The Effect of Interior Plants in High School Classrooms on Student Perceptions of the Course and Instructor

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Introduction and Literature Review

With the progression of time and the advancement of technology, humans are separating from nature more quickly in the last century than ever before. In fact, cities are constantly being constructed over available green space to create more workplaces and living establishments. According to Francesco Ferrini's research on the effects of horticultural therapy on people's health, he argues that it is detrimental to humans' health, both physically and mentally, to be constantly surrounded by the busy lifestyle that a city is associated with. Ferrini insists that it is imperative for humans to reconnect with nature because contact with the environment is a major necessity to regenerate the body and the mind for reducing stress, and as a result, he recommends living in an area with more greenery because the physical environment can have a profound effect on a person's behavior and wellbeing (Ferrini, 2003). In support of Ferrini, psychologists Anne I.H. Borge et al. from the University of Oslo, Oslo, Norway concluded that the growing popularity of forest day-care centers can be attributed to the changing ideas of an ideal childhood for Norwegian parents who want their children to be immersed in nature. When surveyed, an overwhelming majority of 80-90% of Norwegians agreed that outdoor leisure activities added positive values to their lives and were important parts of raising their children (Borge et al., 2003). In addition to these findings, a longitudinal study conducted by Nancy M. Wells found positive effects of greenery on children's cognitive functions. The results of her study showed that the relocation of a child from the city to a suburban area with more access to views of nature resulted in the ability to continuously direct their attention several months after the housing relocation (Wells, 2000). Wells's study concludes that a child's environmental setting around their housing situation can have profound effects on a child's ability to focus.

Additionally, similar findings can be seen in the school environment. In Dorothy Blair's evaluative review of the effects of school gardening on children, she found that three years of place-based learning with a focus of ecology, specifically studying geology, butterfly gardens, and nature trails, led to substantial reductions in unsatisfactory standardized test scores in the core subjects of language arts, math, science, and history. Additionally, she also found that classrooms that used the environment for learning purposes saw increases in enthusiasm for learning and GPAs of 92% higher than in non-integrating classrooms (Blair, 2009). For schools without place-based learning, researchers Daly et al. from the University of Technology, Sydney found that when indoor plants were introduced into the classrooms of middle school students, the schools saw improvements in their academic performances by an increase of 10-14% compared to classrooms without plants. Daly et al. argue that these findings are relevant because improvements of 10% or more in the fundamental subjects, language arts, math, sciences, and social studies, were regarded by educationists as being significant in student progress (Daly et al., 2010). The findings of the study thus concluded the positive effects that indoor plants can have on students' academic performances.

To explain the positive effects of plants on students, psychologist Stephen Kaplan introduces his theory of Attention Restoration and directed attention. Directed attention, as defined by Kaplan, is voluntary and often used by students whenever they are studying for a test or completing homework assignments, tasks which can be mentally draining (Kaplan, 1995). Although useful and quite necessary, an overuse of directed attention is common in students and is the main cause for high levels of stress and will ultimately result in directed attention fatigue, otherwise known as burnout, a state where the mind is mentally exhausted. To address this

problem, Kaplan suggests reconnecting with nature as it allows the mind to temporarily pause from its overuse of directed attention, which is seen especially in the study by Wells where nature helped improve children's' cognitive functioning and in the study of Daly et al. where indoor plants have helped with the improvement of academic performances.

However, the positive effects of plants are not only limited to improvements in mental well-being, academic performances, and cognitive functioning. Researchers Daly et al. also contributed their findings of plants improving the academic performances of students to an improvement in air quality. Daly et al. conclude that the addition of two or three plants to a classroom can significantly help to reduce levels of carbon dioxide and air-borne volatile organic compounds (VOCs). In addition, they argue that higher concentrations of these VOCs are prevalent in classrooms and are a direct result of the fumes emitted by computers, copy machines, and other equipments made of plastic or synthetic materials, which ultimately poses a threat to the physical health of students as they are constantly immersed in this environment (Daly et al., 2010). A similar study done by Park et al. found trends of lowered room temperatures, higher air humidity, and a measurable decrease in air particulate matter in classrooms where plants were introduced. Additionally, Park et al. argue that plants have a positive effect on and improve student health as shown by a decrease in visits to the infirmary and a significant reduction in neuropsychological symptoms such as headaches, fatigues, and concentration problems (Park et al., 2008). Similar findings are seen in a study by Heerwagen, which focused on the effects of plants on office workers. She concluded that the presence of plants brought significant health improvements. In fact, mucous membrane symptoms were reduced by 24% overall, coughing decreased by 37%, and dry skin was reduced by 23% with

plants in the workplace (Heerwagen, 2010). Heerwagen suggests that an improved air quality is the main cause of these improvements in worker health. Meanwhile, a crossover study conducted by Dr. Tøve Fjeld from the Norwegian Agricultural University explains that plants are able to improve health by increasing air quality through its ability to reduce the level of chemical compounds in the air (Fjeld, 2004). The reduction of toxic compounds in the air combined with the rise in room humidity helps improve health problems caused by the confining structure of offices and private buildings, places that limit one's access to nature.

The aim of this study is to see how the presence of plants in the classroom will affect the course perceptions of high school students. While studies from Daly et al., Park et al., and Heerwagen mainly attributed the positive effects of plants and observations to better air quality, other studies from Ferrini, Fjeld, and Kaplan have concluded that the positive effects of plants on people are a direct result of the visual appearances of plants and their ability to rest the mind from prolonging the overuse of directed attention, thus preventing burnouts. Despite there being plenty of existing research on the visual restorative effects of plants and their abilities to improve air quality, thus improving physical health, there has yet to be research done on the extent that these two variables contribute to the positive effects seen on humans. As a result, I decided to research this gap in the field of existing knowledge. Additionally, most studies either focused on elementary students or adults in the workplace. To add to the body of knowledge, I decided to conduct my research on high school students.

I also chose to study high school students because my research can be used to help those who are struggling with stress and dealing with burnouts. High school is the time where students are preparing for college applications and are facing extreme volumes of stress with occupying

themselves with AP classes, studying for SATs, and playing physically demanding sports. With the findings of Stephen Kaplan's research, plants can be used in classrooms in order to help students deal with this overload of stress and prevent directed attention fatigue, which results in disastrous consequences with periods of depressive moods and complete loss of motivation (Kaplan, 1995). Additionally, my research can be applied to classrooms without windows or access to nature, particularly rooms where the architectural structure confines students and allows for the buildup of volatile organic compounds. I hypothesize that the factor of air quality will account more than the visual appearances of plants when influencing course perceptions because an increase in air quality will lead to improved physical health, thus improving student concentration and ability to focus.

Methods

The focus of this study centers around the question: *To what extent is the effect of plants on course perceptions of high school students a result of increased air purity rather than potential restorative effects from the plants' visual appearance*? Based on Kaplan's Attention Restoration Theory, I assumed that the introduction of plants into classrooms would be beneficial for high school students because the appearances of the plants will provide a visual stimulus to effectively pause the mind from its prolonged use of directed attention. In doing so, it is hypothesized that the students will be able to reduce their stress and prevent academic burnout caused by their rigorous schedules and workloads. On the other hand, following the conclusions in the research done by Daly et al, Park et al, Heerwagen, and Fjeld, I deduced that presence of plants in classrooms will improve the air quality by reducing dust particulate and volatile

compounds, thus the improving health of students. As a result, I believe that the improved air quality will have a positive effect on the students by enabling them to focus and learn more effectively without the hindrance of certain health problems such as headaches, fatigue, and problems with concentration. With these assumptions in mind, the ultimate goal of the research is to compare these two variables, the aesthetic pleasure of plants versus its ability to enhance air quality and see their individual effects on the course perceptions of high school students through the use of a mixed methodology.

A mixed method approach was taken by conducting an experiment in addition to distributing preliminary and follow up surveys after the conclusion of the experimental time frame. The experimental portion was modeled after a factorial design. A factorial design allows for the investigation of multiple variables where each independent variable is a factor in the design. The factorial design was chosen because it allowed for the ability to observe the two variables by considering them as separate independent variables. The two variables observed was the standard of air and the visual aspect of the plants. I followed a 2x2 factorial design where the first 2 signifies the two variables mentioned and the latter 2 signifies the two levels within each variable. For example, to measure air quality, the two levels either required the plant to be real or fake. Additionally, to measure the visual aspect, the two levels either required the plant to be hidden or placed in plain sight. **Figure 1** outlines what the experimental conditions will be (the two variables along with their two levels). The purpose of a factorial experiment is not to compare individual conditions to each other but rather, the objective is to observe the combinations of the different experimental conditions. In doing so, one is able to see the main effect of one variable. In the situation of this study, for example, in order to estimate the main

effect of air quality, the results of all the conditions where a fake plant was used should be compared to all of the conditions where a real plant was used. With the research question in mind, this specific process allowed for the effective comparison of the two variables against each other.

Figure 1:

Experimental conditions in the 2x2 factorial design for the effect of plants		
	Variable 1 (Air Quality)	
Variable 2 (Visual Aspects)	Real Plant	Fake Plant
Hidden	Real plant kept hidden	Fake plant kept hidden
Visible	Real plant kept visible	Fake plant kept visible

To measure air quality, I used five Petri dishes in each of the four classrooms, resulting in a total of twenty Petri dishes being used overall. The Petri dishes were chosen in order to allow dust to collect in the plates to measure the levels of dust and overall air purity, similar in design with the methods used by Park et al. The five Petri dishes were placed equidistant from one another and were hidden in inconspicuous areas, such as underneath chairs, behind desks, and on top of cabinets. This was to ensure that no students would tamper with the dishes as to disrupt the dust collecting process. The dishes were placed equidistant from one another in order to generate an average weight of the number of dust particles in the plates to quantitatively measure the air purity of a room. The plates were weighed every three days to ensure enough time for the dust to collect. The plants were introduced for a period of one month, resulting in a total of nine different weigh-ins of dust levels.

The real plants used in this study included a selection of common household plants in addition to a mixture of different succulents. I chose to use a total of five plants in each of the four experimental groups, consisting of a combination of household plants and succulents. Specific household plants used included: *Codiaeum variegatum*, *Zamioculcas*, *Dieffenbachia*, and *Dracaena fragrans*. These plants were used because they are common indoor plants known for purifying the air as well as being able to survive and handle the moderately cold spring weather of New England. The different succulents used included: *Kalanchoe longiflora*, *Kalanchoe millotii*, *Aloe Vera*, and *Cotyledon orbiculata var. Dinteri*. I decided to use succulents because they do not occupy much space inside of the classrooms, are inexpensive, and known for removing toxins out of the air. In order to hide the plants in the hidden experimental groups, I placed each of the five plants into separate cardboard box containers. Then, I used a one-way see-through mesh cloth as the lids of these boxes to allow airflow while also concealing the plants. For classrooms with fake plants, I used artificial plants that resembled the real plants being used. Finally, I placed the five plants equidistant to each other inside the classrooms, similar to the dust plates in order to ensure a consistent change of airflow throughout the entirety of a classroom.

To measure course perceptions, I distributed the same preliminary and post-experimental surveys based off of a similar survey used by researchers Doxey et al. who researched the effects on indoor plants university students' course perceptions.

Figure 2: Survey Statements

1. I find the course challenging and stimulating.
2. I learn something from this class that I consider valuable.
3. I feel that the workload in this class in appropriate.

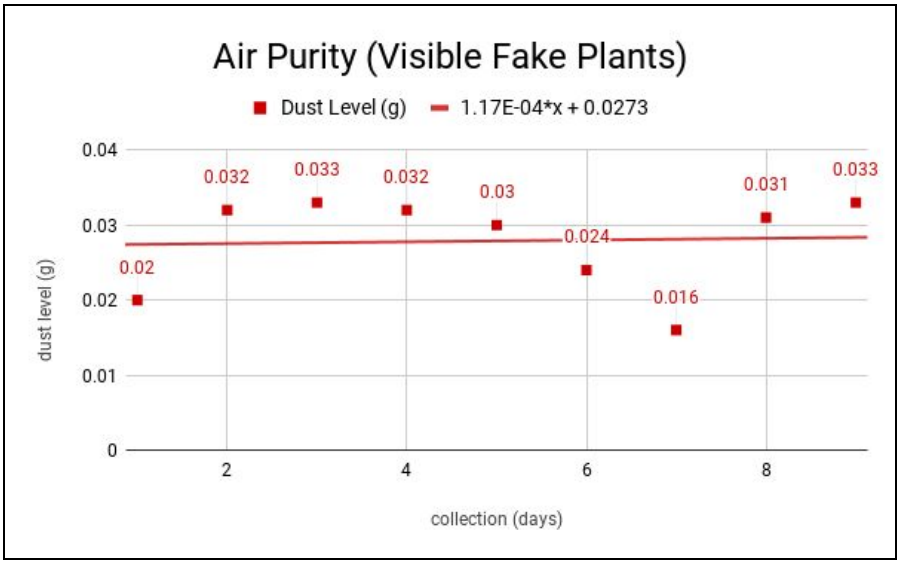
4. My interest in this subject has increased as a result of this course.
5. I learn and understand the subject materials in this course.
6. The instructor's style of teaching holds my interest during most of the class time.
7. The instructor seems interested in teaching the course.
8. The instructor's explanations are clear during lessons.
9. The assignments are carefully explained.
10. The instructor speaks clearly.
11. The instructor speaks at a comfortable speed.
12. The instructor makes me feel welcome in seeking help and advice in or outside of class.
13. The instructor is adequately accessible to me during office hours or after class.
14. The instructor is helpful during office hours outside of class time.
15. Feedback on examinations are useful to me.
16. Feedback on graded materials are useful to me.
17. Methods on evaluating student work are fair.
18. Examinations tested course content as emphasized and outlined by the instructor.
19. Examinations reflect course content covered.
20. Required readings and activities are useful to me.
21. Required texts are useful to me.
22. My level of interest in this subject before this course.
23. My level of interest in this subject at this time.

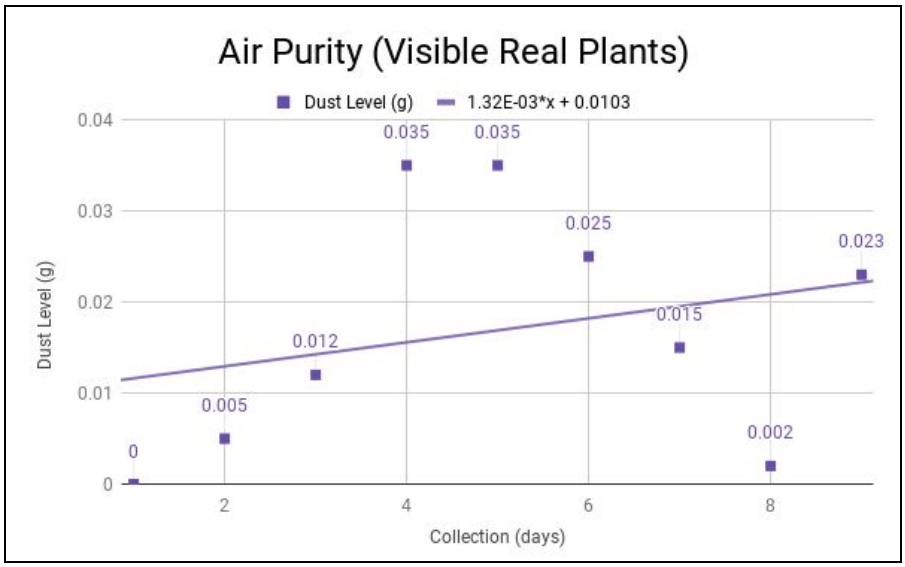
These surveys consisted of twenty-three statements regarding areas of student learning and interest levels in addition to asking students about the enthusiasm and organization of the teachers, which can be seen in **Figure 2**. The students were asked to rate each of the statements on a Likert-type scale (strongly agree, agree, neutral, disagree, and strongly disagree), which I

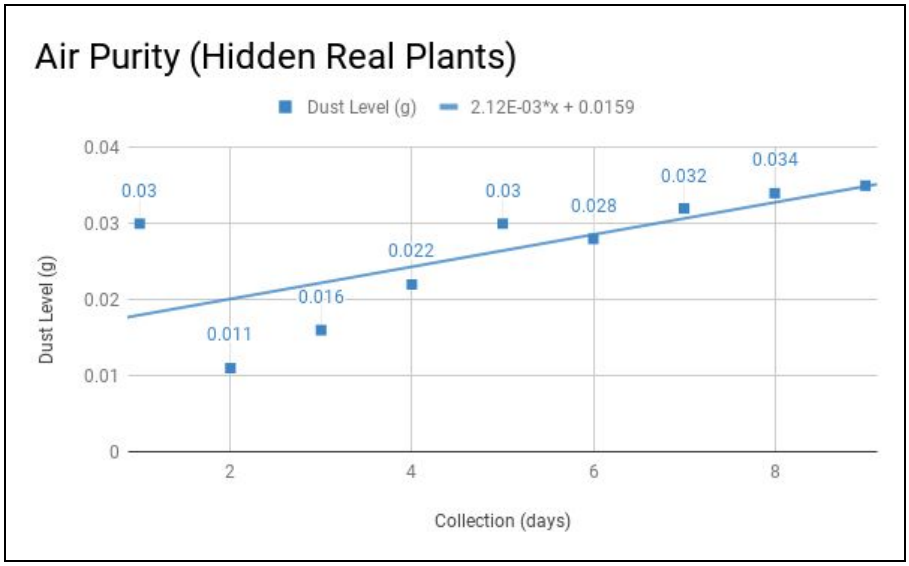
chose to use because it would allow me to generate values for the responses to later on determine the rate of change for the responses of course perceptions. I decided to use these statements because I found them to be reliable after conducting a Cronbach's alpha reliability test. I decided to conduct this specific test because the test measures reliability or internal consistency of how well a survey or test measures the variables that it focuses on. The resulting value of 0.84 meant that the twenty-three statements used were effective and dependable for measuring the variable of interest, which is the course perceptions of students in addition to their perceptions of the instructor.

Results and Analysis

To gauge the effectiveness of plants on the improvement of air quality in the four experimental groups, I compared the level of dust in each of the classrooms against each other. I plotted the weights of the dust levels of each experimental groups in a scatter plot. To find the average dust levels and to quantitatively compare the groups together, I ran a linear regression to estimate the general air quality of the classrooms over the one-month experimental period. A trendline with corresponding slope values was obtained for each of the groups after running the linear regressions. I then compared each of the slope values in order to evaluate the degree of variance of the dust levels.







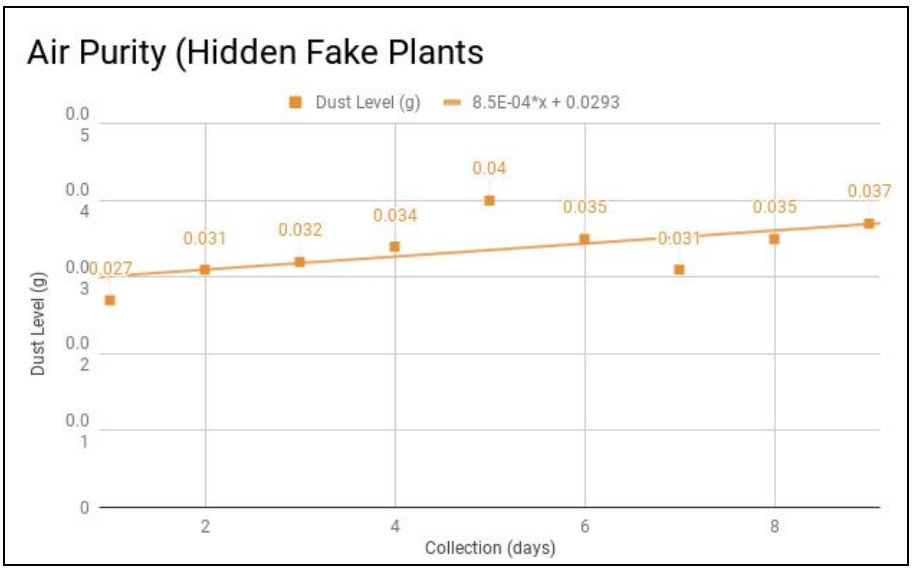
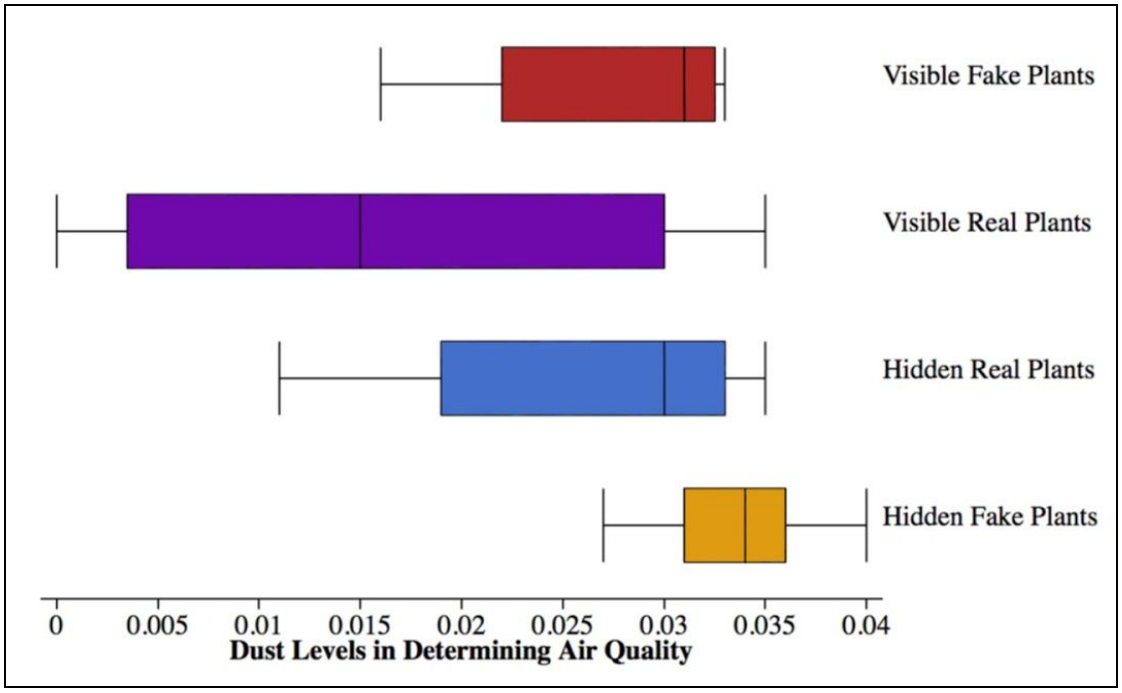


Figure 3: Linear Regression Graphs of Air Purity

As seen in **Figure 3**, the classroom with real plants kept hidden had the most variance with a slope value of 0.00212 while the classroom with fake plants kept visible had the least variance with a slope of 0.000117 with the other two experimental groups in between (the group with real plants kept visible had a slope of 0.00132 and the group with fake plants kept hidden had a slope of 0.00085). However, the comparing of the slopes for the dust levels is not an accurate representation of the overall air quality for the classrooms because it does not account for the various different starting and ending dust levels. In addition, the values of the slopes do not allow for a comprehensive comparison because it fails to show the rate of change and extent of its magnitude.

To address the problem of different starting and ending points, I decided to conduct a one-way ANOVA test in order to compare all four experimental groups and to test whether or not the rate of changes and differences in the dust levels were significant.

Figure 4: One-way ANOVA Test on Air Quality



[Table Values for Figure 4]

Group Name	n	mean	SD	min	Q_1	med	Q_3	max
1: Visible Fake Plants	9	0.028	0.006	0.016	0.022	0.031	0.033	0.033
2: Visible Real Plants	9	0.017	0.013	0	0.004	0.015	0.03	0.035
3: Hidden Real Plants	9	0.026	0.008	0.011	0.019	0.03	0.033	0.035
4: Hidden Fake Plants	9	0.034	0.004	0.027	0.031	0.034	0.036	0.04

F	P-value	$df_{between}$	df_{within}
5.686	0.003	3	32

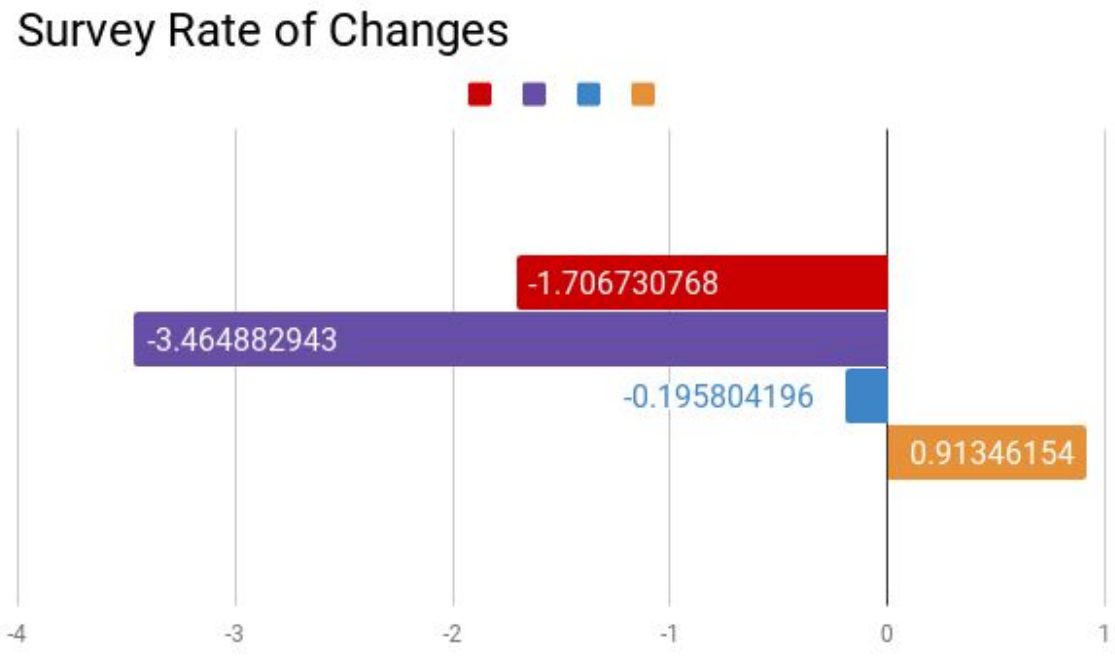
Figure 4 above shows the boxplots of the dust levels for each of the four experimental groups. Using the boxplots, I calculated the median value for each of the groups because the median is a measure of central tendency and shows where half of the data set would fall. The lowest median value belonged to the classroom with real plants kept visible with a value of 0.015 while the classroom with fake plants kept hidden yielded the highest median value of 0.034. Meanwhile, the classroom with fake plants kept visible and the classroom with real plants kept hidden had median values of 0.031 and 0.03, respectively. The variance of the median values shows that the data sets do not overlap, which suggests that there is a significant difference in the dust levels between the experimental groups. In addition, the resulting p-value of 0.003 also shows statistical significance because it is notably smaller than the commonly accepted p-value of 0.05. These findings reveal that the introduction of plants into a classroom does have a positive impact on the room's overall air quality because both experimental groups with real plants exhibited lower median values of dust levels as compared to the other two experimental groups with fake plants.

To study the visual impact of plants in classrooms and its effects on student course perceptions, I decided to look at the rate of change of the responses from the preliminary survey

and compare the results to the responses from the post-experimental survey. Similar to measuring air quality, I decided to assess the rate of changes of responses in order to address the issue of the various different starting and ending points of students with their course perceptions. In the preliminary survey, for each of the twenty-three questions, I totaled up the ratings based off of the Likert-scale and averaged the scores to derive an overall value for the class. After, getting the averages for all twenty-three questions, I repeated the process for the post-experimental surveys. I then added up the averages for the preliminary surveys and the post-experimental surveys as well. To find the rate of change, I subtracted the total average score of the preliminary surveys from the total average score of the post-experimental surveys and repeated this process for all four experimental groups.

Figure 5: Rate of Changes of Survey Responses

[The red colored bar represents the classroom with visible fake plants, the purple colored bar is of the classroom with visible real plants, the blue colored bar is of the classroom with hidden real plants, and lastly, the orange colored bar is of the classroom with hidden fake plants.]



The figure above shows that all of the experimental groups had a negative rate of change in course perceptions except for the classroom with hidden fake plants, which had a positive rate of change of 0.913. On the other hand, the classroom with visible real plants had the most negative rate of change for course perceptions, with a value of -3.465. The findings contradict my original hypothesis because the rate of changes show that the group with hidden fake plants had the greatest positive rate of change in responses, suggesting that neither the air quality nor the visual appearances of plants were responsible for the improvement in student course perceptions. Despite the differences in the rate of change values, the actual values are small and do not significantly differ from group to group, showing that there is no significant difference among the four experimental groups.

Limitations:

There were several limitations and factors surrounding my mixed-methods approach. A possible limitation to be considered is the possible biases and preconceived opinions the students may have towards the teachers, which will affect the findings of the course and instructor evaluation survey. There needs to be a way to account for the differences in class subjects, teachers, and class difficulties. A proposed solution is having a class of students being taught by the same instructor with the students learning the same course materials. However, this is rather difficult considering that the air quality would be harder to observe in having just a single classroom since the relocation of fake and real plants would cause the air quality of the classrooms to fluctuate. In addition, it would be difficult to move and relocate the fake and real plants in between class times. Finally, having one classroom and teacher for four experimental

groups would not be able to address the different class start times, which can affect student attention and interest levels. Due to this limitation, I had to choose four different classrooms for the four experimental groups, all with different class subjects, teachers, and class difficulty, all factors which can influence the results of my research. As a result, the four different classrooms had varying structures and architectural layouts with some having windows with views of the outdoors while others lacked windows and were completely deprived of access to nature. According to the study by Heerwagen, these differences in having or not having windows can dramatically impact one's sense of mental wellbeing, thus skewing my results.

In addition, my data collection of dust levels and course perceptions only occurred over the course of one month, which may not be enough time for student opinions to change, as demonstrated by the small differences in values of rate of changes in my study. Furthermore, relying solely on the amount of dust levels to measure impurities of the air is another limitation because it is not sufficient enough to measure a room's air quality. In addition to collecting levels of dust, actual detection of volatile and toxic compounds in the air would help to distinguish the air quality of the rooms more effectively. I originally wanted to use a handheld volatile organic compound (VOC) meter to analyze and differentiate the air quality of each of the four classrooms, however, the cost of the meter was a constraint. As a result, I resorted to measuring the amount of dust, which is a less accurate representation of air quality as opposed to using a VOC meter. Another limitation to the measurement of air quality was the inability to control whether or not certain classrooms left their doors open or closed, which would impact the airflow and overall dust collecting process.

As suggested by the study conducted by Fjeld, she found that 56% of the participants in her study felt that the plants took up too much space and sometimes presented as a distraction from their jobs (Fjeld, 2004). On the other hand, this study did not control for the arrangement of the plants once placed inside of the classrooms, which could affect the students by acting more as a distraction rather than an aid for relaxation and stress management. Moreover, this study only focused on plants and students and did not consider the potential effects that these plants may have had on the course instructors themselves. These unstudied effects would ultimately influence their ways of teaching and skew the students' course perceptions as a result.

Conclusions and Discussions

My findings conclude that interior plants did have positive effects on the air quality of a classroom. These findings support other studies which have previously found the presence of household plants in classrooms to be able to reduce volatile compounds in the air, such as dust, and improve the overall air quality of a room (Daly et al., 2010; Park et al., 2008; Heerwagen, 2010; Fjeld, 2004). As a result, these findings show that plants have value beyond the aesthetics of their visual appearances because of their ability to remove toxins from the air, which supports my original hypothesis about plants being able to have a significant impact on the air quality of a room.

On the other hand, my data shows no statistically significant difference between the rate of changes for surveys responses to student course perceptions within the four experimental groups. A reason for this may be the short experimental period, perhaps if the study was lengthened to include an entire semester, then students' perceptions of their course and instructor

will have more time to change. Overall, my findings contradict my original thoughts because the experimental group with hidden fake plants had the most positive change in course perceptions, showing that neither the air quality nor the visual appearances of a plant factored into the positive rate of change.

However, results from this study also found that interior plants seemed to have the greatest positive effect in classrooms that had no other natural elements or access to nature, such as a lack of windows. This is observed in **Figure 5**, when the classroom of fake plants kept hidden yielded the most positive rate of change in course perception responses despite having a lack of windows due to the building layout. This phenomenon can also explain for the negative rate of change for the classroom with real plants kept visible because the setting of the classroom already had windows with views of natural scenery at the start of the experiment. As a result, these findings support the findings of Dr. Tøve Fjeld, who argues that our surroundings and access to nature, such as access to windows, can have drastic impacts on our sense of well-being (Fjeld, 2004). My study shows that plants do indeed positively affect air purity levels, which can be used by future researchers to see whether or not an improvement in health can help with student interest levels and overall course perceptions. In addition, the introduction of plants is an effective solution to improving the air quality of a room for classrooms without windows and limited access to greenery because it is inexpensive and most plants are effective while still being small in size, such as succulents.

Despite the most negative rate of changes, more work needs to be done in order to determine the extent of the effects of air purity vs. the effects of the plants' visual appearances on student course perceptions. In addition, for future research, there needs to be a better way to

control for factors such as different class difficulties, different class subjects, different teaching methods, and the presence or lack of windows when choosing classrooms to be used for the four experimental groups. This is to limit the factors of variance that can affect student course perceptions. In addition, by having four experimental classrooms with the same teacher, class subject, and class level of difficulty will allow for future research on the extent of air purity and visual appearances on academic performances in addition to changes in course perceptions.

To account for the small differences in changes of dust levels between the experimental groups, future researchers can look at more characteristics of air quality, such as humidity levels, temperature, and levels of volatile compounds, in addition to levels of dust, as seen in the study by Park et al. Looking at these different characteristics can help to distinguish air quality more between the groups and yield greater differences for better comparisons and analysis. In addition, this study did not focus on how improvements in air quality can affect the physical health of students and whether this change will impact their course perceptions.

With the second variable of visual appearances, this study did not control for the different placements of plants inside of the classrooms, which can change the way students respond to the plants in addition to affecting air quality. In addition, the placement of plants could have done more to distract the students from their learning instead of providing them with a visual outlet for reducing stress. As a result, this can explain for the reason why the classroom with fake plants kept hidden and real plants kept hidden had the most positive rate of change and the least negative rate of change, respectively. On the other hand, the classroom with real plants kept visible and the classroom with fake plants kept visible had the most negative rate of changes. With this in mind, future researchers should look into the strategic placement of plants inside of

classrooms to account for this factor in their research. Finally, future researchers should see how the presence of plants affect the instructors because an effect on the instructors would ultimately change their ways of teaching.

References

Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. The Journal of Environmental Education, 40(2), 15-38.

Borge, A. I., Nordhagen, R., & Lie, K. K. (2003). Children in the environment: Forest day-care centers: Modern day care with historical antecedents. The History of the Family, 8(4), 605-618.

Daly, J., Burchett, M., & Torpy, F. (2010). Plants in the classroom can improve student performance. National Interior Plantscape Association.

Doxey, J. S., Waliczek, T. M., & Zajicek, J. M. (2009). The impact of interior plants in university classrooms on student course performance and on student perceptions of the course and instructor. HortScience, 44(2), 384-391.

Ferrini, F. (2003). Horticultural therapy and its effect on people's health. Advances in Horticultural Science, 17(2), 77-87. Retrieved from http://www.jstor.org/stable/42882222

Fjeld, T. (2004). Do plants in offices promote health?. Agricultural University of Norway.

Heerwagen, J. Plants in the Workplace.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. Journal of environmental psychology, 15(3), 169-182.

Park, S. Y., Song, J. S., Kim, H. D., Yamane, K., & Son, K. C. (2008). Effects of interior plantscapes on indoor environments and stress level of high school students. Journal of the Japanese Society for Horticultural Science, 77(4), 447-454.

Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. Environment and behavior, 32(6), 775-795.