UTILIZING A COMPREHENSIVE WEBPAGE TO IMPROVE SCIENCE CLASSROOM PERFORMANCE

by

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ABSTRACT

The purpose of this study was to improve student classroom performance through the use of a detailed chemistry webpage. Students utilized a monthly assignment calendar with links to all classroom materials. Links to additional chemistry resources for review and reinforcement were also available to assist both present as well as absent students in their learning. Results indicate that the treatment increased assessment scores and improved student learning behaviors.

INTRODUCTION AND BACKGROUND

Project Background

Teaching Experience & Classroom Environment

In the fall of 2009, I moved from a department of defense dependent school (DoDDs) in Japan to a DoDDs school in England. Both schools are associated with the United States Air Force and have similar students. The school in England is about half the size of the school in Japan though and has approximately one hundred thirty high school students.

Based on standardized tests, the students in England score in a higher quartile than those in Japan and therefore, I assumed they would be stronger learners. As the school year progressed though, I became more frustrated with my chemistry students who were not demonstrating good learning behaviors in the classroom. Initially, I had thought that these students needed to learn how significant their classroom behaviors were to their level of performance but through more careful observation, I realized that these poor classroom behaviors were really a cause of coming to class unprepared. The students were not completing or even attempting homework. When absent from class, students rarely would determine what they had missed during their absence, and therefore would quickly become confused and frustrated by the material when they returned to class.

Initially, I contemplated a large variety of possible solutions to assist in helping students come to class prepared. Some of these solutions were already in place at our school however, like late homework policies, but these didn't seem to be adequately

increasing student preparation. One strategy that has not been tried at our school was a class webpage. Therefore, I decided to create a detailed chemistry webpage for students to access. Students could find a monthly assignment calendar with links to every assignment, notes, labs, etc. In addition, links to various resources to reinforce concepts taught in class could assist both present as well as absent students in their learning.

During the course of my action research project, my goal was to improve my students' level of preparation for class through exposure to this webpage. My hope was that if students were more prepared when they came to class then I wouldn't waste as much time dealing with students who weren't paying attention but instead were trying to complete the assignment due that day or trying to figure out what they missed when they were absent. These students also caused distractions from those students who are trying to pay attention, and therefore none of my students understood the material as well as I would have liked. Having a classroom of students whose only concern was with learning the material presented that day would assist me to work with those students who didn't understand that day's material rather than trying to deal with all the students who didn't understand the material from last class or the class before that.

If a student was more prepared when they came to class, then they wouldn't miss out on vital information that I was presenting while they were trying to get themselves organized for class that day. These students wouldn't fall behind as easily in chemistry and therefore more of my students should be successful in chemistry. In addition, there wouldn't be as much frustration felt by the students because there would be fewer distractions and interruptions by those students who weren't prepared for class and therefore were asking questions that had already been addressed.

Although there have been many studies done which link homework scores to increased classroom performance, I think that my action research project will still be useful to other teachers and researchers. In particular, there is not a lot of research linking an on-line assignment calendar to homework completion rates. The results from my project could then be utilized by others as evidence of this strategy's success. Additionally, most teachers are continually looking for ways to encourage students to complete their homework and seeing a new successful treatment will give them something to try or even stimulate them to create something similar to utilize.

Focus Question

Over the course of my action research project, my main research question was, "What are the effects on a student's classroom performance when they utilize my comprehensive chemistry webpage?" Although this was the main focus of my project, there were also several sub-questions which were addressed through my treatment. These questions were:

1. What effects will the chemistry webpage have on a student's confidence in class when returning from an absence?
2. What is the impact of a comprehensive chemistry webpage on homework completion rate?
3. How will this webpage impact my teaching?

CONCEPTUAL FRAMEWORK

My research project involved the relationship between student preparation and classroom achievement and I quickly realized that for the purposes of this project, student preparation would mostly be determined through homework completion patterns. Therefore, the majority of my research was based around the purpose of homework, the completion of assigned homework, and homework's relationship to classroom success. The other component of my research dealt with how successful an on-line assignment calendar would be to student achievement.

Because some of the lack of student preparation and therefore lack of achievement is due to student absences, I felt it was important to determine what findings other researchers had found about this relationship between absences and achievement. Many of the articles I found did state that students with more absences did not perform as well in school (Borland & Howsen, 1998; Gottfried, 2009; Lehr, Sinclair, & Christenson, 2004). However, many of these same researchers also stated that other factors could be contributing to these outcomes. For instance, in many areas those students with more absences are also those from lower socio-economic households and this could be the cause of the lower achievement (Finn, 1993). I did find an article though that attempted to remove many of these variables in order to analyze the relationship between absences and student GPAs as well as performance on standardized tests (Gottfried, 2009). This study had the same findings as others in which Gottfried determined that, "there exists a statistically significant and practically meaningful relationship between attendance and achievement" (Gottfried, 2009, p. 437). These results support my observations that students with more absences are not performing as well in class.

Working to decrease the number of times that a student was absent from school is not a viable option in this case. The students were absent due to school related activities or as a result of their parent's military occupations. Instead, I needed to develop ways to overcome the deficiencies caused by classroom absences so that these absent students could still reach the same achievement as those who were present in class. The basic theoretical approach that I wanted students to understand about their success is that completion of homework improves their overall performance in class. Again, several articles were found that support this theory. Bempechat (2004) discusses the positive role that homework plays in a student's cognitive as well as social development. Although the social components are an added bonus to my research, the cognitive components that emerge support my ideas on the link between homework completion and academic performance. The article cites several research projects, including one by Cooper, Lindsey, Nye and Greathouse (1998). In this study, students (n=709), parents and teachers (n=82) completed a questionnaire about the amount of homework assigned, the amount of homework completed and the attitudes of each participant in terms of how they perceived homework (Cooper, Lindsey, Nye & Greathouse, 1998). In addition, these results were correlated with student achievement scores. The results show that a positive relationship exists between academic achievement and homework completion, especially in middle and high school students (Cooper, Lindsey, Nye & Greathouse, 1998). Another study by Keith and Cool (1992), found that academics are favorably linked to homework completion, regardless of student ability (Bempechat, 2004).

Throughout my research project, I was working to overcome the effects of student absences, which decrease student achievement. Most of this involved working to

improve homework completion rate, which increases student achievement. The major bulk of this was done through the incorporation of my detailed webpage. The webpage had an up-to-date assignment calendar in which students could always utilize for their assignments and class work. Although I was unable to find any research to correlate class assignment calendars to improved homework completion, Flores, Schloss and Alper (1995) conducted a study in which having individual student calendars resulted in an increase in homework completion. This article discusses the results of a study in which daily calendars were incorporated into the daily procedures for eight special needs students (Flores, Schloss & Alper, 1995). For these students, "the percentage of scheduled daily activities completed independently increased from 37% during baseline to 88% after intervention" (Flores, Schloss & Alper, 1995, p. 42). Therefore the use of my assignment calendar should assist the students to complete homework more independently when they are absent from class.

Because I utilized an online learning source, I wanted to find some research about the success of using an on-line homework calendar but unfortunately, I had a difficult time finding an article that didn't also include data for web-sites utilizing web-based tests or 100% on-line classes. Therefore, I chose an article that dealt with more than just homework calendars, but I still feel it justified the use of on-line calendars to improve homework completion and therefore classroom achievement. The article was based upon incorporating a teacher designed website, called GetSmart, into science classrooms in Australia (Chandra & Fisher, 2009). Within the article, there were many helpful ideas about how to optimize a web site for higher learner outcomes but one of the more interesting suggestions was to have students propose ways that it can be improved for

content as well as ease of use. After reading this article, I added a question about my webpage to the student interview questions in hopes that the students might also suggest some good ideas. As the study progressed, students were asked to complete a survey which addressed the use of the GetSmart website. In particular the result category of the survey, which was designed to determine the extent to which students were able to achieve the learning outcomes through the use of the on-line resources, showed a mean of 3.88 out of a possible 4.00 (Chandra & Fisher, 2009). Therefore, it would seem that having an on-line calendar for my students to access when they are absent should increase their preparedness for class.

As I was searching for articles discussing homework completion, I came across an article that addressed the fact that most schools do not have any sort of statement or policy concerning homework (Bonfiglio, 1988). One school in Vermont decided to develop a standard homework policy for each department. Within the policy, there were a variety of statements discussing why homework was so important for the student's success. In addition, the policy also stated various responsibilities for the teacher, the parent, and the student. Although completing the homework was very important for overall student achievement, it was also important for me to ensure that the students understood my expectations about completing any work they missed during their absences. Therefore, one component of my research project was to ensure that a clear, understandable policy is in place for makeup work.

As a way to delve further into how my students prepare for class when they are absent, students completed a modified minute paper when they returned. This classroom

assessment technique (Angelo & Cross, 1993) did not take the students long to answer, but gave me some insight and helped shape changes throughout my research project.

The articles and books utilized in this research project support my classroom observations about the correlation between student absences and academic achievement. In addition, other resources show that by improving homework completion, student achievement also increased. By incorporating the theories and methods of the articles and books into my data collection, I had a firm foundation upon which my research was based.

METHODOLOGY

Treatment

As I attempted to address the research questions above, I utilized a comprehensive website as my treatment. Most importantly, the website contained a calendar of my daily lessons plans. Each day the calendar had links to homework assignments, labs, and notes that were covered in class that day. Students who were absent or had misplaced assignments downloaded the information from here. Homework assignments could then be completed and ready to turn in when students returned to school. If students were struggling with the concepts they missed, or for those who needed additional assistance with the concepts, there were links to on-line sites which helped students to understand the concepts that were covered in class. At the beginning of each unit I filled in the calendar for each day that I had planned for that unit, with the realization that I might have to make some changes as the unit progressed.

Students who are also absent for extended periods of time could complete the assignments in an electronic form which could then be emailed to me. This assisted those students with extended absences to get some feedback throughout their time away from class. Students were always able to access the website and determine their assignments in advance when they knew they would be gone as well as accessing to receive their homework when they had an unplanned absence. This was even more important this school year as I no longer accepted the excuse of absenteeism for late work. Students were required to access my site in order to avoid late work penalties.

As an overseas military community almost every student has internet access at home. For those that do not, there are a multitude of free computers and printers to use around the base at restaurants, libraries, many of the military buildings, and of course in our school. Therefore web access was not a negative factor in the success of this intervention.

The initial data for my study was taken during the first quarter, which was approximately nine weeks. This included test scores, homework completion rates, and interviews of selected students. At the beginning of the second quarter, I began my treatments which each lasted approximately four weeks. I completed one unit of the chemistry curriculum with the treatment described above. During the next unit, students continued to have access to the website, but they were not able to download assignments. In this non-treatment phase, students either had to collect their assignments in advance from me or scramble to get them from their classmates before class time in order to avoid late penalties. For the third unit, treatments were reintroduced. During the fourth and last data collection period, conditions again returned to pre-treatment.

Research Design

In order to obtain a large sample quantity, I chose to utilize data from all thirty seven of my chemistry students. These students were in two separate classes but because my research centered on my webpage, any differences that occurred in class should not have affected the outcome of the project. In addition, I chose to select six students for more detailed data collection throughout the project. Three of these students were often absent from class and the other three students typically did not miss much class time. This determination was somewhat subjective, but by looking through the previous school year's attendance as well as some common knowledge of the activities these students were part of, I believe that I selected six students who met the criteria. Additionally, I selected a low, middle, and high performing student for each type of attendance. Therefore, a low, middle and high performing student who was often absent was selected as well a low, middle, and high performing student who was rarely absent. Of these the most difficult category to identify was a low performing student who was often absent. We have a certain GPA that students must have in order to participate in extracurriculars. Initially, the low performing student was allowed to participate but by the end of the first non-treatment period the student was no longer allowed to participate in extracurriculars.

Although I chose six students from my class, these six were very representative of the chemistry class population. All were white but considering that there were only seven minority students at our school, none of which were in my classroom, this was indicative of my class. They all come from military families and therefore would be considered middle income, as would all of our students. Although our school has a large number of

students on IEPs, there were none in my chemistry classes and therefore none of the selected students. The only other difference then that I tried to incorporate besides performance level was gender. Three of the selected students were male and three were female. The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained.

As this project progressed, a variety of data collection instruments were utilized to obtain data. For all case study questions, at least three different instruments were incorporated so that triangulation during data analysis could occur. The use of each of the instruments as an appropriate method to determine the outcome of each case study question was discussed at length with other teachers in various curriculums. Their advice and suggestions as well as my own input resulted in the following table which shows how these instruments were linked to the appropriate research question they addressed in my project. The incorporation of these various methods helped to insure that my case study was valid and reliable.

Table 1.
Research Questions and Data Collection Methods

Focus Questions	Student Interviews	Teacher Log	% Homework Completion	Test Scores	Minute Papers	Likert Scale
Primary Question 1. What are the effects on a student's classroom performance when they are accessing my comprehensive chemistry webpage?	1,2,3,4,5	1,4,5	1,3,4	1,3,4	1,2,4,5	1,2

Secondary Questions					
2. What effects will the chemistry webpage have on a student's confidence in class when returning from an absence?	1,2,4,5	1,4,5		1,2,4,5	1,2
3. What is the impact of a comprehensive chemistry webpage on homework completion rate?	1,2,4,5		1,3,4	1,2,4,5	1,2
4. How will this webpage impact my teaching?	1,2,4,5	1,4,5			2,4,5

KEY: Explanation as to why each data collection method was selected.

1. Will give qualitative data.
2. Will show student opinions about specific questions.
3. Will show a baseline for the students prior to treatments.
4. Will show progress during the treatment.
5. Will show the value of the treatment.

Two quantitative measurements were utilized throughout the project in order to show numerically whether students were completing homework as well as whether this homework completion had an effect on their classroom performance. The first collection method was the average homework completion rate of all of my thirty seven chemistry students. The other quantitative measure was the overall summative assessment average for all of my chemistry students. The homework completion rates and summative assessment average was calculated at the end of the pre-treatment phase as well as the end of each treatment and non-treatment phase of the project.

A teacher log (Appendix A) was incorporated into my daily schedule during this project. Although most of my research questions addressed improving student performance, I also wanted to address how this process was assisting me to become a better teacher and the log allowed for this reflection. In addition, I also used this log to carefully make observations of the six selected students. This gave some additional data showing student progress during this process. This log was completed at the end of each chemistry class with observations and student tracking data throughout the treatment and non-treatment periods.

Two collection instruments, student interviews (Appendices B through D) and a Likert scale survey (Appendix E), were designed to obtain primarily qualitative data from the students. I would really have liked to interview each of my students, but the sheer time factor as well as the massive amount of data to analyze would have been prohibitive. As an alternative, the use of a Likert scale survey gave me some insight into every student within a realistic time frame as well as a feasible amount of data to analyze. The Likert scale survey was given during class to all students at the end of each treatment and non-treatment phase of the project. The questions for this scale, as well as the interview, were developed to assist me in determining how students prepared for class as well as ways in which I could help them become more successful in chemistry class.

Because the Likert scale survey was not able to procure as much information as an interview, I also decided to interview the six selected students. As discussed above, three students who were often absent from school were chosen, one as a low, middle, and high performing student. Three others, again a low, middle, and high performing student who were rarely absent were also chosen. The individual interviews occurred during our

seminar period at three times during the project. Initially, an interview occurred during the pre-treatment, an interview at the mid-treatment point which was at the end of the first treatment phase, and finally at the end of the second treatment phase.

In addition to the various data collection instruments described above, I also utilized a modified minute paper (Appendix F) throughout the project. When students returned from an absence, they were asked to respond to three questions that assisted me in determining how they were preparing for class after an absence. These were utilized both during treatment and non-treatment times.

The use of these various data collection methods was instrumental in my case study. The data, both qualitative and quantitative, was obtained and analyzed. From these results, I was able to address my primary research question and determine whether the treatment did increase student classroom performance. In addition, these results were also utilized to address my secondary research questions.

DATA AND ANALYSIS

During the first quarter of school, a variety of pre-treatment collection instruments were utilized in order to get a baseline of the students' academic performance and their beliefs about how to be successful in chemistry. These instruments continued to be utilized throughout the next four units, which alternated between treatment periods and non-treatment periods. The quantitative data, summative assessment scores and homework completion rates, were disaggregated in two different ways. First, all students were placed into four categories based upon the percentage of days they were absent from

class. Initially, I had planned to utilize the number of days absent but because each unit was not identical in class meeting days, I decided that percentages would be a more decisive method for comparison. The categories therefore were: students who fell between zero to ten percent absent, students who fell between ten to twenty percent absent, students who fell between twenty to thirty percent absent, and those who fell between thirty and forty percent absent. Since each unit occurred at a different time, some of the students did not fall into the same category for each data period. However, all students fell within one category of their pretreatment placement. For instance, one student had twenty to thirty percent absent rates during the pretreatment phase. Throughout the rest of the time periods, this student either fell into the same category or fell into the ten to twenty percent absent rates. Since some students' absenteeism rates changed, this also meant that the total students in each category changed during the case study. It was interesting to note however, that the total number for the first two categories, zero to ten percent and ten to twenty percent were very consistent. During all phases, the total number of students who fell into the zero to ten percent category was between twenty four to twenty six students. The total number for the ten to twenty percent category was between seven to ten students. Therefore, although some variations in the student population for each category occurred, I believe they were very slight and had minimal effect on the overall data analysis. The last two categories, twenty to thirty percent and thirty to forty percent never had more than four students and therefore were not very effective in terms of conclusive data analysis, but I still included this data for trending patterns. As mentioned earlier, six students' data was specifically analyzed in

order to gain further insight throughout my research project and therefore the quantitative data was also disaggregated to show the outcome from each of these students.

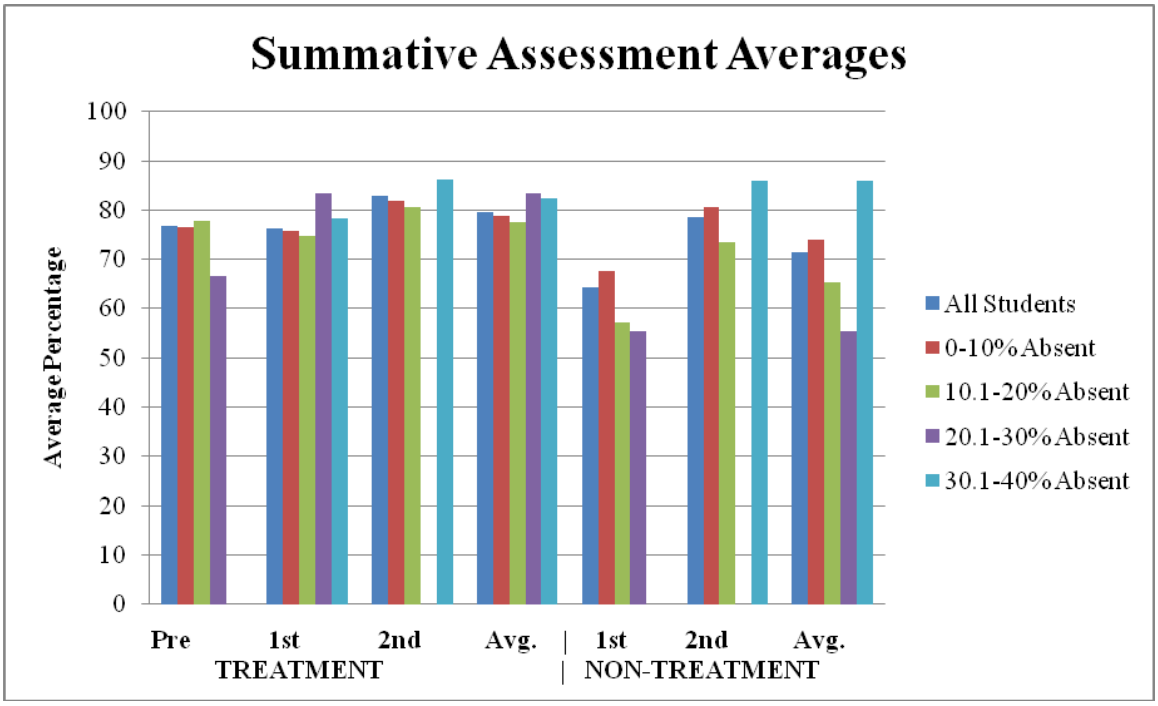

Figure 1. Summative Assessments, (*N*=37).

In looking at the disaggregated data of the summative assessment averages, there does not appear to be a significant difference in the average percentages of any one category of absences. However, in each phase of the case study, the percentage for those students missing ten or less percent of class was always higher than those students missing ten to twenty percent of class. A one sample t test on this difference however resulted in a t = 1.6 and a p value of 0.083 which is not quite enough to be statistically significant when tested at a 0.05 significance level.

Another noticeable difference in the figure was the overall scores during the treatment periods as compared to the non-treatment phases. There appeared to be a substantial drop in student assessment scores during the non-treatment phases, especially during the first non-treatment period. A one sample t test which compared all student

scores from the treatment to those from the non-treatment resulted in a t = 3.5 and a p = 0.00052 which is extremely statistically significant when tested at a 0.05 significance level. Initially, I was concerned that this large drop during the first non-treatment phase might be due to an increase in the difficulty level of the material covered. However, I would state that the level of difficulty in chemistry increases throughout the year and therefore the last phase of non-treatment should have been the most difficult and therefore show the lowest scores. The fact that this unit's scores were not as low as the first unit would suggest that it was not the difficulty of the material that resulted in the large drop in scores but rather student access to a detailed webpage. Therefore, I would state that the t test results are significant to my case study.

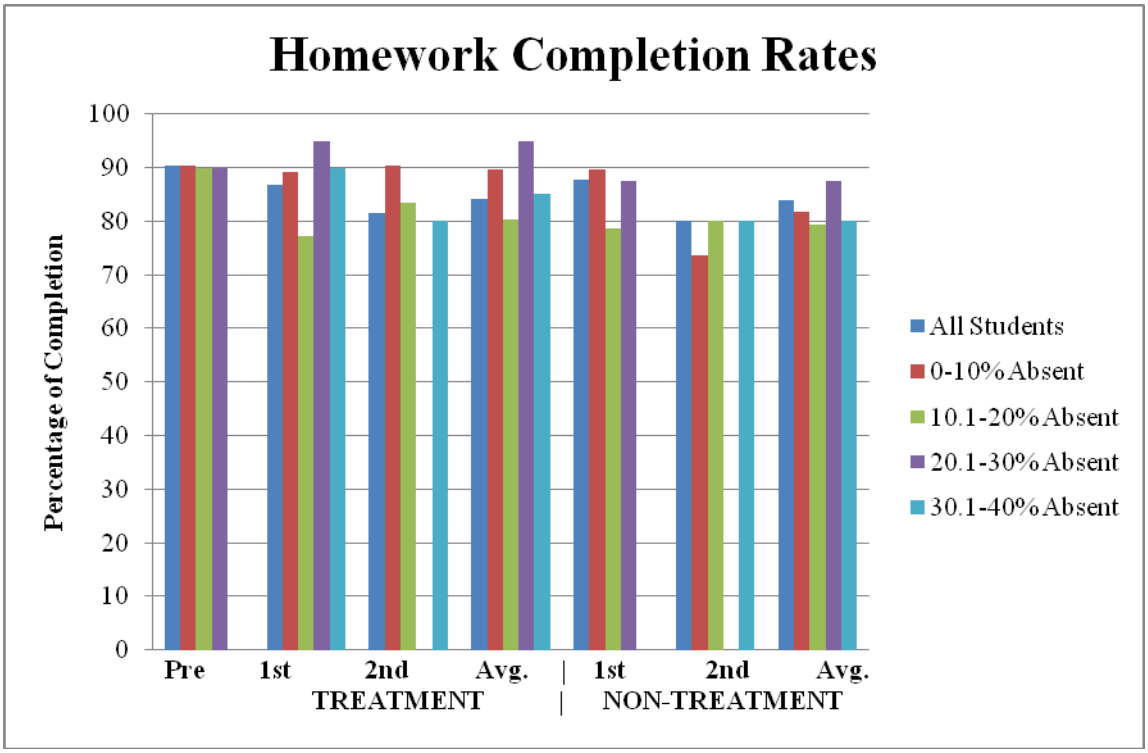

Figure 2. Homework Completion Rates, (*N* = 37).

On the other hand, analyzing the homework completion rates throughout this case study did not result in any significant discoveries. The students were again disaggregated

into four categories based on the percent of absences. At first glance, it did appear that students during the treatment phases had a higher rate of completion than during the non-treatment phases. However, a one sample t test comparing completion rates for all students during the treatment and during the non-treatment phases resulted in t = 0.27 and a p value of .16 and therefore was not statistically significant when tested at a 0.05 significance level.

As with the summative assessment scores, it would appear that increased absences also resulted in a lower percentage of homework completion rates. For all units, except the second non-treatment phase, students who were only absent zero to ten percent had a higher homework completion rate than those students who were absent ten to twenty percent. However, running a one sample t test comparing all scores for students who fell into the zero to ten percent category with those scores for students who fell into the ten to twenty percent category resulted in a t value of 2.4 and a p value of 0.10 which is not statistically significant when tested at a 0.05 significance level.

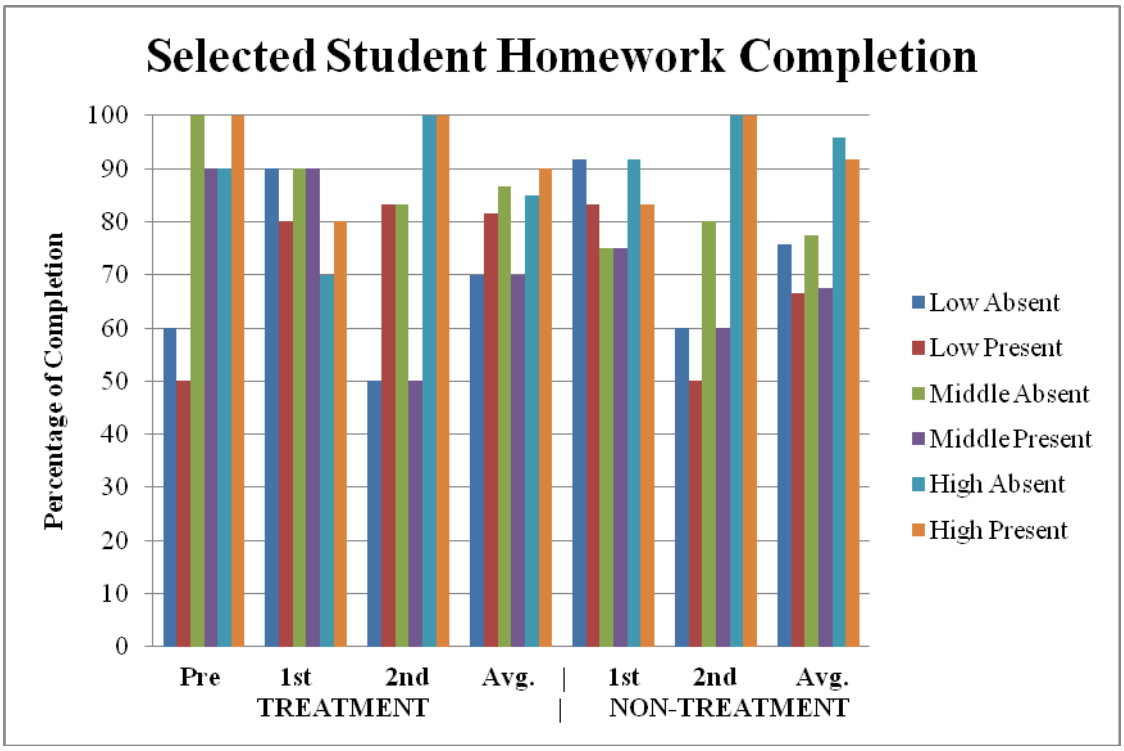

Figure 3. Homework Completion Rate for Selected Students, (*N*=6).

These apparent, though not statistically significant, trends did not extend through the six selected students however. In fact, the pattern in these six students would indicate that students who are absent complete more assignments than those who are present, regardless of ability level. In addition, comparing the average percentage of completion during the treatment and non-treatment phases showed that there was a decrease in completion rates for both the low absent and the high absent students during the treatment phase, which would again suggest that absent students were better prepared during the non-treatment phases of my case study. However, this is just a select group of students and when comparing their values to the class average, it would appear that these students are the exception rather than the norm and therefore this data was probably not indicative of the class overall.

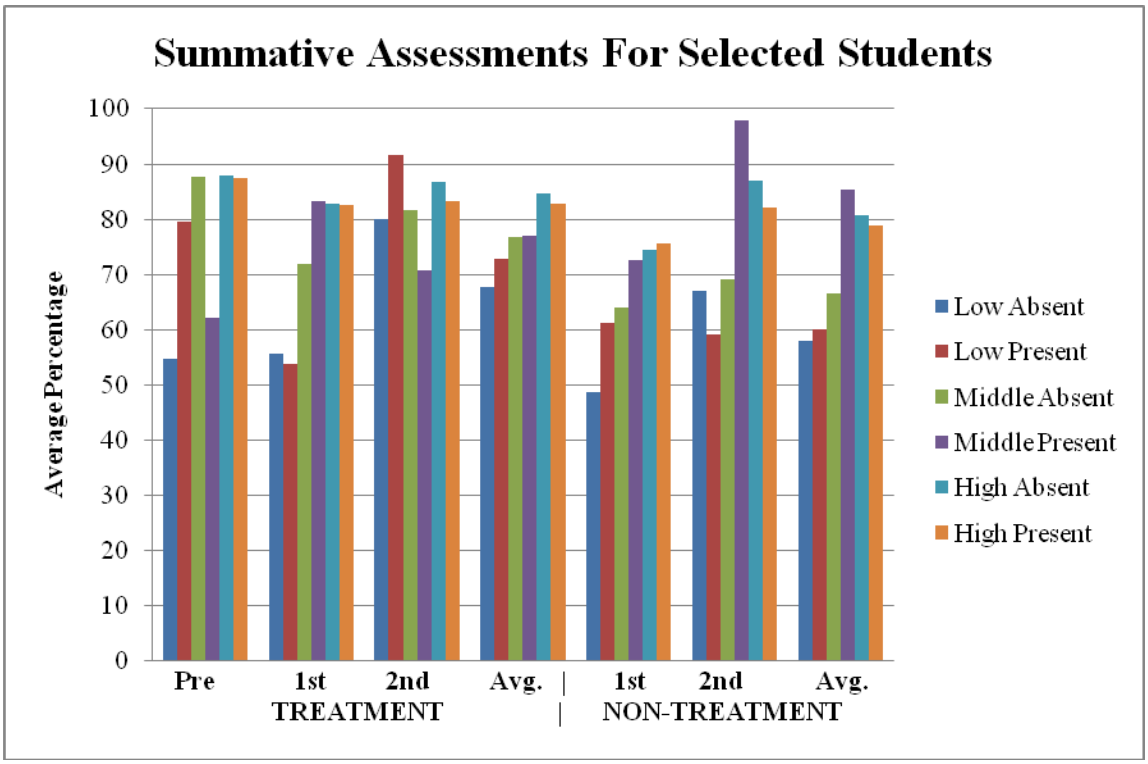

Figure 4. Summative Assessment for Selected Students, (*N*=6).

The summative assessment data for the six students was more helpful to my research and was similar to the patterns seen in the entire class. In particular, comparing the average scores for all six students during the treatment to the non-treatment scores showed an increase in all students with the exception of the middle achieving student who was usually present. In addition, there exists a prevailing pattern which revealed that the ability levels that I selected for each of these students was accurate. Initially I was concerned as some of the students scored higher or lower than I had anticipated during the pretreatment phase. However, by the end of first non-treatment phase, those discrepancies became less apparent as students began to fall into projected ability levels. Comparing assessment scores between the two students with the same ability level also shows that students who are typically present score higher than those that are absent. The

data from the assessment scores for these six students mirrors the data collected for the entire class.

Table 2.
Teacher Observations of Preparedness for Six Selected Students, (N=6)

Student	***Pre treatment**	***1st Treat**	***2nd Treat**	***1st non-treat**	***2nd non-treat**
Low Absent	0.75	0.8	0.8	0.8	0.8
Low Present	2.33	1.2	0.7	1	0.5
Middle Absent	1.5	2.4	2.4	2.2	2.2
Middle Present	1	1	1	1	1
High Absent	2.5	2	2.5	2	2.3
High Present	3	2.3	2.5	2.5	2.5

*PREPAREDNESS: All homework complete = 3, homework complete except of areas in which student didn't understand = 2, some of homework attempted = 1, no homework complete = 0

The observations from the teacher logs for these six students appeared to correlate better with the summative assessments as there were discrepancies between my observations about their homework and the quantitative data collected for their homework completion rates. For instance, from my observations it would appear that students became more aware of the importance of completing homework as the level of preparedness for all students except the low ability students increased over my case study observation phases. In particular, the middle absent student became much better at determining what she would miss when she were absent. Initially, this student relied heavily on classmates to obtain the missing work and learn the concepts needed to complete the work. As the case study progressed though, this student began to utilize the website more as well as seek my help during seminar. On the last Likert survey she stated, "I still not sure about some of the stuff that I miss when I am absent but your webpage helps because I can go to other sites to get help with the material when I'm not

in class. I also know that I have to come see you as soon as I am back to school so that I can ask for help on anything I didn't understand before class starts."

Table 3.
Teacher Observations of Attentiveness for Six Selected Students, (N=6)

Student	****Pre treatment**	****1st Treat**	****2nd Treat**	****1st non-treat**	****2nd non-treat**
Low Absent	1.7	1.5	0.6	1.4	1.3
Low Present	2	1.7	1.5	1.5	1.3
Middle Absent	1.25	2	2	2	2
Middle Present	0.75	2.8	2.8	2.8	2.8
High Absent	1.75	2	2.7	2.2	2.7
High Present	2	1.8	2.6	2	2.4

**ATTENTION: Very attentive = 3, mostly attentive = 2, somewhat attentive = 1, not attentive = 0

The observations that I made for the attentiveness of these six students did not show a significant change during the treatment compared to the non-treatment phases. However, overall most of the students became more attentive when comparing the initial pretreatment observations to those from the final non-treatment phase. In particular, the high achieving absent student showed great improvement in his ability to stay on task during class. It was interesting to also note that this particular student showed an improvement in his homework completion rates by the end of the case study.

Table 4.
Teacher Observations of Frustration for Six Selected Students, (N=6)

Student	***Pre treatment**	***1st Treat**	***2nd Treat**	***1st non-treat**	***2nd non-treat**
Low Absent	2.5	2.0	2.6	2.3	2.3
Low Present	0.66	2.2	2.2	2.3	2.0
Middle Absent	1.5	0.8	1.0	1.0	1.3
Middle Present	1.75	0.5	0.0	0.5	0.0
High Absent	1.33	1.8	0.5	2.2	0.5

High Present	0.33	1.0	1.3	1.3	1.4

***FRUSTRATION: Completely frustrated by material = 3, mostly frustrated by material = 2, somewhat frustrated by material = 1, no frustration apparent = 0

On the other hand, the level of frustration for many of my students increased over the course of this case study. The material became much more difficult in chemistry and students started to fall further and further behind when they missed class and didn't understand the material. Even those students who typically didn't miss class became more insecure with chemistry. In particular, the two low achievers struggled with their frustration by the end of the last non-treatment phase. The low present student began to utilize my website much more and often would consult the additional homework helper and tutoring links that were available on the webpage. During the final interview with this student, she stated, "I think the website is a very good thing and every teacher should do that to help assist the students' learning process." The low absent student actually struggled so much that he tried to drop the course at the semester but was unable to do so by the administration. As a solution, I began to tutor him one day after school each week. This began during the last non-treatment phase and my observations of his attitude showed a change in the positive direction during the last few weeks of the case study.

Looking at the student interviews, two areas of student concern as well as changes in their responses were particularly notable. First, there were several questions which dealt with student absences and how students prepared themselves for class. During each interview students were asked if they were absent, how would they obtain their homework and go about completing that homework. During the pretreatment all students stated they would come and see me in advance to get their work and then talk to their classmates to get help. At the time, I knew that two of these students had been absent and

had not seen me in advance. This was part of my initial frustration with students that had led to the development of this research project. Students knew what my expectations were but they were not following through with their responsibilities. In the mid and post interviews, the students gave more realistic answers in terms of what they actually did. In particular, the middle absent student stated, "I know what I'm supposed to do. Check your calendar and print my work. If I don't understand, I should check your links or get with my lab partner *before* I return to class. But usually I get the assignments and then wait until I come back to class before working on them."

This leads directly into the next few questions that were asked in the pretreatment interview in which I addressed students' biggest concern when returning to class after an absence. This resulted in a wide variety of concerns that students had when they were absent from class. The middle absent and the high present students stated they hated missing the notes and explanation of the concepts. The high absent stated, "missing anything in chemistry is scary," and the low present student had a similar comment with, "anytime I miss chemistry, I know that I have to come and get help from you because I can't figure it out on my own." During the mid and post interviews, I asked these questions in a slightly different manner. Students were asked if they returned to class unprepared with their homework incomplete, were they more concerned with completing the homework or with paying attention to the new material we were learning. At the mid treatment interview, the group was divided with three stating the homework was more important and three stated it wasn't. During the post interview, all six students stated that they more concerned with completing their homework than listening to the new material which was disappointing to hear based on the purpose for my case study. This attitude,

while not as prevalent, can also be seen in the Likert survey results which were given to all students at the end of each treatment and non-treatment phase. Question #7 addressed this same concern and almost all students hovered between agreeing and disagreeing which would indicate that students still have not realized the relationship between attentiveness in class and performance on assessments.

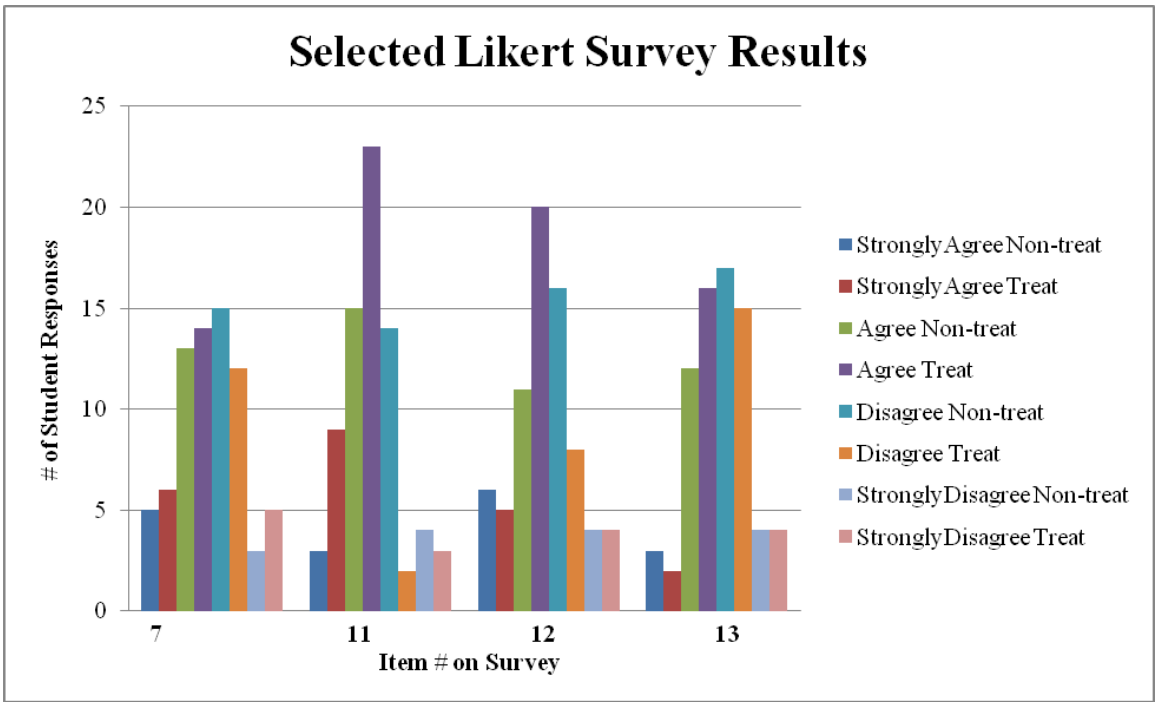

Figure 5. Selected Likert Survey Results, (*N*=37).

The other area of change that I noticed throughout the interviews was the students' dependency upon my website. During the pretreatment interviews, the students were fairly noncommittal in terms of whether a comprehensive website would be beneficial to them. However, by the mid-treatment interview when I asked questions about my website, all of the students except the low level absent student were heavily in favor of this site. The high level present student said, "I didn't really care in the beginning since I'm not gone too often but then I realized that I could plan ahead with

your calendar. I could figure out if I was going to be really busy when you had planned a test. If so, I could start studying and completing the study guide posted so that I wasn't as stressed out." These findings can also be seen in the Likert survey results. Questions eleven through thirteen addressed the use of my website and whether it was helpful for the students. The number of students who either agreed or strongly agreed increased from the non-treatment to the treatment phases. One student in particular added this comment, "Love the website Miss Lund and so do my parents. I don't miss class too much but I often forget my work at school but I can always download another so that I don't get a zero for not having my work done."

Although students could receive extra credit for completing the minute paper after they were absent from class, I began to see that not every student was completing these. I began to remind students and had several tell me that they didn't want to put down that they hadn't checked my website or completed their assignment. Therefore, they were only filling out a minute paper when they had fulfilled their responsibility due to their absence. By that point after clarifying that if not everyone was completing these then my results would be skewed did help but unfortunately it means that this data is really not reliable. Most of the responses to the minute paper questions reinforce that the students were using the website and that it helped them feel prepared when they returned to class but due to these circumstances, I don't believe that I can include them as viable data. However, considering the number of data collection instruments that were utilized, the exclusion of this one instrument did not negatively affect the overall results for my case study. The other five methods allowed for sufficient collection and analysis to draw

conclusions in relationship to the four focus questions, which will be addressed in the next section.

INTERPRETATION AND CONCLUSION

All of the data obtained and analyzed was used to address my primarily research question, "What are the effects on a student's classroom performance when they utilize my comprehensive chemistry webpage?" Although the overall class summative assessment data did not demonstrate a statistically significant difference between the zero to ten percent absent students and the ten to twenty percent absent students ($p = 0.83$), the data obtained from the six selected students does demonstrate that student absences effected assessment performances. The six students' assessment scores showed a decrease in scores for those students who were absent more often. In addition, the student interviews and my observation logs indicate that students who were absent were not performing as well as those present. These same data collection instruments indicate that the use of my webpage has increased their assessment performance. The overall class data showed a statistically significant increase in scores from the non-treatment to treatment periods ($p=0.00052$). The data obtained from the six selected students also agreed with this finding as these students also demonstrated an increase in assessment scores during treatment periods. The interviews and Likert surveys also showed that students became more dependent upon the website, which supports the findings that the treatment had a positive effect on student classroom performance.

The first sub-question, "What effects will the chemistry webpage have on a student's confidence in class when returning from an absence?" utilized primarily qualitative data in the form of student interviews, Likert surveys, and teacher logs. The student data demonstrated mixed results in relation to this question. Students were becoming more responsible about obtaining their assignments when absent but they still were not completing the homework before returning to class. Although students became more concerned about completing their homework, they were not concerned about completing it before class but instead were trying to finish it during class time (Likert survey question #7). My observations also were not conclusive in relation to this sub-question. Over the course of this case study most of the students became better prepared, more attentive and less frustrated but not in relation to the treatment. Instead these changes appear to have occurred due to student growth and learning over the course of the school year. However, I believe that these students are continuing to change as a result of my expectations and their increased usage of my website. The students have seen how this website can assist in their learning process but there wasn't enough time for this to be demonstrated in their actions and thoughts. Although I have completed my data studies, I am continuing to utilize my website with my students. Last week after a student who typically struggles with class material was absent, he came back to class and had completed his homework assignment and was even able to demonstrate solving one of the problems for the class. When I asked how he completed his assignment he said, "Sarah told me to check out the notes and sample problems you had on your website. Once I did that, it wasn't that difficult for me to do the homework." The data for this

sub-question was inconclusive but I believe with more time, it could easily be shown that student confidence has increased through utilizing my webpage.

"What is the impact of a comprehensive chemistry webpage on homework completion rate?" was my second sub-question. The quantitative class data for this appeared to show a relationship between the webpage and an increase in homework completion rates, but the t test was not statistically significant ($p=0.1032$). Quantitative data from the six students also did not support an increase in homework completion rates through exposure to the website. The student interviews and Likert surveys also did not have noticeable change in student responses during the treatment and non-treatment phases. Therefore it would appear that having this webpage does not increase homework completion rates. However, as this case study progressed I realized that I was only determining whether or not the students turned in the homework not how well they were doing on the homework. If I had instead determined the homework averages for each treatment and non-treatment period, I might have found that my webpage did in fact result in an increased performance on homework.

The last sub-question, "How will this webpage impact my teaching?" was the driving force behind this research project. I wanted all of my students to achieve greater success in chemistry, but in order for that to occur, I needed to develop the most effective methods for my particular classroom. The data collected from my teacher logs, student interviews, and Likert surveys assisted in my development of better teaching methods. Based on the interviews and Likert surveys, additional components were continually added to my webpage due to student suggestions that could help with their learning process. One of the best suggestions was to add links to a variety of simulations so that

students could visually see and review the chemistry concepts that I had explained in class. The largest change to my lesson planning was that every class lesson for each unit had to be finalized so that all the notes, homework, activities, labs, and study guides could be available to the students on my webpage starting on day one for that unit. As a teacher this required much more advanced planning than I typically would do, but this also allowed for a more thought out schedule which meant that I was more prepared each day and therefore presented better lessons to my students.

VALUE

Before the end of the first treatment phase of my research project I already felt that this project was successful for my students and me. By discussing my concerns about absences with my students, they realized that I really did care about their success in chemistry, and the rapport between us definitely was much better than with my students from previous years. Students were more at ease discussing their difficulties in chemistry because they realized that I was trying to develop ways to eliminate these difficulties. The atmosphere in my chemistry classes has become a more unified community working together to be successful.

Within my school, fellow teachers have been very interested in my research project. Although the webpage was intriguing to some of them, it was more the concept that students would no longer be able to turn in work late and still receive credit. Having access to their assignments at all times meant that students couldn't use the excuse that they didn't know what the assignment was or that it was due. Many of the teachers were

anxious to try this and want our administration to change our handbook to state that no late work will be accepted. Although I'm not sure about going to this extreme, it was great to see that other teachers felt that my research project had some merit in their classrooms. Our school district was also very concerned about flu epidemics and how this would affect our teaching. Research is currently being done to determine ways in which effective learning could occur if either the student or the teacher could not be present in the classroom. This research project could easily have some implications that these researchers, as well as other school districts with the same concern, could incorporate into their findings and outcomes.

Throughout this case study, many changes and additional steps to the original data instruments have come to my attention. For instance, I realized that it would have been good to relate the actual dates that a student was absent to the material presented that day. Then, when an assessment was given, I could look at specific assessment items that relate to the concepts from that particular day they were absent. This would assist in correlating the relationship between absence and performance. As stated previously, when I collected data on homework completion rates, I should have also determined the student score on each homework assignment. This would have allowed me to determine if the students' homework scores increased with exposure to my webpage rather than just whether or not they turned in their homework.

The initial purpose for this project was to assist students in their learning so that they could perform at a higher level in the classroom. Although not all of the collected data supported the incorporation of my treatment, a comprehensive chemistry webpage, the majority of instruments resulted in a positive change within the students and their

classroom performance. Knowing that this webpage has been successful for my student's learning process, means that it will continue to be utilized and expanded upon in hopes of seeing an even greater increase in student confidence and accomplishments within my classroom.

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APPENDICES

APPENDIX A

TEACHER LOG

Teacher Log

Karen Lund Date _____ Time _____

1. Purpose of today's lesson:

2. Today's successes:

3. Today's challenges:

4. Changes for next lesson:

5. Tracking of students:

Student Name	Attentiveness*	Preparedness**	Frustration Level***	Comments

*Very attentive = 3, mostly attentive = 2, somewhat attentive = 1, not attentive = 0
**All homework complete = 3, homework complete except of areas in which student didn't understand = 2, some of homework attempted = 1, no homework complete = 0
*Completely frustrated by material = 3, mostly frustrated by material = 2, somewhat frustrated by material = 1, no frustration apparent = 0

APPENDIX B

PRE-TREATMENT INTERVIEW

Pretreatment Interview

1. How has chemistry been for you so far?

PROBE: What has been good? What hasn't been good?

2. When you leave class with homework, whether labs, problems, activities, group projects, do you feel prepared to complete these on your own?

PROBE: Why or why not? If no, how can I assist in making you more prepared?

3. If you find that you don't understand something on your homework, what is your normal process to get help?

PROBE: If you had access to additional instruction material (more examples, lab results, etc) do you think you would use that instead of your normal process? Why or why not?

4. If you are absent from class, do you feel that you can figure out how to complete the missing assignments on your own?

PROBE: Why or why not? If no, how can I assist in making you more prepared?

5. If you know you will be absent from class, what do you do to make sure that you are prepared when you return to class?

6. What is your biggest concern when you are absent from class?

PROBE: Why is this such a concern for you?

7. If you are absent, are you concerned that you will be "lost" when you return to class?

PROBE: Why or why not? If yes, do you have some ideas about how you could prepare before returning to class? If no, how are you ensuring that you aren't "lost" when you return to class?

8. If you were absent and could access a website to obtain your assignments, would you be willing to do that so that you would be prepared when you return to class?

PROBE: Why or why not? If no, what other ideas might you have as a way to return to class prepared?

9. If I develop a website that allows you to obtain your assignments, what other types of resources would you like to see on the site?

PROBES: If they don't have any suggestions, I could supply some to see what they think about these. For example, links to additional practice problems, worked problems, lab results, chemistry homework helpers, etc.

10. Is there anything else that you would like to add? Something that I didn't address about coming to class prepared?

APPENDIX C

MID-TREATMENT INTERVIEW

Mid-treatment Interview

1. How has chemistry been for you so far?
   PROBE: What has been good? What hasn't been good?

2. How often are you absent from chemistry?
   PROBE: What were the reasons for the absences?

3. If you knew you were going to be gone, what did you do to prepare for the absence?
   PROBE: Did you access my website? Why or why not?

4. If you didn't know you were going to be absent, what did you do to prepare to return to class?
   PROBE: Did you access my website? Why or why not?

5. What is the best way for you to feel prepared to return to class when you are absent?
   PROBE: If that option isn't available, what would be the next best choice for you?

6. When you returned to class, did you find that you were prepared for class?
   PROBE: Why or why not? If yes, do you think that my website was helpful is making you prepared?

7. If you are unprepared when you return to class (homework incomplete, didn't study for a test, etc.), what do you do?
   PROBE: If your homework isn't done, are you more worried about trying to finish the homework during class or are you more worried about paying attention to the new material being presented? Why?

8. When you come to class unprepared, do you ask your classmates for help when you should be doing something else that I want you to do? I.e. You are supposed to be working on today's lesson but you are trying to finish up yesterday's homework.
   PROBE: What do you think is a better alternative to this?

9. If you return to class after an absence and feel “lost”, what do you do to try and clear up your misunderstandings?
   PROBE: If you were absent again in the future, what could you do in order to ensure that you were prepared when you returned to class?

10. If you use my website after an absence, do you feel more confident about the material that you missed?
    PROBE: Why or why not?

11. How often do you access my website?
    PROBE: Is there a particular time (absences, before tests, etc.) that you access it more often?

12. Do you think that the website is helpful for you?
    PROBE: Why or why not?

13. How can I make the website more helpful for you?

14. Is there anything else that you would like to address? Something that I didn’t address?

APPENDIX D

POST-TREATMENT INTERVIEW

Post-Treatment Interview

1. How has chemistry been for you so far?

PROBE: What has been good? What hasn't been good?

2. How often are you absent from chemistry?

PROBE: What were the reasons for the absences?

3. If you knew you were going to be gone, what did you do to prepare for the absence?

PROBE: Did you access my website? Why or why not?

4. If you didn't know you were going to be absent, what did you do to prepare to return to class?

PROBE: Did you access my website? Why or why not?

5. What is the best way for you to feel prepared to return to class when you are absent?

PROBE: If that option isn't available, what would be the next best choice for you?

6. When you returned to class, did you find that you were prepared for class?

PROBE: Why or why not? If yes, do you think that my website was helpful is making you prepared?

7. If you are unprepared when you return to class (homework incomplete, didn't study for a test, etc.), what do you do?

PROBE: If your homework isn't done, are you more worried about trying to finish the homework during class or are you more worried about paying attention to the new material being presented? Why?

8. When you come to class unprepared, do you ask your classmates for help when you should be doing something else that I want you to do? I.e. You are supposed to be working on today's lesson but you are trying to finish up yesterday's homework.

PROBE: What do you think is a better alternative to this?

9. If you return to class after an absence and feel “lost”, what do you do to try and clear up your misunderstandings?

PROBE: If you were absent again in the future, what could you do in order to ensure that you were prepared when you returned to class?

10. If you use my website after an absence, do you feel more confident about the material that you missed?

PROBE: Why or why not?

11. How often do you access my website?

PROBE: Is there a particular time (absences, before tests, etc.) that you access it more often?

12. Are you using the website more than you did at the beginning of the treatment?

PROBE: Why or why not?

13. Do you think that the website is helpful for you?

PROBE: Why or why not?

14. How can I make the website more helpful for you?

15. Is there anything else that you would like to address? Something that I didn’t address?

APPENDIX E

LIKERT SCALE SURVEY

Likert Scale Survey

1. Chemistry is my most difficult class.
   Strongly Agree Agree Disagree Strongly Disagree

2. Chemistry is the worst class to be absent from.
   Strongly Agree Agree Disagree Strongly Disagree

3. When I leave class with homework, I feel prepared to complete these on my own.
   Strongly Agree Agree Disagree Strongly Disagree

4. When I realize that I don't understand material from class, I seek out Miss Lund for assistance.
   Strongly Agree Agree Disagree Strongly Disagree

5. Miss Lund is available for help when I need assistance.
   Strongly Agree Agree Disagree Strongly Disagree

6. I feel comfortable coming to get assistance from Miss Lund during seminar.
   Strongly Agree Agree Disagree Strongly Disagree

7. When I come to class unprepared (homework incomplete), I am more worried about completing the homework than I am about what we are learning that day.
   Strongly Agree Agree Disagree Strongly Disagree

8. When I am absent, I know what Miss Lund's expectations are for returning to class.
   Strongly Agree Agree Disagree Strongly Disagree

9. When I am absent, I know how to find out what I missed in class.
   Strongly Agree Agree Disagree Strongly Disagree

10. When I am absent from class, my biggest concern is that I will be "lost."
    Strongly Agree Agree Disagree Strongly Disagree

11. When I am absent, it is easy for me to access Miss Lund's webpage.
    Strongly Agree Agree Disagree Strongly Disagree

12. When I am absent and I use Miss Lund's webpage, I feel prepared when I return to class.
    Strongly Agree Agree Disagree Strongly Disagree

13. When I am absent and I don't use Miss Lund's webpage, I feel prepared when I return to class.
    Strongly Agree Agree Disagree Strongly Disagree

14. When I know that I will be absent in advance, I get the assignments from Miss Lund before I leave.
    Strongly Agree Agree Disagree Strongly Disagree

15. When I am absent from class, I find it difficult to understand the material that I missed.
    Strongly Agree Agree Disagree Strongly Disagree

16. When I am absent from class, I would prefer to get the assignments from my classmates over other sources.
    Strongly Agree Agree Disagree Strongly Disagree

17. When I don't remember my assignment, or have lost the assignment, I use Miss Lund's webpage in order to come to class prepared.
    Strongly Agree Agree Disagree Strongly Disagree

18. If I use Miss Lund's website after an absence, I feel more confident about the material that I missed.
    Strongly Agree Agree Disagree Strongly Disagree

19. Do you have any other comments, concerns, or questions that might assist in your learning process? If so, please address those items here.

APPENDIX F

MINUTE PAPER

Minute Paper

Name _____ Date _____

1. When you returned to class today, did you feel confident about the material we were going through? Why or why not?

2. Which of the following, if any, did you use to help prepare you for returning to chemistry class after your absence?

   _____ Using Miss Lund's website to get assignments and notes
   _____ Talking to Miss Lund to get the assignments and notes
   _____ Talking to a classmate to get the assignments and notes
   _____I used another source to get the assignments and notes (Please explain your source below.
   _____ I didn't get the assignments and notes that I missed before I came back to class

3. If you are absent again, what would be do differently (if anything), to be more prepared for chemistry?