5 years (88%) and those who had indicated being away from high school for more than 5 years (75%); however, given the small sample size of 16 students for the latter subgroup, the effect of high school recency is not fully explorable.

Retention rates did not differ across the various high school measures and ranged between 98.6% to 100%. Results for additional analyses using grade earned (Grade point 4=A, 3=B, 2=C, 1=D) in CHEM-151 for these group are provided in the Appendix.

*Table 2. Success Rate of First Time Students by Self-Reported levels of High School Measures*

Group	Success Rate	Retention Rate
First-time CHEM-151 Students, overall (N=127)	85.8%	99.2%
Any Chemistry Course (N=108)	87.0%	99.1%
Honors/AP (N=28)	89.0%	100.0%
Non-Honors (N=80)	86.0%	98.8%
Any Chemistry Course with A/B in HS (N=86)	89.5%	98.8%
HS GPA Level 3.5 or above (N=70)	92.9%	98.6%
HS GPA below 3.5 (N=51)	76.5%	100.0%
2.5 to 2.99 (N=12)	75.0%	100.0%
3.0-3.5 (N=39)	76.9%	100.0%
High School Recency within 5 years prior (N=109)	88.0%	99.0%
High School Recency more than 5 years prior (N=16)	75%*	100.0%

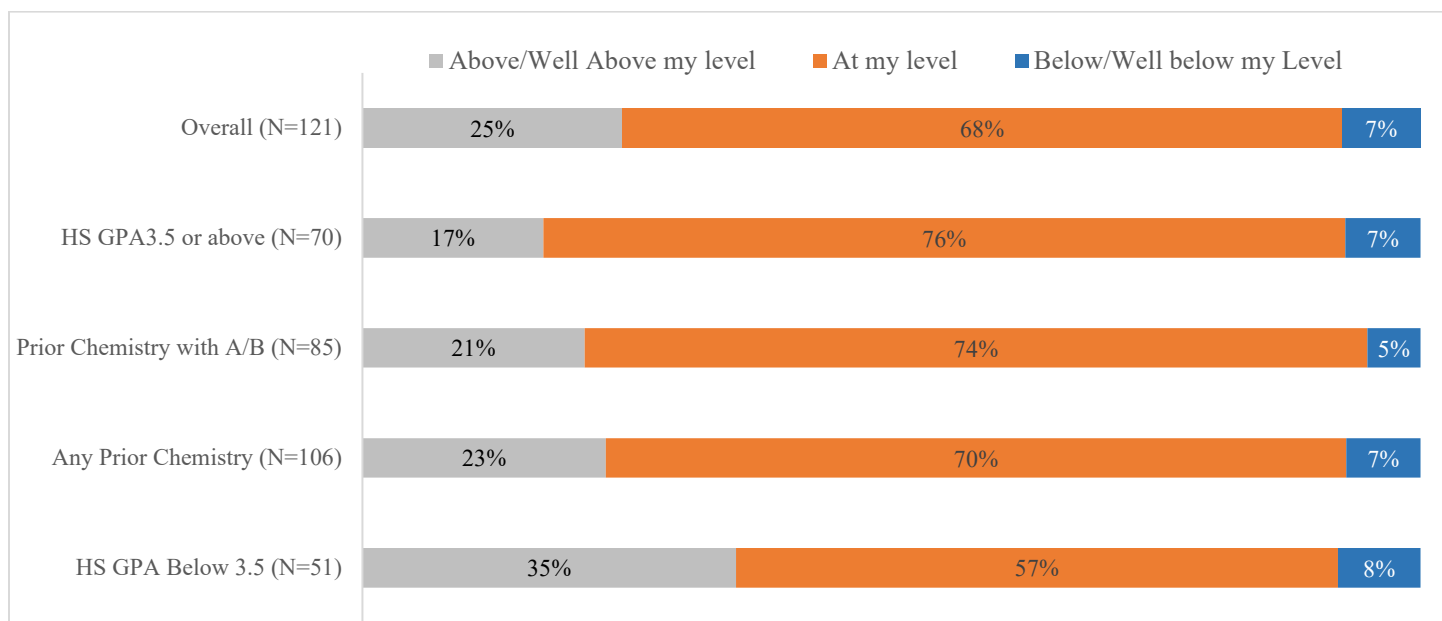
\*low sample size unable to discern full effect of Recency

### ***CHEM-151 Perception of Rigor and Preparedness***

In addition to information on high school measures, students’ perceptions with regard to the rigor of the course, and how well prepared they felt for CHEM-151 were assessed. The questions asked, ‘How would you describe the rigor of CHEM-151?’ and ‘How prepared do you feel for CHEM-151 this semester?’

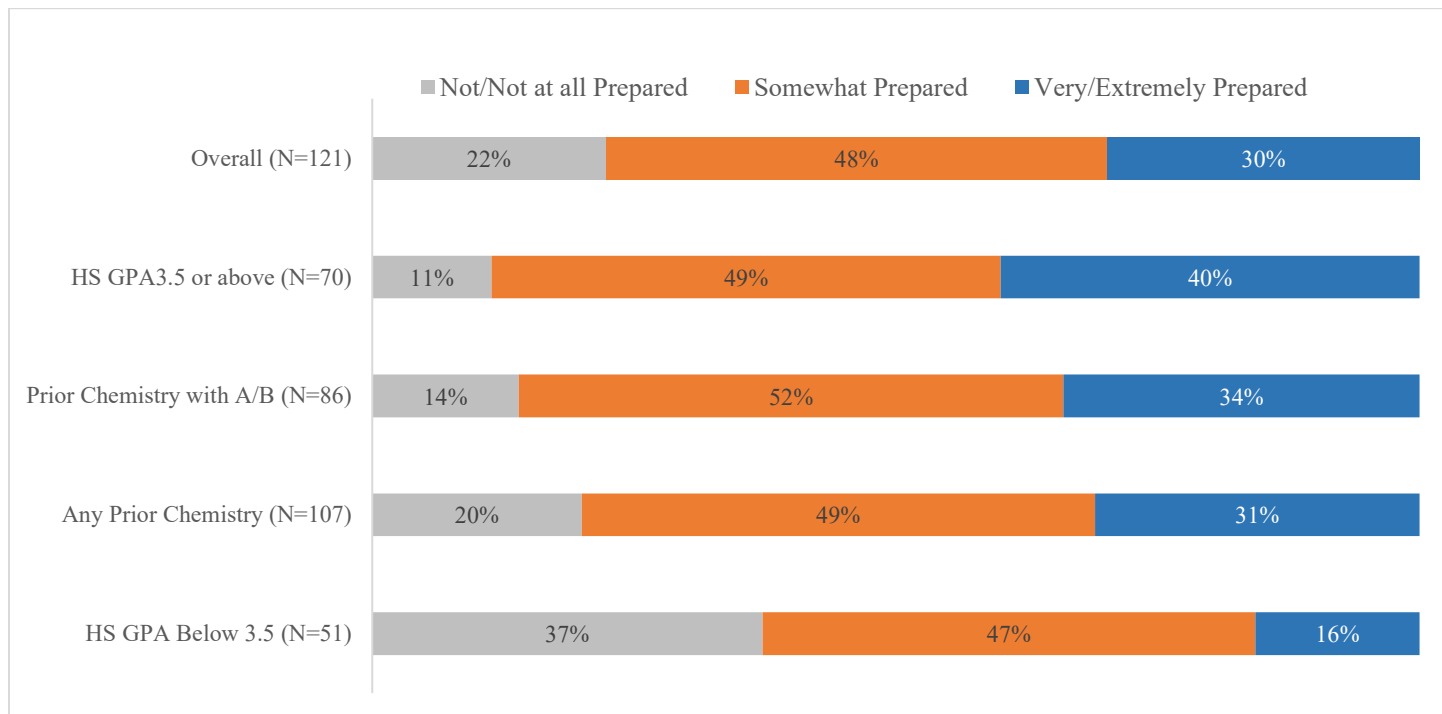
For the Overall group, 25% of the students marked the rigor as “above/well above my level”; while 35% of the “HS GPA Below 3.5” group indicated perceiving the rigor as “above/well above”, an increase of 40% as compared to the Overall group.

Figure 2. Perception of Rigor of CHEM-151 by High School GPA and Prior Chemistry



These patterns remained consistent as above with the groups differing with regard to how well prepared they thought they were for the CHEM-151 course. While only 22% of the Overall group felt “Not/Not at All” prepared, that number jumped to 37% for those in the “below 3.5 HS GPA” group. This is a 68% increase for the lower HS GPA group. Also, this disparity held in reverse for the “Very/Extremely Prepared” responses with the Overall Group having almost double the rate as the “below 3.5 HS GPA” students (30% v. 16%).

Figure 3. Perception of Preparedness for CHEM-151 by High School GPA and Prior Chemistry



## Summary Findings

- While there are some groups that are over-represented in the survey, the difference was generally modest.
- The retention rates for the Respondents were remarkably stable for all groups in the survey, ranging from a low of 98.6% to a high of 100%.
- Since the two lower HS GPA groups (2.50-2.99 and 3.0-2.49) had similar success rates (75% and 76.9%), they were merged into one larger group with a success rate of 76.5%. The “HS GPA 3.5 or above” had a 21% higher success rate (92.9%) than the “HS GPA below 3.5 group”.
- The “below 3.5 HS GPA” had significantly higher incidence of perceiving the course as “Above My Level” (35% v. 25%) and being “Not/Not at All Prepared” (37% v. 14%) as compared to the Overall group.
- Sub-groups that had a higher success rate than the Overall group (85.8%) were: students with experiences in any high school chemistry class (87%), experiences in any high school chemistry course with a grade of A/B (89.5%), HS GPA 3.5 or above (92.9%), High School recency within 5 years prior (88%).
- The students who responded to the survey had a 11% higher success rate (84% v. 76%) and 7% higher retention rate (98% v. 92%) than the overall group of CHEM-151 students. This difference would need to be considered if one wanted to attempt predicting success rates in CHEM-201 based on this analysis.
- Per Appendix A, similar to success rates, students with high school GPA of 3.5 or above, and for students with prior chemistry experience earned higher grades in CHEM-151.
- Per Appendix B, 89% of the First Time Respondents had completed a chemistry course in high school, whereas 58% had a HS GPA 3.5 or above.

## Recommendations

Upon review of the results of the survey responses and success in CHEM-151, the following recommendations should be taken into consideration:

- Consider a decision rule to allow students with “Any HS Chemistry” OR “3.5 or above HS GPA” direct placement into CHEM-201
- Explore a CHEM-201 with support class option for those students with “below 3.5 HS GPA”.
- Continue monitoring data on students in this analysis on subsequent success in CHEM-201 in Winter/Spring 2023.

## Implications

Upon review of the results of results of the survey responses and success in CHEM-151, [please identify and submit actions and/or decisions that emerge from the data and findings presented in this report.](#)

For questions, or more detailed information on this research brief, contact Preeta Saxena, Ph.D., Director Institutional Research, Planning and Institutional Effectiveness at [preeta.saxena@canyons.edu](mailto:preeta.saxena@canyons.edu).

## APPENDIX A

Distributions for grade earned in CHEM-151 (Grade point 4=A, 3=B, 2=C, 1=D) by high school GPA level, prior chemistry and recency of high school experience are provided in the figures below.

Figure 4. Distribution of Grade Point earned in CHEM-151 by High School GPA level

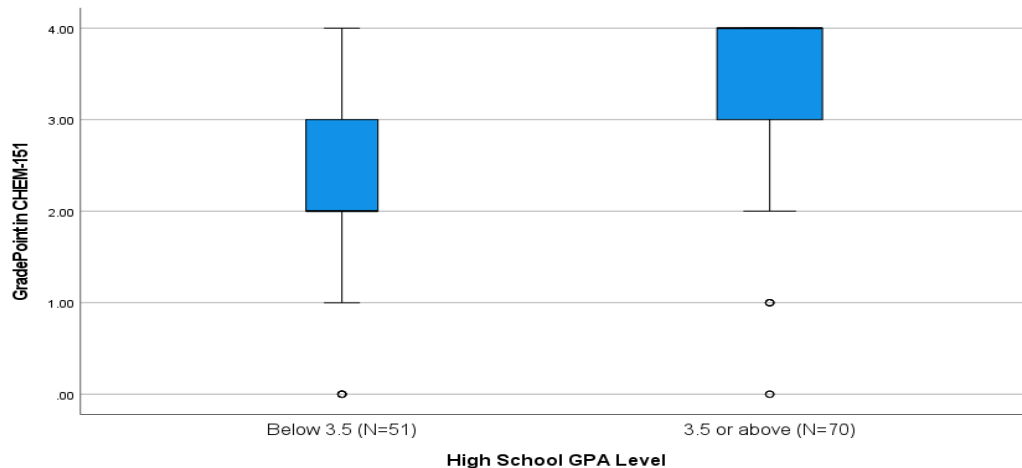


Figure 5. Distribution of Grade Point earned in CHEM-151 by Experience with Prior Chemistry

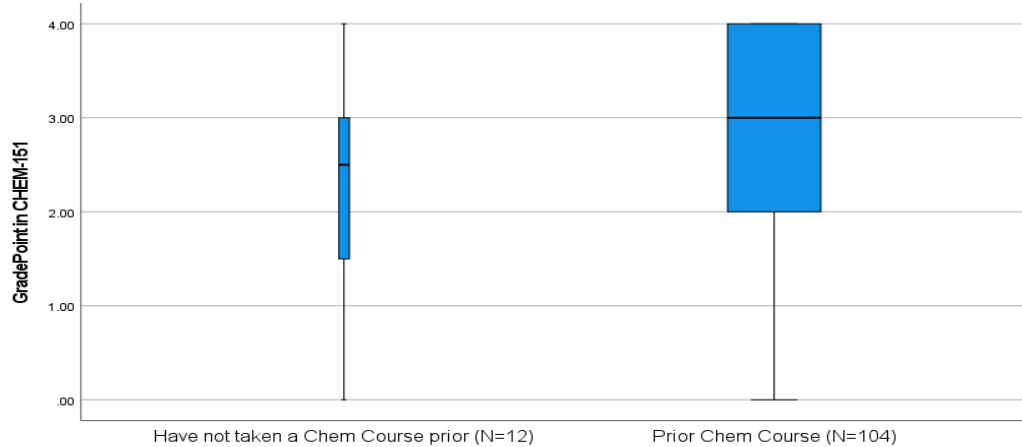
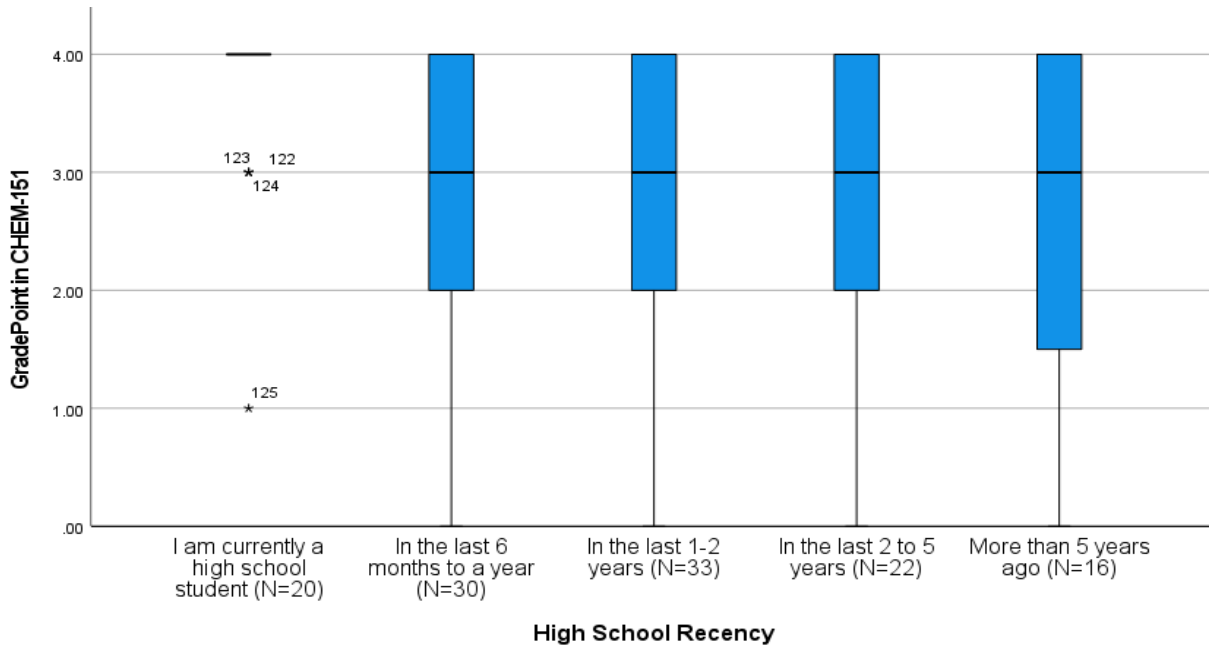




Figure 6. Grade Point earned in CHEM-151 by Recency of High School Completion



APPENDIX B

Table 3. Distributions for Responses to Survey Questions

	First-time Respondents		All Respondents	
<i>High School GPA Level</i>				
Below 3.0	12	9.9%	17	12.8%
3.0 to 3.5	39	32.2%	44	33.1%
3.5 to 4.0	43	35.5%	45	33.8%
Above 4.0	27	22.3%	27	20.3%
Total	121		133	
<i>High School GPA</i>				
Median	3.7		3.2	
Mean	3.7		3.1	
SD	0.57		0.58	
min-max	2.5-5.0		2.0-3.8	
<i>Prior Chemistry</i>				
Honors/AP Chemistry	28	23.1%	31	23.0%
High School Chemistry (non AP/Honors)	80	66.1%	89	65.9%
I have not taken chemistry before	13	10.7%	15	11.1%
	121		135	
<i>Grade earned in Prior Chemistry</i>				
A-/A/A+	56	50.0%	59	47.6%
B/B-/B+	33	29.5%	38	30.6%
C/C+	18	16.1%	21	16.9%
D or did not pass	5	4.5%	6	4.8%
Total	112		124	

Table 4. Table 3. Distributions for Responses to Survey Questions (contd.)

	First-time Respondents		All Respondents	
<i>Highest Education Level</i>				
Less than a high school diploma	17	13.5%	17	12.1%
High school diploma or equivalent (e.g. GED)	47	37.3%	50	35.7%
Some college, but no college degree yet	52	41.3%	63	45.0%
Associate's Degree or Higher	10	7.9%	10	7.1%
Total	126		140	
<i>High School Recency</i>				
	20	16.5%	20	14.4%
In the last 6 months to a year	30	24.8%	30	21.6%
In the last 1-2 years	37	30.6%	41	29.5%
In the last 2 to 5 years	22	18.2%	27	19.4%
More than 5 years ago	16	13.2%	21	15.1%
Total	125		139	