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**Transparency Teaching in the Virtual Classroom: Assessing the Opportunities and Challenges of Integrating Transparency Teaching Methods with Online Learning**

**Tiffany O. Howard, Mary-Ann Winkelmes, Marya Shegog**

**Abstract**

The existing literature on transparency teaching in higher education reveals that the adoption of transparent oriented assignments improves the learning outcomes for underserved students at the introductory level, and decreases the rate of attrition among the student population with the highest risk of dropping out (Winkelmes et al., 2016). Concurrently, the continued demand for online education programs has resulted in the expansion of course and degree offerings, and a steady increase in online student enrollment nationwide (U.S. News, 2016). However, a number of recent studies find that while the goal of online education is to improve access to higher education, that historically underrepresented groups report lower course completion rates and poorer grade performance in online classes, when compared to underrepresented students enrolled in hybrid and in person courses (Gladieux and Swail, 1999; Hoskins and Hooff, 2005; Newell, 2007; Figlio, Rush, and Yin, 2010; Xu and Jaggars, 2012, 2013, 2014). Utilizing a quasi-experimental design, this paper evaluates the implementation of transparency teaching methods in the online classroom versus the in person classroom to determine if student learning outcomes vary according to course modality, focusing specifically on outcomes among the underserved student population. The goal of this study is to establish that transparent teaching methods help mitigate the negative effects of the virtual classroom for underserved students.

## **Background**

The promulgation of online instruction has been attributed to a core set of factors, most notably that of globalization, technology savvy Millennials, and the most recent economic downturn. Prompted by telecommuting and virtual meetings in the corporate business world, the demand for distance learning in higher education was inevitable. Additionally, today's students are increasingly technologically literate, which has forced academic institutions to adapt to a generation of pupils who are accustomed to accessing and obtaining information within a matter of seconds, utilizing any number of mobile devices. Further, the Great Recession increased the number of students seeking to return to school, while colleges and universities faced with budgetary cuts relied heavily on distance learning options in order to meet the increased student demand, despite having fewer personnel and resources. Consequently, online education emerged as an attractive alternative to in person instruction to both the consumer and seller; and as higher education responded to the demand for distant learning opportunities, online education programs have grown in both number and breadth, and online student enrollment has steadily risen since 2006, even when in person enrollments in higher education declined (U.S. News, 2016).

The convenience and accessibility of online educational programs are widely considered the main advantages this modality has over traditional instruction. However, a number of recent studies find that while the goal of online education is to improve access to higher education, that historically underrepresented groups report lower course completion rates and poorer grade performance in online classes, when compared to underrepresented students enrolled in hybrid and in person courses (Gladieux and Swail, 1999; Hoskins and Hooff, 2005; Newell, 2007; Figlio, Rush, and Yin, 2010; Xu and Jaggars, 2012, 2013, 2014). As a result, for historically underrepresented groups the perceived advantages of online education programs are negated by decreased educational outcomes and increased economic hardship due to the costs of higher education for this group.

Despite the disappointing findings for underrepresented students and online education, the contemporary reality is that distance learning represents the future of education in general, but specifically, with regard to higher education. Therefore, while existing research focuses on the role race and ethnicity play in the adaptability of students to online learning (Chyung, 2001; Muse, 2003; Bernard et al., 2005; Wojciechowski and Palmer, 2005; Yukselturk and Bulut, 2007; Roksa et al., 2009; Allen and Seaman, 2010; Stewart et al., 2010; Xu and Jaggars, 2012, 2013, 2014), this body of literature stops short of assessing how to improve the online educational outputs for underrepresented and underserved groups and better prepare them to excel in this learning medium. This study addresses this knowledge gap with its evaluation of transparent teaching methods, and whether this model can be adopted successfully in online courses to improve the learning outcomes for underrepresented minority and underserved students.

## **Transparency Teaching And Underrepresented Students**

Transparency teaching can best be defined as a combination of teaching practices that are explicit in the articulation of instructor expectations for student learning and classroom success, that rely upon unambiguous language and techniques to develop and enhance analytical and critical thinking skills and deepen student learning (Biggs, 2003;

Harden, 2001; Fierro, 2003; Cook-Sather, 2011; Winkelmes et. al., 2016). The assertion has been that transparent expectations combined with transparent assignments contribute to enhanced student engagement and academic achievement, and the emerging research seems to support this. Recent study findings on transparency teaching in higher education reveal that the adoption of transparent assignments improve the learning outcomes for underserved students at the introductory level, and decrease the rate of attrition among the student population with the highest risk of dropping out (Winkelmes et. al., 2016). The obvious importance of this finding is that students historically disadvantaged and marginalized by traditional teaching methods demonstrate increased academic achievement with transparent oriented models, suggesting that traditional models are largely ineffective with regard to today's student population which is more racially, ethnically, and socio-economically diverse than ever before.

Given the success of transparent teaching, this study utilizes a quasi-experimental design to evaluate the implementation of transparency teaching methods in the online classroom versus the in person classroom to determine if student-learning outcomes vary according to course modality. The goal of this study is to establish that transparent teaching methods can help mitigate the negative effects of the virtual classroom for underrepresented minority and underserved students.

### **Research Design**

The data for this study come from a convenience sample of students from the political science course, PSC 302-Research Methods and Statistics taught at the University of Nevada, Las Vegas (UNLV) across four consecutive semesters. A designated Title V Minority Serving Institution (MSI)<sup>1</sup>, over half of the UNLV student body self-report as a member of a racial and/or ethnic minority group<sup>2</sup>; and UNLV is currently ranked second in the US News and World Report's *Best University for Ethnic Diversity* (U.S. News, 2016). Additionally, according to data released from the 2014 U.S. Census Bureau, young adults with the likelihood of being the first in their families to attend college "comprised more than 80 percent of Hispanics and Pacific Islanders, more than 75 percent of African-Americans and Native Americans, 51 percent of whites and 36 percent of Asians."<sup>3</sup> Given the racial and ethnic diversity of UNLV, as well as the university's commitment to educating low-income, under-represented minority, and underserved college students, UNLV functioned as an ideal site for data collection.<sup>4</sup>

PSC 302 was selected as the course for inclusion because it is one of the two Milestone Courses that students must pass with a "C" or better before they can be accepted into the major (political science); therefore, the majority of students who are enrolled in this course are second semester sophomores and first semester juniors<sup>5</sup>.

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<sup>1</sup>UNLV is also recognized as a Hispanic Serving Institution and an Asian American, Native American, and Pacific Islander-Serving Institution (AANAPISI).

<sup>2</sup>25% percent of UNLV students are Hispanic, 7% are Black, 14% are Asian, and 38% are White

<sup>3</sup>Lyle, Michael (2017). "How students are overcoming the nation's education inequality". *Las Vegas Sun*. July 24.

<https://lasvegassun.com/news/2017/jul/24/how-students-are-overcoming-the-nations-education/>

<sup>4</sup>See <https://www.unlv.edu/news/article/ahead-class> and <https://knpr.org/knpr/2016-04/first-generation-college-students-get-extra-help-graduate>

<sup>5</sup>As higher education students matriculate the probability of graduating increases, which is why a Milestone course is analyzed as opposed to a First Year Experience course. The

Study data were collected from four independent samples: Fall 2014 (N=26), Spring 2015 (N=24), Fall 2015 (N=28), and Fall 2016 (N=25). The mean rate of attrition for the study sample is 10.6.

Table 1.1 provides demographic data on the students who completed the course for each term. The information presented in Table 1.1. indicates that the majority of the students who completed the course are underrepresented minorities, and more than one-fifth of them identified as first-generation college students. Although, we were unable to obtain data on the students' economic status, the students in the selected courses meet two of the three parameters for underserved students, which include low-income students, underrepresented minority students, and first-generation college students.<sup>6</sup>

*[Table 1.1 Here]*

A quasi-experimental design is employed because the sample is based upon a naturally formed group, which in this case is the classroom, and thus, the selection of participants is non-random. Additionally, the assignment of students to the in person classroom versus the online classroom cannot be randomized, further necessitating a quasi-experimental design.

The four samples allow us to accomplish two objectives in this study, first we are able to test the effects of online instruction on student learning outcomes, and second we are able to test the effects of online instruction on student learning outcomes when transparent teaching methods are adopted. To further elaborate, the first sample represents students enrolled in the Fall 2014 course, which was conducted in person, using traditional teaching methods. While the second sample represents students enrolled in the Spring 2015 course, which was conducted online, also using traditional teaching methods. The third sample represents students enrolled in the Fall 2015 course, which was also conducted online, but this time using transparent teaching methods for the first major homework assignment only. While the fourth sample, represents students enrolled in the Fall 2016 course, which was conducted online, and all major assignments include transparent language. It is also important to note that with the exception of adopting transparent teaching methods, the curriculum for instruction, course materials, and all other course-related variables remained the same across the four samples, including the textbook editions and the course instructor<sup>7</sup>.

For the purposes of this study student learning outcomes are measured using two variables, the first is performance on the first major homework assignment in the course (See Appendix One and Appendix Two), while the second is the student's final grade in the course. The independent or treatment condition is captured by two measures, the implementation of transparent teaching methods for the first major homework

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expectation is that these students are more likely to possess equivalent skillsets since they have successfully advanced to this stage of their academic career. The implication is that underperformance can be more accurately attributed to the variant teaching models than the collective aptitude of the students.

<sup>6</sup>See page 3 of "Understanding the Underserved Learner, 2014". *The ACT National Curriculum Survey*. <http://www.act.org/content/dam/act/unsecured/documents/STEM-Underserved-Learner.pdf>.

<sup>7</sup>The first author taught all four courses as the primary instructor of record.

assignment, and the adoption of transparent teaching methods for all major assignments in the course.

Given the study design and goals of this research, we expect the findings to demonstrate that in person instruction is superior to online instruction with respect to student performance. However, when transparent teaching methods are adopted in online classroom instruction, student performance is comparable to in person instruction.

### **Findings**

To determine the impact of transparent teaching methods on the learning outcomes for students in the online classroom we first chart the performance of the students in each of the four samples, and then calculate the mean differences for independent samples to determine if there is a statistical difference between the groups. The first set of findings is presented in Figures 1.1 and 1.2.

*[Figure 1.1 Here]*

Figure 1.1 shows the mean student score on the first major homework assignment in PSC 302. The highest possible score on the assignment is a four, and the lowest possible score is a zero. The graph allows us to make two comparisons. The first being how students perform on the first homework assignment given in person classroom instruction versus online classroom instruction. The second comparison allows us to examine how students perform on the assignment in an online classroom forum using traditional teaching methods versus transparent teaching methods. The findings reveal that students appear to perform better when taught in person as opposed to online. The mean score on the assignment for the in person class is 3.79, while the mean score for students taught online is 2.89. In both instructional settings, traditional teaching methods are used.

Turning now to the second set of findings, the results reveal that students in online classes performed only marginally better when transparent methods were adopted for the same assignment. The mean score for students in the online class who were taught using traditional methods is 2.89, while the mean score for students in the online class who were taught using transparent methods is 2.92. This is an unexpected finding given what we know of the positive impact transparent teaching methods have on student learning. We believe one reason why there is no observable improvement between the two classes is that only one assignment was modified to utilize transparent methods, and that was the first homework assignment, which students typically under-perform on given the recent introduction to the course, and classroom expectations. Students overwhelmingly demonstrate a tendency toward higher performance scores on assignments as the course progresses. Therefore, a better test of the impact of transparent teaching methods on student learning outcomes would have likely been an assignment that came later in the course, when students were accustomed to the material and instruction.

Nonetheless, I believe the main reason why there was no observed improvement between the two teaching methods is because transparent teaching is a fluid, ongoing unrestricted model that cannot be simply applied to a singular assignment. It is not so

much a style as it is a method of teaching. This assertion is supported by the findings from the Fall 2016 course where transparent teaching methods are utilized in all assignments, and transparent language is also used on the course syllabus. In stark contrast to the preceding course where only one assignment was modified, in the Fall 2016 course where transparent methods are engaged throughout the entirety of the course, the mean score for students on the first assignment is 3.82. The implication of this finding is significant because it suggests that students enrolled in an online course that adheres to the transparent teaching model outperform even those students receiving in person instruction. Consequently, this finding provides support for the argument that transparent teaching in the online classroom can mitigate the negative impact the online format has on student learning outcomes.

Turning now to Figure 1.2, this graph presents the mean final numerical grade for students in each of the four courses. With respect to the first set of findings, we see that once again, students in the online classroom underperform students in the in person classroom when traditional teaching methods are used. The mean GPA<sup>8</sup> for the in person class is 84.6, while the mean GPA for the online class is nearly ten points lower at 75.2. With respect to the findings for online students who receive instruction using traditional versus transparent methods, the results are consistent with our expectations, although the effects are greater than anticipated. For students enrolled in the online class where the first homework assignment was modified to utilize transparent teaching the mean GPA is 83.1, whereas students in the online class who were taught using traditional methods is 75.2. This finding is important, because it supports the assertion of the utility of transparent teaching methods; however, we would not expect a student's final course GPA to be largely driven by the adoption of transparent methods for a single assignment. Therefore, the larger explanation for this result could also be that the Spring 2015 course was the first time the instructor taught that course online. Subsequently, there are unique challenges that come with teaching a course for the first time, even if it just means adapting it from in person to online. With that in mind, it is believed that by Fall 2015, the instructor was better able to anticipate the needs of the students and respond accordingly given experiences from the previous semester; thus, influencing the observed findings.

Finally, turning to the Fall 2016 semester, the findings are consistent with our expectations. For students enrolled in an online class where the entire course utilizes transparent oriented teaching, the mean GPA is 85.2 which is substantively higher than the mean GPA for online students who were taught using traditional methods (75.2), and slightly higher than the mean GPA for students taught using traditional methods in the in person class (84.6), which is a significant finding. Again, the findings confirm our expectations that when utilized in the online classroom, transparent teaching methods can help mitigate some of the challenges that are associated with online instruction. The findings suggest that the performance of students in online courses that use transparent

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<sup>8</sup>It is important to note that GPA refers to the student's numerical final grade in the single course examined in this study, PSC 302-Political Science Research Methods. It does not refer to the student's overall GPA in their major or in fulfillment of their baccalaureate degree.

teaching methods is comparable to the performance of students in the traditional classroom setting.

*[Figure 1.2 Here]*

### Mean Difference Calculations

Calculating the mean difference between two independent samples allows us to determine whether or not the differences observed between the two groups is a substantive or meaningful difference. To determine if this difference is meaningful we observe the level of statistical significance achieved for the difference value. In this case we calculate the difference in means for the mean student GPA in the courses. We use mean GPA as opposed to mean score on the homework assignment because we contend that the impact of one assignment cannot be effectively measured in this context. Consequently, to measure student-learning outcomes, we believe at this juncture, mean course GPA is the most optimal variable.

The mean difference results presented in Table 1.2 test the difference of means between the GPA for students enrolled in the online class versus the in person course; both classes utilize traditional teaching methods. The results reveal that there is a significant difference at the .10 level between the mean GPAs of the students enrolled in the online course versus the in person course. This finding further supports the results presented in Figure 1.2, along with the existing literature, which argues that student performance is negatively impacted by the online teaching format.

*[Table 1.2 Here]*

Turning now to the results presented in Table 1.3. The mean difference results presented in Table 1.3 test the difference of means between the GPA for students enrolled in the online course that used traditional teaching methods versus the online course that used transparent teaching methods for one assignment. The results do not suggest that modifying one assignment using transparent teaching methods has any impact on student learning outcomes in the online teaching setting. The mean difference is not statistically significant in this analysis.

*[Table 1.3 Here]*

We turn now to the results presented in Tables 1.4 which tests the difference of means between the GPA for students enrolled in the in person course that used traditional teaching methods versus the online course that used transparent teaching methods for all of the assignments. The results presented in Table 1.4 reveal that there is no significant difference between the mean GPAs of the students enrolled in the online course that used transparent methods throughout the entire course versus the in person course which utilized traditional teaching methods. This finding further bolsters the results presented in Figure 1.2.

To elaborate, the results indicate that after controlling for sample size and sample characteristics, there is no statistically significant difference between the mean GPA for the students in the in person course (84.6), and the mean GPA for the students enrolled in the online transparency course (85.2). This finding suggests that students enrolled in online classes that utilize transparent teaching methods achieve comparable learning outcomes to those students enrolled in the same course taught in person.

*[Table 1.4 Here]*

## **Conclusion**

This study examines the impact of transparent oriented teaching in the online classroom in an effort to demonstrate that the use of transparent teaching methods has a positive impact on student learning outcomes, to such an extent that student learning outcomes are comparable to those achieved using traditional methods in the in person classroom. The results of this study provide evidentiary support for the effective use of transparent teaching methods in the virtual classroom.

The findings of this study are promising; however, the results should not be overstated for the following reasons. First, a more appropriate test of the relationship of interest requires further inquiry utilizing an expanded sampling frame to include a greater number of courses that come from a wide range of academic disciplines. It is possible that transparency teaching is effective in the online classroom for certain subject matters, and identifying which ones means that this relationship must be evaluated in a variety of subject-matter contexts.

Second, while it was not practical in this particular study to design a longitudinal study, there is great value in utilizing such a research design because it would allow the researcher to observe students as they matriculate, and subsequently evaluate their performance in courses, both online and in person that use transparent methods versus those courses that use traditional teaching methods. The current study does not account for variation in student aptitude, and makes the assumption that all of the students in the study begin the course with similar intellectual abilities when that is not necessarily the case.

And finally, although it is our hope that the findings can be expanded upon in future research that looks specifically at underrepresented and underserved students, the current study is unable to make observations and draw inferences for this specific population. That is because the authors cannot presume to have insight into how students racially and ethnically self-identify; just as the authors do not have access to the socio-economic backgrounds of the students in the study. Consequently, while the expectation is that the findings of this work can be applied to research on the performance of minority and underserved students in the online classroom, it stops short of being able to make specific predictions regarding the academic improvements of underrepresented and underserved students in the online courses.

Despite some of the study limitations, the findings remain promising and indicate that when online course instruction utilizes transparent teaching as a holistic course

model that there is significant improvement in the performance of students in the online course when contrasted with the performance of students in the online classroom that uses traditional teaching methods. Further, the learning outcomes for students in the transparent virtual classroom are comparable to the learning outcomes for students in the traditional in person classroom; thereby suggesting that going forward online curriculums in higher education could benefit greatly from the adoption of transparent teaching models in order to improve student performance, specifically the learning outcomes for students from underrepresented and underserved groups.

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## **Appendix**

### ***Appendix One: Homework Assignment One-Without Transparent Teaching Methods***

**Homework Assignment 1:** Research Problem, Question and Hypotheses for Final Research Design Project

**Due Date:**

**Format:** Assignment must be typewritten and submitted via Webcampus. Format is 12 pt. Times New Roman, Double Spaced and 1 inch Standard Margins.

**Instructions:** To complete the assignment you will do the following:

- In 300-500 words submit a political science thesis statement, a research problem, empirically driven research question(s), and **at least four** testable research hypotheses. Note: Use the Wolford and Postero Proposal Examples as guides.

### ***Appendix Two: Homework Assignment One-With Transparent Teaching Methods***

**Homework Assignment 1:** Research Problem, Question and Hypotheses for Final Research Design Project

**Due Date:**

**Format:** Assignment must be typewritten and submitted via Webcampus. Format is 12 pt. Times New Roman, Double Spaced and 1 inch Standard Margins.

**Purpose:** The purpose of this assignment, like all assignments in this course, is to help you successfully complete your Final Research Design (which is a thorough plan for conducting research.)

- **Knowledge:** This assignment will provide you with knowledge on how to develop a research purpose statement, empirically driven research question(s) and testable research hypotheses. You will also be able to identify library databases to obtain peer reviewed research on your topic and synthesize this information to compose a concise but well-developed introduction to your final research design topic.
- **Skills:** You will practice the following skills which are essential to your development as a political science student, including: a) collecting and evaluating the necessary information from primary and secondary sources; b) summarizing the most relevant information for your topic; c) composing a well-organized, clear, and thorough introduction to your topic of interest

**Task:** To complete the assignment you will do the following:

- In 300-500 words submit a political science thesis statement, a research problem, empirically driven research question(s), and **at least four** testable research hypotheses.

### **Homework Assignment One: Guidelines and Example**

**The structure should be as follows:**

#### **Title of Project**

**Thesis Statement-**This is an introduction to your project. It provides some background information regarding your topic and at the end of it you tell me the purpose of your project study.

**Research Problem/Study Purpose-**This is where you provide a statement of the problem you're addressing in your study. It is generally a two to three sentence version of the final sentence of your thesis statement. You are just restating it here as well but it is a little bit more fleshed out here.

**Research Questions-**The easiest way to present research questions is to take your research problems and turn them into questions. For example:

- Research Problem-This study examines the relationship between state failure and terrorism
- Research Question-What is the relationship between state failure and terrorism?

**Research Hypotheses-**These are testable predictive statements of what you hope to find if you were to do this research (I will explain more about the difference between a research design and a research paper/project as the semester progresses). What I mean by testable is it is a statement that indicates you can prove or disprove it or not and again what I mean by predictive is that it tells me what you hope to find or expect to find if you were to do this research. For example:

#### **Research Hypotheses-**

- The probability of terrorism increases when a state fails
- The probability of terrorism increases when a state completely collapses
- The probability of terrorism increases, but only marginally when a state declines

## Sample Homework Assignment One

### **Climate Change and Conflict in Syria: Water Scarcity Wages War**

#### **Thesis Statement:**

The variability of precipitation in the Middle East, mismanagement of water resources, and a lack of efficient agricultural equipment in Syria have created a vulnerable period of drought in the largely agrarian state. Severe drought has caused widespread poverty and has forced population migration within the state, as rural farmers struggle to adapt to urban environments, often blurring previously upheld ethnic boundaries. The desperate nature of poverty and famine brought on by the drought has fueled complicated rifts between ethnic sects of the Syrian population, facilitating a civil war. Thus, the purpose of this study is to assess the impact environmental degradation has had on the propensity for conflict in the ecologically fragile nation of Syria.

#### **Statement of Problem:**

Environmental degradation acts as a leading variable in both the cause of conflict and the facilitation of the continuation of conflict in the modern Syrian state.

#### **Research Question:**

What is the relationship between environmental degradation and conflict in the modern state of Syria?

#### **Research Hypotheses:**

- H1: There is a positive relationship between environmental degradation and conflict in the modern state of Syria. As environmental degradation increases in severity, competition over scarce resources, and thus conflict, positively correlates.
- H2: Regional conflicts within the state of Syria are predominantly based around scarce water resources.
- H3: Environmental degradation facilitates famine in periods of conflict within the Syrian state. Populations negatively affected by conflict are further impacted by lack of water and food resources brought on by environmental degradation.
- H4: Continued water scarcity will make Syria more susceptible to conflict. As the relationship between environmental degradation and conflict are positively correlated, Syria will be more susceptible to internal and external conflict competing over control of water resources in the future.

**Table 1.1: Demographic Data for PSC 302, Fall 2014-Fall 2016**

Academic Term	Percent Identified as Caucasian/ White	Percent Identified as African American	Percent Identified as Hispanic-Latino American	Percent Identified as Asian/Pacific Islander/Native	Percent Identified as First Generation College Student	Total Number of Students the Completed the Course*
Fall 2014	45.8	12.5	33.3	8.3	22.8	24
Spring 2015	40.0	10.0	20.0	10.0	23.6	20
Fall 2015	41.6	16.6	29.2	12.5	23.2	24
Fall 2016	35.0	10.0	30.0	25.0	24.1	20

Source: Transparency in Learning and Teaching (TILT) in Higher Education Survey for PSC 302, Fall 2014-Fall 2016

\*Note: Figures do not include students who withdrew from the course

**Table 1.2: Mean GPA Difference Between In person and Online Teaching**

Variable	N	Mean	Std. Dev.	Degrees of Freedom	T-Value	Difference	P-Value
Fall 2014 (In Person)	24	84.6	14.3				
				42	1.54	9.42	.064*
Spring 2015 (Online)	20	75.2	24.5				

\*Significant at .10 level, \*\*Significant at .05 level, \*\*\*Significant at .01 level.

Note: Final N does not include students who withdrew from course

**Table 1.3: Mean GPA Difference Between Online Teaching Before Transparent Methods and Online Teaching After Transparent Methods (One Assignment)**

Variable	N	Mean	Std. Dev.	Degrees of Freedom	T-Value	Difference	P-Value
Spring 2015 (Online)	20	75.2	25.5				
				42	-1.24	-7.9	.890
Fall 2015 (Online-Transparent Teaching)	24	83.1	16.6				

\*Significant at .10 level, \*\*Significant at .05 level, \*\*\*Significant at .01 level.

Note: Final N does not include students who withdrew from course; **Fall 2015 only includes one transparent assignment**

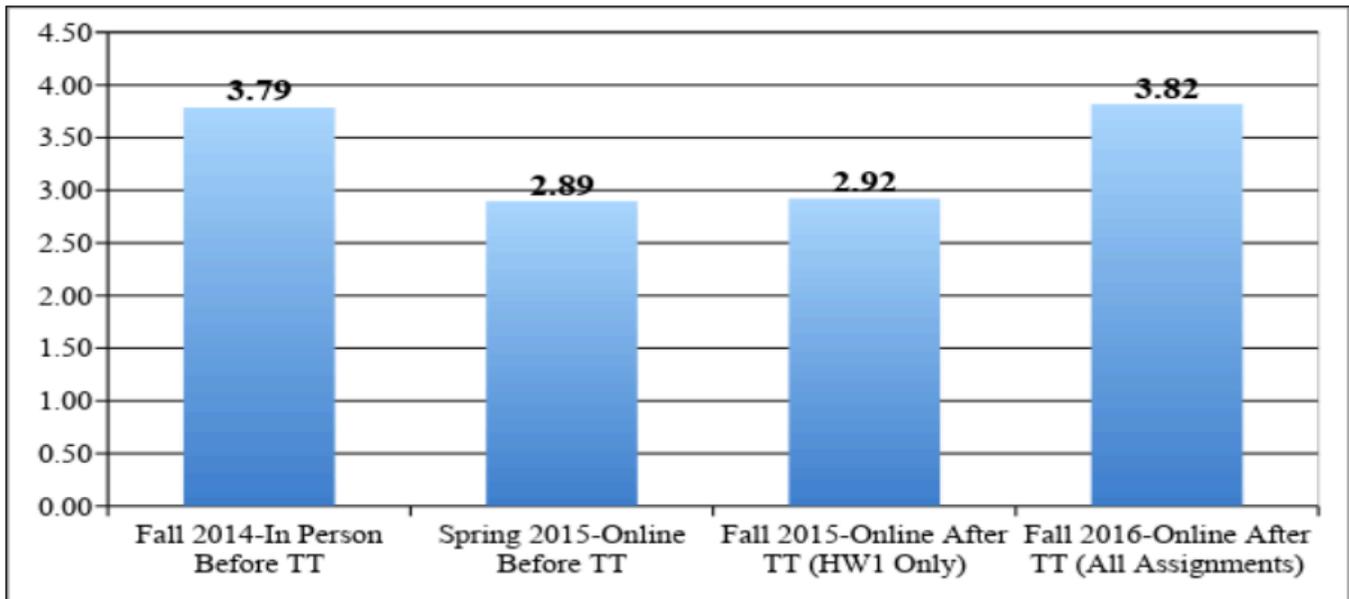
**Table 1.4: Mean GPA Difference Between In person Teaching (Using Traditional Methods) and Online Teaching Using Transparent Methods (All Assignments)**

Variable	N	Mean	Std. Dev.	Degrees of Freedom	T-Value	Difference	P-Value
<b>Fall 2014 (In Person)</b>	24	84.6	14.3				
				39	.820	4.02	<b>.208</b>
<b>Fall 2016 (Online-Transparent Teaching)</b>	20	80.6	17.0				

\*Significant at .10 level, \*\*Significant at .05 level, \*\*\*Significant at .01 level.

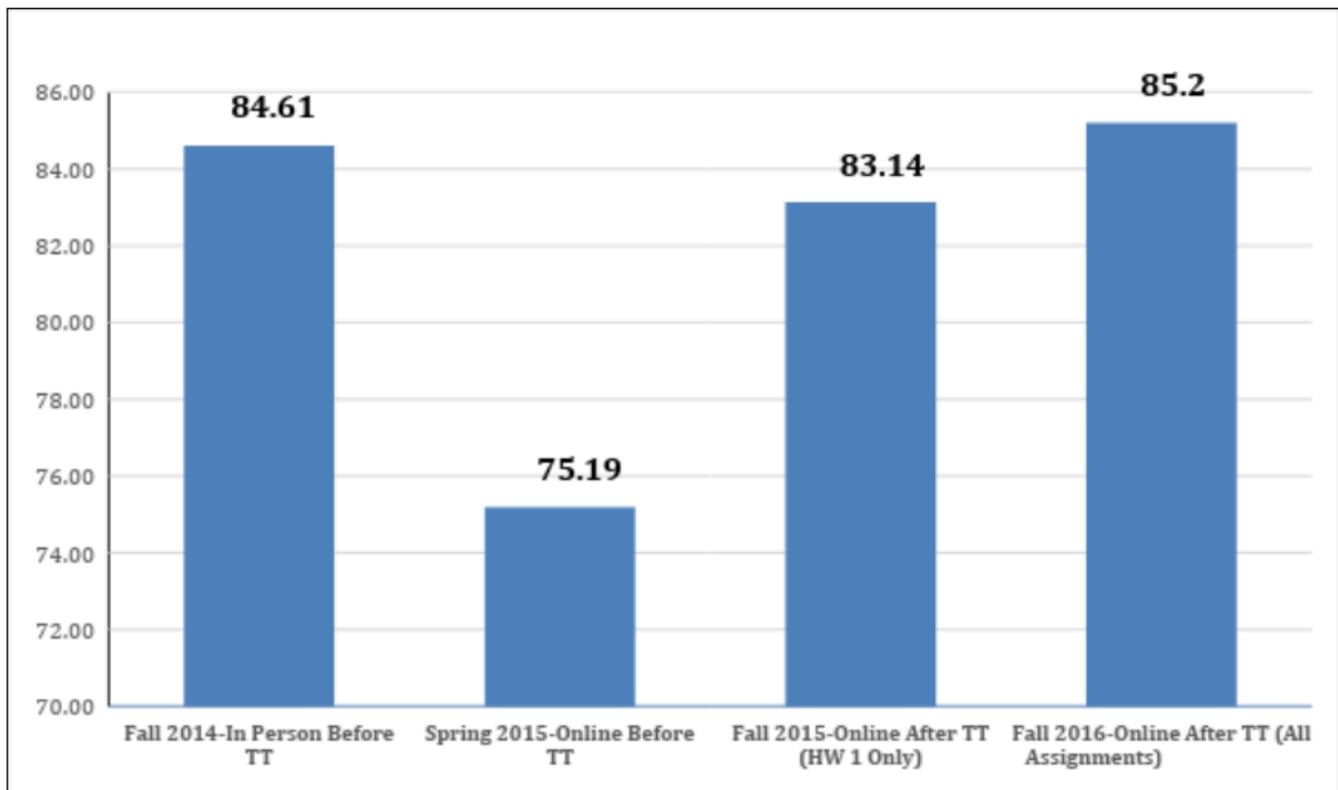
Note: Final N does not include students who withdrew from course

**Figure 1.1: Mean Score on Homework Assignment One for PSC 302, Fall 2014-Fall 2016<sup>1</sup>**



Note: TT represents Transparent Teaching

**Figure 1.2: Mean Course Final Numerical Grade for PSC 302, Fall 2014-Fall 2016**



Note: TT represents Transparent Teaching