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Impact Of Traditional Versus Alternative Assessment On Student Achievement

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IMPACT OF TRADITIONAL VERSUS
ALTERNATIVE ASSESSMENT ON STUDENT ACHIEVEMENT

BETH LUSTGARTEN

HONORS PROJECT

Submitted to the Honors College
at Bowling Green State University in partial fulfillment of
the requirements for graduation with

UNIVERSITY HONORS

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Abstract

The focus of this study looks at the effect of alternative assessment on student achievement in a high school science classroom. Within this action research, students have choices and are able to demonstrate creativity in their alternative assessments. By comparing student results from traditional and alternative assessments, the impact of assessment showed students had an overwhelming preference for completing alternative assessments, and a majority of students did better on the alternative assessment when compared to the traditional assessment.

Introduction

Assessment is a component often at the forefront of education. Whether it be multiple choice tests, group projects, presentations, essays, or portfolios, students are constantly assessed in the classroom. However, the type of assessment that should be implemented is often in question. In education, two forms of evaluation are traditional assessment and alternative assessment. Traditional assessment is often associated with a test or quiz commonly used in all classrooms. Conversely, alternative assessment navigates assessing student performance through other methods such as group projects, research projects, creative ideas to demonstrate achievement, or other opportunities not used as frequently in a classroom. When both forms of assessment are applied, this can create a classroom setting where student understanding is assessed effectively and accurately.

I am extremely interested in the topic of traditional versus alternative assessment because of my experiences with both forms of assessment throughout high school and college. Like many of my peers, I struggled with traditional standardized tests due to the pressure and stress I put upon myself to memorize information. In my experience, a traditional test was simply an obstacle. These tests were simply snapshots of my learning and a test of whether or not I could select the correct answer in a timely fashion. This rote memorization for a test left me with gaps in my knowledge of certain topics because all I knew to do was remember information for a test, and then I forget about it. On the other hand, when I was given the option of an alternative assessment, I found myself becoming more invested in the material, retaining and understanding it better rather than simply memorizing it. I also felt more in control of my grade and less anxious because I could take the time to showcase my understanding through an alternative assessment.

Secondly, I am passionate about alternative assessment because it promotes the implementation of student choice and creativity within the science classroom. In my experience, when I have been given a choice of how to be assessed, I preferred to pick out the assessment type that would best showcase what I have learned. When student choice is considered, it encourages greater collaboration and can spark student engagement. Additionally, by allowing for student choice, this cultivates an experience where students can be creative. As an individual who grew up enthralled with science and art, I have always been motivated to knock down the ‘left-brain’ and ‘right-brain’ barriers by striving to create an interdisciplinary classroom that incorporates art into science. Some people often think science is very procedural and straight-forward, but it is my hope to show the creative side of science. By pushing the envelope and having my students demonstrate their knowledge in creative ways, I will foster an environment where higher-order thinking is not only encouraged, but promoted.

Next, providing alternative assessment opportunities within a science classroom lends itself to real-world application. When students are able to visualize how their learning is relevant to everyday life scenarios, it further promotes student autonomy and ownership of their education. By giving students the chance to apply the science curriculum to projects with real-world applications, it can stimulate student initiative, perceptions of the importance of the curriculum, and aspiration to achieve academically.

Furthermore, assessment and how it affects student achievement is important to research because it is imperative students are being assessed in meaningful ways. In other words, the type of assessment should not hinder a student’s ability to demonstrate mastery of a particular topic. By incorporating alternative assessment, and, therefore, student choice and creativity, differentiation is taking place. Differentiating assessments is another component of being an

effective teacher. By providing students with multiple opportunities to succeed, they can take ownership of their learning and demonstrate mastery in many ways rather than simply regurgitating information on a multiple choice test. Unfortunately, there appears to be limited research into education of alternative assessment practices in the classroom. Although there is a clear desire to integrate alternative assessment practices, there exists a gap in our knowledge of how to effectively do so. There is too much ambiguity with respect to accurately appraising students through alternative assessment. Not enough research explores different avenues for incorporating alternative assessment into the classroom. This is why my research is essential.

The purpose of this research is to investigate the impact of traditional and alternative assessment on student achievement in the science classroom. Therefore, the two research questions asked are: How does assessment type impact student achievement? How do students perceive having choice, demonstrating creativity, and completing alternative assessments?

Literature Review

Traditional and Alternative Assessment

Assessment is essential in the field of education. Regardless of the assessment type, it is indisputable that a teacher needs to know how much content the students learned (Nasab, 2015). Without assessment, a teacher has no means of knowing what content has been mastered as well as what content needs to be revisited.

One type of assessment, known as traditional assessment, is what is often thought of when one hears the word *assessment*. This type of assessment is typically a standard test with multiple choice, short answer, true-false, and extended response questions (Nasab, 2015). Traditional assessment may be viewed as a snapshot of what a student knows by appraising a

student's knowledge at one particular point in time when given the test. This method implies students are absorbing information to apply to a test rather than constructing it to use in a way they prefer to be assessed (Letina, 2015). Traditional assessments often dominate a classroom and what a teacher focuses on teaching. Thereby creating the dilemma of teaching to a test, and inhibiting a teacher's ability to be effective.

Conversely, when looking at alternative assessment, the goal of this process is to introduce students to new methods of demonstrating mastery that ultimately lead to engagement and motivation with the task at hand (Nasab, 2015). This comprehensive approach can provide teachers with a more holistic perspective of their students' knowledge. Alternative assessment implies a progressive movement away from the snapshot of a student's performance often associated with traditional assessment (Letina, 2015). In essence, alternative assessment puts emphasis on a student's work and their ability to demonstrate what they know over a longer period of time.

Critique of Traditional Assessment

Before implementing either evaluation method into the classroom, a teacher should first evaluate the strengths and weaknesses of each. Traditional assessment has many surface-level benefits. These tests provide teachers with statistics on student achievement when certain learning targets are specifically addressed (Nasab, 2015). In particular, traditional assessments are viewed as an objective and efficient way to track student progress (Letina, 2015). This form of evaluation is quick to administer and score. With teachers being in an environment where they need to think quickly, adapt to change, plan thoroughly, and assess knowledge, traditional tests are an efficient choice because of how quickly they may be evaluated (Nasab, 2015).

Nonetheless, there are many negative aspects associated with traditional assessments. Most notable, these often lack authenticity, multidimensionality, and the potential for real-world application. This also only discloses to teachers a student's performance on a given day instead of their total performance. It further limits teachers' ability to gauge student engagement and learning style preferences. Rather, students are associated only with the score they earned, and then compared to their peers. Additionally, traditional assessment puts all of the responsibility on the teacher instead of allowing students to initiate ownership of their performance (Nasab, 2015). Not only does traditional assessment minimize the rich information a teacher can obtain, but these tests can be disadvantageous for students. Between having to study ahead of time, not always having a clear perception of what will be on the test, and having the pressure of completing the test in the allotted time, this creates an environment where students are stressed (Letina, 2015). As such, these tests can be detrimental for students with anxiety. For students with test anxiety, they may not be able to articulate what they know because their apprehension of the test beforehand promotes ineffectively studying.

Critique of Alternative Assessment

Likewise, there are many benefits resulting from alternative assessment. Alternative assessment is authentic. There are real-world applications correlating with the implementation of these assessments. Not only is achievement being measured, but so is student motivation, engagement, and attitude toward the matter at hand. In addition, alternative assessment encourages students to collaborate, which in turn enhances a student's self-esteem and efficacy (Nasab, 2015). With that being said, alternative assessment provides a great amount of valuable information from the teacher's perspective. This student-centered approach to evaluation

informs a teacher of a student's reasoning (Letina, 2015). It provides an opportunity for a teacher to develop a holistic view of the student's knowledge and ability to apply it. Also, the extent a student can construct accurate information rather than choosing correct information (Nasab, 2015). In return, a teacher can gain insight with respect to reevaluating future lesson plans and how to address any misconceptions arising from students' explanations. Equally important, with these observations, differentiation can also be effectively accounted for in future lessons.

Despite the benefits associated with alternative assessment, there are still reservations with this method that need to be addressed before it can be effectively implemented on a wider scale. On the teacher's end, there is a greater amount of planning and well-thought out objectives are required to offer to the students (Nasab, 2015). This necessitates a lot of effort from the teacher to have a well-structured agenda with how to execute alternative assessment. Simply put, a teacher cannot just tell the students to complete a project on a specific science topic. Even though there is more freedom with respect to expressing ideas in unique ways, there are still standards required. Additionally, as stated by Brown and Hudson, validity, reliability, and practicality are occasionally questioned because there is limited research into this form of instruction (Nasab, 2015). These discrepancies can be attributed to a lack of education on alternative assessment and minimal standardized direction for using alternative assessment in the classroom.

Student Receptiveness of Alternative Assessment

Student attitude towards alternative assessment is one aspect a teacher can learn from in order to make changes for more effective alternative assessments. Amongst all of the feedback,

there will be differing opinions and feelings towards alternative assessment. In one study which took place in a secondary science classroom, students' responses to alternative assessment were examined. Student perception was analyzed based on responses gathered from a Likert-Scale survey and an open-ended questionnaire (Waters et al., 2004). Similarly, in another study, nursing students were given alternative assessments, and their receptiveness was documented (Garside et al., 2009). After examining these two studies, it is clear that most students appreciate an alternative assessment, and they recognize there are numerous benefits with this method of evaluation.

When looking at the perceived benefits of alternative assessment, there are many common themes that came across through data gathered from student responses. It concluded most high school students preferred alternative assessment because it provided them with the chance to work in groups, gave them choices in their assessment, and allowed them to be comfortable with their choice. In addition, most of these students favored the longer time frame for completing the assessment, had a sense of autonomy for their work, were more motivated to produce quality work, and recognized alternative assessments lessened pressure in comparison to a traditional test. In parallel, one of the most common desires to have alternative assessment was students' belief they truly learned more through the process of completing this form of evaluation (Waters et al., 2004). Likewise, most of the nursing students had similar attitudes towards their alternative assessments. The consensus was this form of evaluation led to a more comprehensive understanding of the material, appreciation for more time to fulfill the criteria for their alternative assessment, and a reduction in pressure and stress correlated to studying for an exam (Garside et al., 2009).

Nevertheless, there were students in both studies who preferred the traditional assessment route. Some favored traditional testing because they viewed it as more straight forward, better organized, and more detailed. These students also maintained the belief that studying prior to the test promotes learning and then, application of knowledge to think through a multiple choice test (Waters et al., 2004). In the same manner, some of the nursing students expressed why they preferred an exam. Reasoning includes being comfortable in an examination environment, being confident in one's ability to succeed when presented with an exam, and believing an exam is most valuable for committing information to memory for use later on in a career (Garside et al., 2009).

Impact of Student Choice

Alternative assessment often lends itself to incorporating student choice into the classroom. Student choice provides students with an environment where they have a voice in their assessment. They have a say in how they will demonstrate their understanding to the teacher. Studies show numerous advantages associated with student choice. As acknowledged through Self-Determination Theory, having a choice is one aspect leading to autonomy, motivation, and higher achievement. Not only are students more motivated by choices, but statistically they will put forth more time and effort when a choice is provided (Patall et al., 2010).

In one example of student choice, nursing students were given options alluding to a choice between a traditional assessment or an alternative assessment. Students could either show mastery by taking an exam, making a presentation, or writing an essay. Out of all of the students, it was determined the majority chose the essay form of assessment. This was the most

common choice because an essay alleviates the stress and pressure correlating with preparation for an exam or presentation (Garside et al., 2009). Although a significant majority were in favor of having a choice, a few participants were overwhelmed by the choice. One drawback of the study is there was no evidence collected on how the provided options impacted academic achievement.

Second, another study approached student choice in a different way. One group of students was instructed on a specific homework assignment to do, while the other group was given two options of homework and were allowed to choose which option to complete. The results of this study are congruent with Self-Determination Theory. Students in the test group showed greater interest and a sense of autonomy in comparison to the control group. Under the test group circumstances, these students also scored higher on the corresponding unit test (Patall et al., 2010). The methodology for this study was well-thought out and minimized the amount of variables manipulated. However, this study could have improved credibility if it were conducted over a longer period of time.

Next, in a third study, research was conducted on the effects of including student choice and art activities into a seventh grade social studies classroom. While this study initially focused on the impact of art in the classroom, the main takeaways were in regard to student perception of having choice in the activities. In order to draw conclusions, data were collected on students' rating of the lessons and their amount of participation. After statistical analysis, it was determined students participated more and rated lessons higher when they were given choices and allowed to collaborate with their peers (Kosky and Curtis 2008). In essence, students showcased active learning when they had a choice in their activities. With this action research, similar principles and methods could be altered and applied to a science classroom.

Ultimately, when students understand their teachers are giving them options with the assessment at hand, this can build rapport between teacher and student (Patall et al., 2010). Likewise, providing choice can be a way of teachers acknowledging they care about their students and are taking their students' strengths and preferred learning styles into account.

Importance of Creativity and Right-Brained Activation in a Science Classroom

While science is most commonly thought of as a left-brained subject entailing logical thinking and analysis, there is a great deal of creativity involved. Research shows right-brained activation in a classroom leads to a balanced curriculum, and allows for a teacher to engage the whole student rather than only the analytical side of their brain. By the same token, one study from a chemistry class evaluating equal right- and left-brained activation supported higher recollection scores pertaining to the areas of knowledge, comprehension, and application skills (Hildebrand, 1980). Creativity is one aspect that can be included in teaching science so more students may be afforded an equitable chance to understand this subject. The importance of right-brained activation in a science classroom is validated by the fact our world is the product of creating and developing new ideas and scientific phenomena. Likewise, scientific processes such as problem solving, developing hypotheses, and modeling concepts, are all attributes that require creative thinking (Hadzigeorgiou et al., 2012).

With respect to integrating creativity into a science classroom, a study on utilizing art in a sixth grade social studies classroom provides evidence that when art was incorporated into lessons, the students rated these lessons higher in comparison to those lessons lacking creativity and art application (Kosky and Curtis 2008). Although this research was conducted in a social studies classroom, similar concepts may be applicable to other subjects. Concerning creativity

and right-brained lessons in science, activities can be used to make it more manageable to learn fundamentals such as periodic elements (Hildebrand, 1980). For example, teachers and students may use mnemonic devices, pictures, poems, or puns to help with memorizing elements.

Ultimately, by fostering an environment where creativity is encouraged in the science classroom, all ideas may be heard equally, and students may be more apt to engage with science and have a desire to succeed in the classroom.

Methodology

This research determining the impact of traditional and alternative assessment on student achievement was conducted in a high school physical science classroom in Fostoria City Schools. It is hypothesized that student scores on the alternative assessment will be greater than the scores on the traditional assessment. With this action research, a mixed method research approach was utilized. Over the course of one unit pertaining to the physics topics of motion, speed, velocity, and acceleration, the impact of traditional and alternative assessment on student achievement was evaluated.

Participants

This study was conducted throughout one physical science classroom consisting of 21 students. There were ten female students and 11 male students. Out of the 21 students, two students were sophomores, and the remaining 19 were freshman. One student has previously taken physical science and is currently retaking it. Ten students typically earn A's for the quarter, six students typically earn B's, and five students earn either C's or D's for their overall grade.

Procedure

The physics unit took place over the course of three weeks. Students first learned about distance and displacement, and then, speed, velocity, and acceleration were introduced. The alternative and traditional assessments took place on separate days. Students were first given a Speed, Velocity, and Acceleration Race Car Alternative Assessment at the end of the unit, see Appendix A. They were allotted two 50 minute class periods to complete the alternative assessment. In this assessment, students had a choice in how they explained their answers, they demonstrated their creativity with constructing visuals, and they exemplified their prediction abilities. Each student was permitted to work with a partner from their lab group, but each person was responsible for completing their own assessment. The day after alternative assessments were turned in, students independently completed a traditional assessment in the form of a test, see Appendix B. Students were given one 50 minute class period to complete their test. This traditional assessment addressed the same learning targets covered in the previously given alternative assessment. In addition, students were not allowed to use external resources in either format. Moreover, students were not allowed to take either assessment outside of the classroom, students were given calculators to use on both assessments, formulas were provided to students on both assessments, and students were required to show their work for extended response questions on both assessments.

In order to evaluate the impact of assessment type, both qualitative and quantitative data were analyzed. Comparing students' scores on their traditional assessment performance versus those of their alternative assessment served as quantitative data. The average scores of both assessment types were used to see if there was a difference between academic achievement of the two assessment methods. Additionally, a Likert-scale survey was given to determine students'

opinions pertaining to the completion of alternative and traditional assessment, see Appendix C. This survey provided qualitative data to assess students' attitudes towards traditional and alternative assessment.

Data and Analysis

In order to evaluate the impact of traditional versus alternative assessment on student achievement, the research was conducted amongst 21 students in a high school physical science classroom. These 21 students completed both the alternative and traditional assessments. The quantitative data collected compared the average scores on both assessment types, while the qualitative data was based on results from the Likert-scale survey evaluating student receptiveness, impact of student choice, the ability to use creativity, and overall attitudes towards alternative assessment.

Assessment Results



Figure 1: Mean, Median, and Mode Comparison Between Traditional and Alternative Assessments in a Physical Science Classroom

Student	Alternative Assessment Score	Traditional Assessment Score	Difference
1	95.0%	97.0%	-2.0%
2	95.0%	88.0%	7.0%
3	80.0%	78.0%	2.0%
4	80.0%	67.0%	13.0%
5	92.0%	54.0%	38.0%
6	100.0%	95.0%	5.0%
7	95.0%	82.5%	12.5%
8	85.0%	57.0%	28.0%
9	100.0%	92.0%	8.0%
10	61.5%	75.0%	-13.5%
11	95.0%	89.0%	6.0%
12	95.0%	62.5%	32.5%
13	85.0%	89.0%	-4.0%
14	95.0%	90.0%	5.0%
15	100.0%	78.0%	22.0%
16	55.0%	73.0%	-18.0%
17	72.5%	93.0%	-20.5%
18	75.0%	93.0%	-18.0%
19	55.0%	85.5%	-30.5%
20	85.0%	95.0%	-10.0%
21	90.0%	93.0%	-3.0%

Figure 2: Table of Student Data Comparing Students' Individual Scores

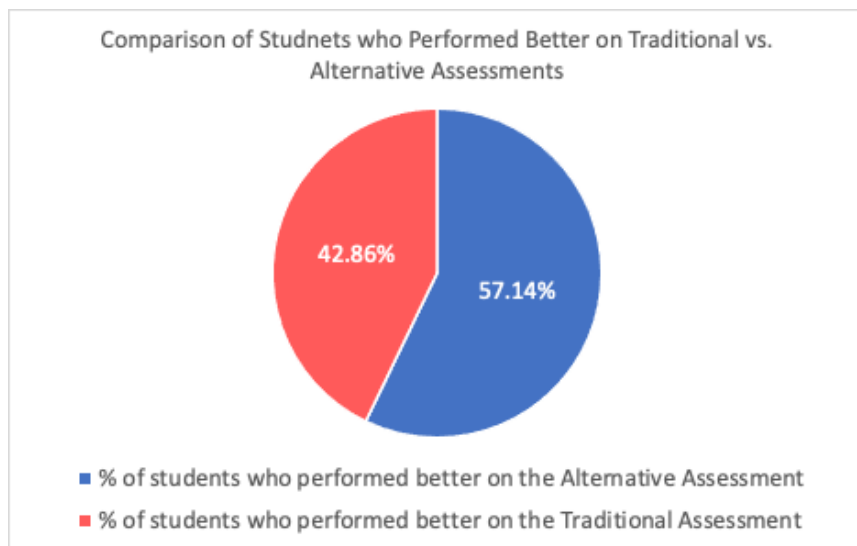


Figure 3: Comparison of Student Performance on Traditional vs. Alternative Assessments

The mean, median, and mode amongst the 21 students for both assessment types are illustrated in *Figure 1*. As shown in *Figure 1*, the average score on the traditional assessment was 82.21%, and the average score on the alternative assessment was 85.05%. Therefore, on average, students scored 2.84% better on the alternative assessment. Next, the median score of the traditional assessment was 88%, while the median score of the alternative assessment was

90%. Additionally, the mode of the traditional assessment was 93%, and the mode of the alternative assessment was 95%. While there was no statistical difference between the mean, median, and mode values on the assessments, there was an increase ranging from 2.00% to 2.84% in all three categories on the alternative assessment in comparison to the results of the traditional assessment. Therefore, in all three aspects, the percentages were greater for the alternative assessment.

Next, when comparing the individual results of each student's performance on the traditional and alternative assessments, as seen in *Figure 2*, a majority of students performed better on the alternative assessment. In *Figure 2*, each student's score is recorded, and the 'Difference' column represents the traditional assessment score subtracted from the alternative assessment score. Therefore, as indicated in blue font, a positive difference indicates the percentage a student scored higher on the alternative assessment. Conversely, a negative difference, as shown in red, is indicative of students who scored higher on the traditional assessment. Then, after analyzing the differences in results of *Figure 2*, the data was extrapolated to show the percentage of students who scored better on each assessment type. As shown in *Figure 3*, 57.14% of students, or 12 out of 21 students, performed better on the alternative assessment, while only 42.86% of students, or 9 out of 21 students, performed better on the traditional assessment. Hence, a majority of students scored higher on the alternative assessment.

Student Receptiveness of Alternative Assessment

I prefer completing the Race Car Post-Lab (alternative assessment) rather than taking a traditional test.

21 responses

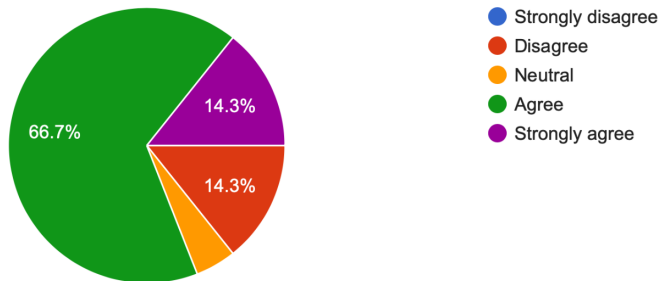


Figure 4: Preference for Completing Alternative Assessment

I feel less pressure when completing a post lab / alternative assessment project in comparison to when I am taking a test.

21 responses

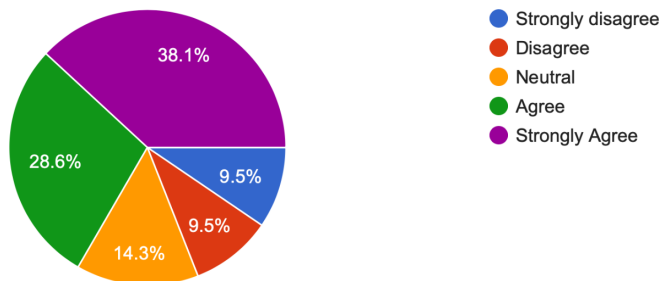


Figure 5: Feeling Less Pressure while Completing Alternative Assessment

I feel that I learn more when completing a post lab / alternative assessment project in comparison to when I am completing a test.

21 responses

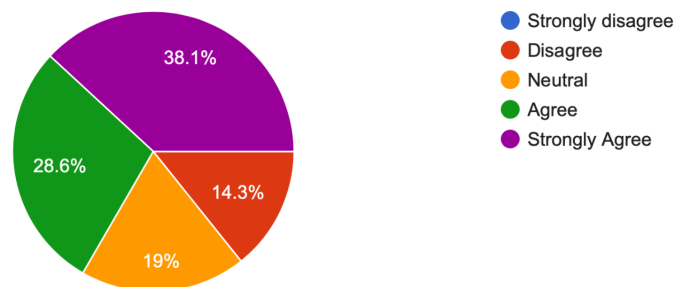


Figure 6: Receptiveness of Learning through Alternative Assessment

Student receptiveness to completing alternative assessments is summarized in *Figures 4, 5, and 6*. As seen in *Figure 4*, 66.7% of students agreed with the statement, “*I prefer completing the Race Car Post-Lab (alternative assessment) rather than taking a traditional test,*” 14.3% of students strongly agreed with this statement, and only 14.3% of students disagreed with the statement. Therefore, a combined 81% of students either agreed or strongly agreed with the previously mentioned statement. This indicates an overwhelming majority of the students who took both assessments preferred completing the alternative assessment over the traditional test.

Next, as seen in *Figure 5*, 28.6% of students agreed with the statement, “*I feel less pressure when completing a post lab / alternative assessment project in comparison to when I am taking a test,*” and 28.1% of students strongly agreed with this statement. On the other hand, only 19% of students either disagreed or strongly disagreed with this statement, and 14.3% of students took a neutral stance. Therefore, 66.7% of students agreed or strongly agreed that the post lab alternative assessment created an environment where they felt less pressure than when completing a traditional assessment. Hence, these results indicate a majority of the students felt an alternative assessment created a low pressure, or low-stakes, environment compared to the high pressure, or high-stakes, culture of traditional tests.

In addition, as seen in *Figure 6*, 28.6% of students agree with the statement, “*I feel that I learn more when completing a post lab / alternative assessment project in comparison to when I am completing a test,*” and 38.1% of students strongly agreed with this statement. Conversely, 14.3% of students felt they learn more when completing a test rather than an alternative assessment, and 19% of students felt indifferent as to which type of assessment made them feel like they learned more. Therefore, a combined 66.7% of students either agreed or strongly agreed with the belief they learned more from completing an alternative assessment. This shows

a majority of students felt it was additionally beneficial to complete an alternative assessment because they hold the belief they learned more from completing that type of assessment compared to what they learned from completing a test.

Overall, a vast majority of the 21 students either agreed or strongly agreed with respect to the fact they had a strong preference for completing an alternative assessment, they felt less pressure while completing an alternative assessment, and they felt as if they learned more from completing the alternative assessment. Ultimately, most students showed an overwhelming positive receptiveness towards fulfilling the requirements of the alternative assessment.

Impact of Student Choice

In the alternative assessment, I enjoyed having a choice in how I explained my answers to questions 1 and 2. (how you were able to choose if you referred to the data or created diagrams)
21 responses

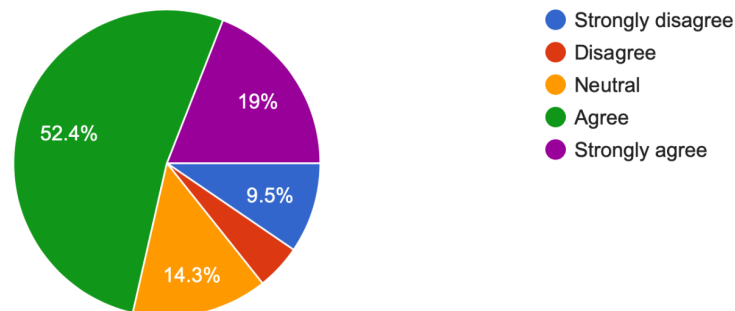


Figure 7: Preference for Having Choice in Explaining Answers

In the alternative assessment, having a choice in how I completed my explanations made me feel more motivated to complete the task.

21 responses

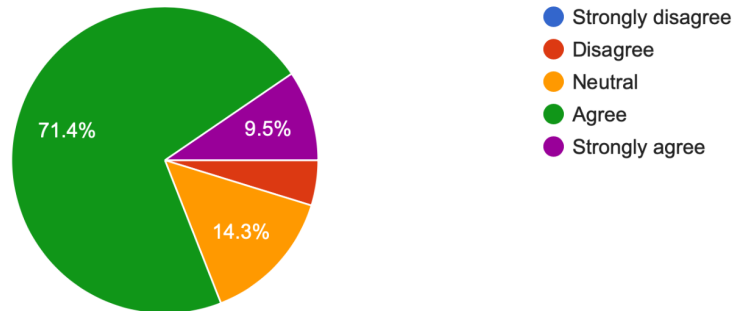


Figure 8: Impact of Choice on Motivation

In the alternative assessment, having a choice in how I completed my explanations made me feel more confident in my ability to do well on the task.

21 responses

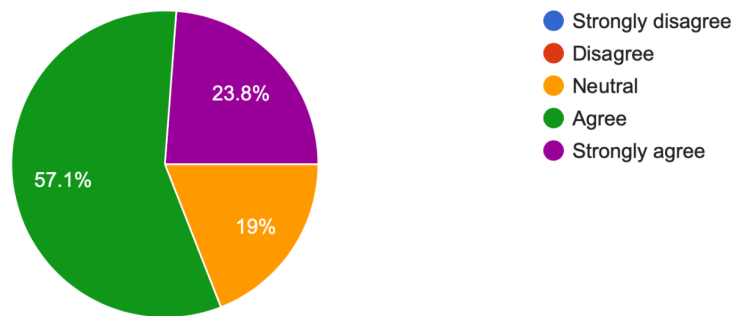


Figure 9: Impact of Choice on Confidence

The impact of student choice on completing explanations for the alternative assessment is addressed in *Figures 7, 8, and 9*. As seen in *Figure 7*, 52.54% of students agreed with the statement, “*In the alternative assessment, I enjoyed having a choice in how I explained my answers to questions 1 and 2,*” and 19% of students strongly agreed with this statement. On the other hand, 14.3% of students disagreed or strongly disagreed with this statement, and 14.3% of students were neutral. In total, 71.4% of students agreed or strongly agreed with the above

statement. Accordingly, this percentage shows a majority of students enjoyed having a choice in how they completed the alternative assessment and how they explained their answers.

Next, as seen in *Figure 8*, the impact of student choice on task motivation was evaluated. A vast majority of students agreed with the statement, “*In the alternative assessment, having a choice in how I completed my explanations made me feel more motivated to complete the task.*” More specifically, 71.4% of students agreed with this statement, and 9.5% of students strongly agreed with the statement. Conversely, only 4.8% of students disagreed with the statement, and 14.3% of students selected neutral with respect to the impact of student choice on motivation. Consequently, 80.9% of students either agreed or strongly agreed their motivation was heightened due to the fact they were able to have a choice in how they explained themselves throughout the alternative assessment. Therefore, an overwhelming majority of students felt more motivated to explain themselves with the choice which best allowed them to demonstrate their understanding.

Additionally, as seen in *Figure 9*, the impact of student choice on confidence in ability to do well on the task was assessed. Over half of the students agreed with the statement, “*In the alternative assessment, having a choice in how I completed my explanations made me feel more confident in my ability to do well on the task.*” Specifically, 57.1% of students agreed with this statement, 23.8% of students strongly agreed with this statement, 19% of students were neutral, and there were no students who disagreed or strongly disagreed. Hence, it can be concluded that 80.9% of students agreed or strongly agreed they felt more confident in their ability to explain their answers thoroughly in the alternative assessment due to the fact they had choices provided as to how they could explain their answers.

Overall, a very large percentage of students agreed or strongly agreed with respect to preferring to have a choice in explaining their answers, in feeling more motivated to complete the alternative assessment because of their choices provided, and in feeling more confident in their ability to do well on the assessment because they had a choice in completion. All in all, students held positive attitudes toward having choice while completing an alternative assessment.

Creativity in the Science Classroom

In the alternative assessment, I enjoyed having the ability to use creativity with answering the "Predict!" and "Get Creative" prompts (questions 3-5).

21 responses

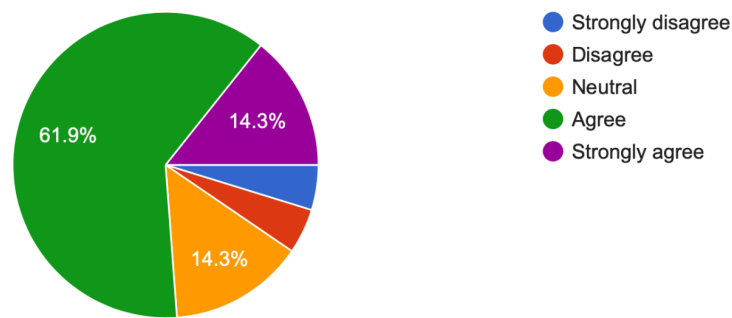


Figure 10: Preference for Utilizing Creativity in an Alternative Assessment

Overall, I enjoy being able to demonstrate my creativity/ use visuals in the science classroom to help explain my thoughts.

21 responses

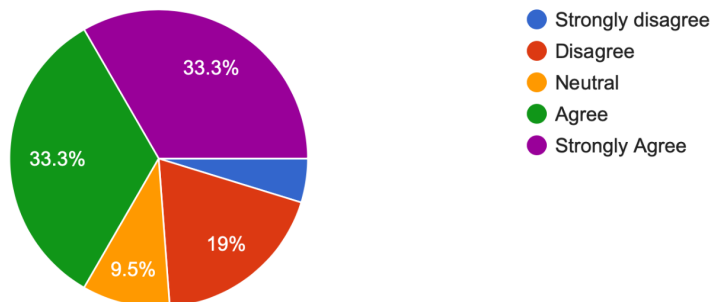


Figure 11: Preference for Using Creativity and Visuals to Explain Answers

The impact of implementing creativity in the science classroom to express students' thoughts is assessed in *Figures 10 and 11*. As seen in *Figure 10*, the preference for having the ability to use creativity to explain prompts was well-received overall. More specifically, 61.9% of students agreed with the statement, "*In the alternative assessment, I enjoyed having the ability to use creativity with answering the 'Predict!' and 'Get Creative' prompts (questions 3-5)*", and 14.3% strongly agreed with the statement. In opposition, only 9.8% disagreed or strongly disagreed with enjoying having the ability to use creativity. Along with this, 14.3% of students remained neutral in their response. However, it is still expressed that a majority, or 76.2% of students, agreed or strongly agreed with the statement. Hence, most students favored the use of creativity to answer questions and develop their thoughts in prompts.

Along with this, as seen in *Figure 11*, the preference for using creativity and visuals to aid in explanations throughout the alternative assessment was addressed. This graph illustrates 33.3% of students agreed and 33.3% of students strongly agreed with the statement, "*Overall, I enjoy being able to demonstrate my creativity / use visuals in the science classroom to explain my thoughts.*" In addition, 14.3% of students had no preference to use creativity and visuals. However, 19% of students disagreed, and 4.8% of students strongly disagreed with favoring the use of creativity and visuals to help with explaining answers. While this is considerably the greatest percentage of students who have disagreed with a statement, there is still 66.6% of students who agreed or strongly agreed with the preference to use creativity and visuals to explain answers. With this being the case, it is still reasonable to conclude a majority of students, specifically 80.9%, either preferred or had no preference with respect to the ability to demonstrate creativity in explaining answers on the alternative assessment.

In general, students enjoyed being able to think outside of the box and use their creativity to explain themselves and justify their answers throughout the alternative assessment. While there was more disagreement for preference pertaining to the use of creativity compared with student attitudes towards alternative assessment and preference for having student choice, between 66.6% and 76.2% of students still enjoyed integrating creativity into their answers throughout the alternative assessment.

Conclusions

In conclusion, my action research supports that students benefit from completing alternative assessments. This study upholds the notion that students performed better on alternative assessments than they did on the corresponding traditional assessment. Based on the results from the Likert-scale survey, it can be concluded a majority of students preferred to have a choice in their explanations, they were more motivated by completing an alternative assessment, and they felt more confident in their ability to sufficiently complete the alternative assessment task at hand. Additionally, the results pertaining to creativity in the science classroom also alluded to the fact most students enjoyed being able to think creatively and use visuals to explain themselves in some aspects of the alternative assessment.

After evaluating the data, I was not surprised by the results. The findings for an overall preference towards alternative assessments were consistent with the past research in my Literature Review. While there were still some students who would have rather taken a traditional assessment, a vast majority of my students favored the alternative assessment, and more students than not, in fact, performed better on the alternative assessment. Furthermore, my findings were consistent with the positive impact student choice has on students' attitudes (Patall

et al., 2010). My results showed an overwhelmingly positive impact of student choice on completion of the alternative assessment. Almost all of my students felt more confident and motivated due to having a choice in how they expressed their explanations on the alternative assessment.

Lastly, throughout this study, I learned a lot about my students. I learned my students felt less pressure when they were completing an alternative assessment. I also learned my students seemed to be more content when they realized they had choices and only had to answer one of the explanation options for the questions where explanation options were provided. Next, I learned many students struggle with providing thorough explanations to demonstrate their knowledge of the task at hand. Many of my students seemed to be able to verbally articulate their answers, but they struggled to write it out in a way that answered all pieces of the question. With this being said, I noticed a lack of thorough explanations was where most points were lost on the alternative assessment.

Limitations

While my results were consistent with what was hypothesized, there were some limitations to consider. First, one limitation was the sample size used. This sample size of 21 students was rather small due to external factors. If more time were allotted, it would have been beneficial to conduct this study throughout all of the physical science sections. Using a larger sample size could have further validated or refuted the conclusion.

Second, time constraints were another limitation. Due to time constraints, this research was only able to be conducted across one learning unit. Because of the amount of content covered in the physical science curriculum, it was not feasible to have students complete both

traditional and alternative assessments for more than one unit. Therefore, there is a smaller pool of data in comparison to the ability to give traditional and alternative assessments across more than one unit throughout the year.

Next, I believe there were limitations because of the format in which I collected qualitative data on students' attitudes towards alternative assessments. While it appeared students took the time to honestly answer the questions on the Likert-scale, there are limitations with having this type of data in comparison to interviews conducted with each student or asking open-ended questions on the survey so they could further explain their attitudes and receptiveness of alternative assessments.

In addition, due to Covid, my students had scant experience with completing alternative assessments and having to explain themselves and justify their answers. During the pandemic, many assignments and assessments were given in a multiple choice format. Therefore, only having one alternative assessment was a limitation because this type of assessment was unfamiliar to some students, and this may have been one reason as to why the alternative assessment average was not much greater than the average of the traditional assessment.

Furthermore, inconsistencies in student performance caused by external factors lead to larger differences in assessment scores. After looking at the scores, it appears that students who had a greater than 30% difference between assessments typically have these variations in their scores due to external factors unrelated to their actual ability to demonstrate their knowledge.

Lastly, a conditional issue could be the order in which the assessments were completed. All students completed the alternative assessment before completing the traditional assessment. If it were possible to have two class periods complete both assessment types, the impact of order on completing each assessment may have been investigated as a factor.

Implications for Future Research or Practice

If future research were conducted with other students or in another classroom, other variables could be evaluated. First, if this research were to be further investigated, I would significantly increase my sample size. By increasing the sample size, there could be a wider range of data, and this would lead to more validity in the results for future implementation of this action research. Secondly, I would complete the study over the course of more than one learning unit. This would allow me to evaluate if alternative assessment scores were consistently greater than the comparable traditional assessment scores. Additionally, based on the conclusions in the original study, I would further investigate different types of alternative assessment on student achievement, motivation, and confidence. For example, I would implement the use of different alternative assessments such as choice boards, essay writing, presentations, authentic lab experiments, and projects. By implementing the research throughout the year, I would be able to incorporate a different type of alternative assessment with each corresponding traditional assessment and then conduct interviews at the end of the year to record students' receptiveness to each format of alternative assessment. Lastly, if the research is conducted throughout a full year in the future, I would alternate the order of the assessment. For example, I would give the alternative assessment first in unit one, and then follow it up with the traditional assessment. Then, in unit two, I would give the traditional assessment first and then have students complete the alternative assessment. By switching the order in which the assessments are given, this would allow for a deeper look into whether or not the order in which assessments are given impacts student achievement and perceptions.

The conclusions from conducting research investigating the impacts of traditional and alternative assessment on student achievement will influence my future teaching and how I will

implement this assessment practice into my future classroom. These results will influence my future teaching in three major ways. First, this research has validated my belief of integrating alternative assessment into the science classroom to best meet the needs of and create an equitable learning environment for my students. By integrating alternative assessments where students have a choice, they can use creativity, and they feel more motivated, it is my hope to create a classroom environment where students foster a passion for science and where they gain confidence in their ability to succeed in the classroom. Next, the evidence from the study supports the use of student choice in the classroom. Therefore, I plan to provide students with choice in learning and assessments when appropriate. Students may be given choices when it comes to explaining their answers, completing a project, or working in groups. Last, by executing my action research, I have learned the significance of gaining student feedback. Conducting this research has taught me that when something unfamiliar to students, like alternative assessments, is implemented into a classroom, it is imperative to step back and allow students the opportunity to provide feedback to me, as their teacher. This will allow me to better understand what is most beneficial for student learning and how new techniques, learning formats, or assessment types are perceived from their perspectives. As an educator, it is essential to reflect on educational practices and to see how students respond to new assessment types. Therefore, by receiving feedback, I am able to better evaluate strengths and areas of improvement of incorporating new learning formats.

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Appendix A - Alternative Assessment**Speed Velocity, Acceleration Post-Lab Alternative Assessment**

1. What happened to the velocity of the car as the ramp height increased with each trial? Explain your answer by
 - a. referring to your graph and comparing the data you collected, OR by
 - b. drawing diagrams using velocity vectors for the 5 trials.

Answer:

Explanation Option A:

Explanation Option B:

Predict!

3. Imagine that you measured the velocity of your toy car going down a ramp built on 8 books. Would the velocity of the car be greater than or less than what you calculated in the trial with 5 books used? Explain your answer by referring to the data and your graph from the lab.

4. What would have happened to the speed AND acceleration of the car if it continued going past the 100 cm mark? Explain your answer by using the definitions of velocity and acceleration, OR by referring to the formulas for these vector quantities.

Get Creative!

The ramp, the car used, and the table used all stayed the same throughout the lab. The only thing that changed was the height of the ramp.

5. Other than changing the height of the ramp, come up with a procedure that would result in....

a. The car experiencing a greater velocity than what was experienced in the lab.

b. The car experiencing a slower velocity than what was experienced in the lab.

(Hint: think about what you could change in the procedure or materials to change the velocity).

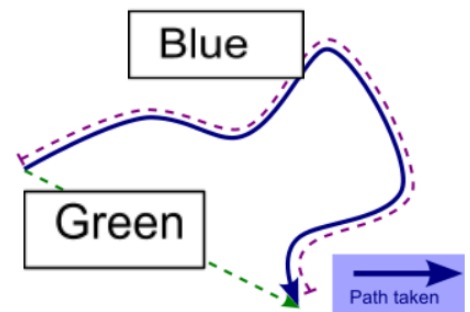
Appendix B - Traditional Assessment

Name: _____ Date: _____ Period: _____

Motion Test

Directions: Use the bubble sheet to mark your answers for questions 1-21.

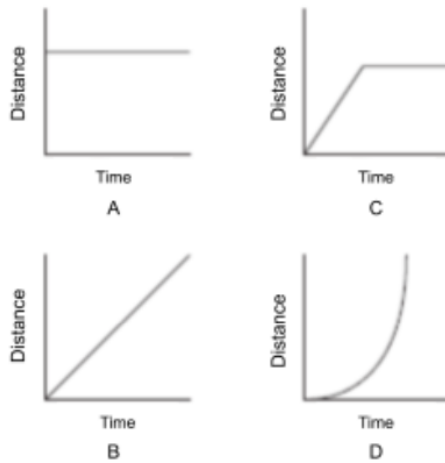
1. Frame of reference is based on where the observer is and how s/he sees the motion.
 - a. True
 - b. False
2. Velocity is a _____ quantity, whereas speed is a _____ quantity.
 - a. Vector, Scalar
 - b. Scalar, Vector
3. Distance is a _____ quantity, whereas displacement is a _____ quantity.
 - a. Vector, Scalar
 - b. Scalar, Vector
4. In the diagram to the right, the blue path taken (solid line surrounded by dotted line) is the _____?
 - a. Displacement
 - b. Distance
 - c. Speed
5. In the diagram to the right, what is the green dotted line called?
 - a. Displacement
 - b. Distance
 - c. Speed
6. Acceleration = (change in _____) / (time taken for that change)
 - a. Velocity
 - b. Speed
 - c. Force
 - d. Displacement
7. A vector is a quantity which has both magnitude and direction.
 - a. True
 - b. False



8. A dog chases his tail around in a circle. He is able to maintain his speed while doing this. Is he accelerating?
- He is not accelerating because he is maintaining his speed in a circle
 - He is not accelerating but his going in a circle does tell his direction
 - He is accelerating because he is going around in a circle
 - He is accelerating because it is impossible for a dog to maintain his speed
9. Which of the following is **NOT** accelerating?
- a ball being juggled
 - a woman walking at 3.5 m/s along a straight road
 - a satellite circling Earth
 - a braking cyclist
10. What is the speed of an object at rest?
- 15 km/hr
 - 1 km/hr
 - 0 km/hr
 - This cannot be determined without further information
11. The difference between speed and velocity is that velocity includes...
- Direction
 - Distance
 - Time
 - Weight
12. You are walking to your seat next to your friend after you just got your lunch in the cafeteria, and the apple on your lunch tray falls off and hits the ground. From YOUR perspective, the apple appears to be...
- Falling behind you
 - Falling in a parabolic curve
 - Falling straight down
13. You are walking to your seat next to your friend after you just got your lunch in the cafeteria, and the apple on your lunch tray falls off and hits the ground. From YOUR FRIEND'S perspective, the apple appears to be...
- Falling behind you
 - Falling in a parabolic curve
 - Falling straight down

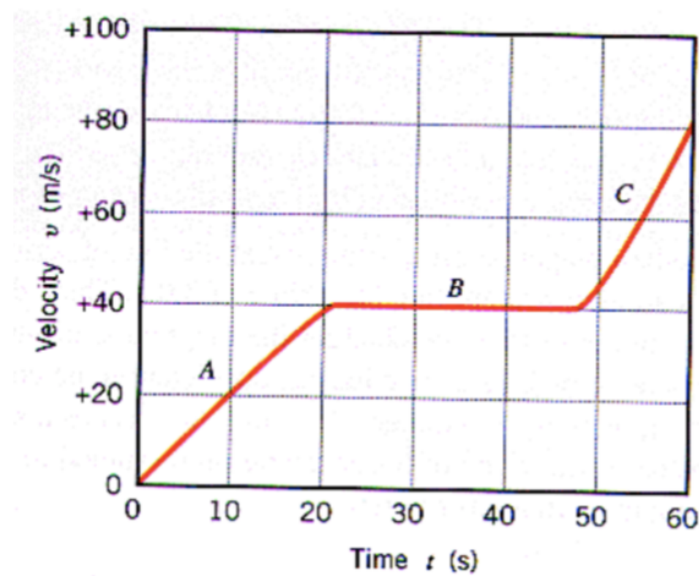
14. If you jog for 1 hour and travel 10 km, 10 km/h describes your
- Momentum.
 - displacement.
 - Acceleration.
 - average speed.

15-18. Use Graphs A-D to answer the questions below (questions 15-18).



15. Which graph represents an object staying in the same place?
- A
 - B
 - C
 - D
16. Which graph represents an object moving at a constant velocity?
- A
 - B
 - C
 - D
17. Which graph represents an object accelerating?
- A
 - B
 - C
 - D
18. Which graph represents an object moving at a constant velocity and then stopping / staying in the same place?
- A
 - B
 - C
 - D

19-21. Use the graph below to answer the following questions (questions 19-21).



19. Which section(s) of the graph show(s) an object accelerating?

- A
- B
- C
- A and C

20. Which section(s) of the graph show(s) an object moving at a constant velocity?

- A
- B
- C
- A and C

21. Which section(s) of the graph show(s) an object accelerating at a rate of about 2 m/s^2 ?

- A
- B
- C
- A and C

Directions: Match the vocabulary terms in column B with the appropriate definition in column A. All terms will be used once. **(1 point each)**

Column A	Column B
22. ____ How far an object travels	A. Frame of reference
23. ____ The difference between an object's starting position and final position	B. Velocity
24. ____ A point from which to describe motion	C. Distance
25. ____ Described as how fast an object travels	D. Acceleration
26. ____ Defined as change in velocity over time	E. Displacement
27. ____ How fast an object travels in a particular direction	F. Speed

Directions: Complete each problem by finding the distance AND displacement for each scenario. Write your answers, and **be sure to include units & directions (N, S, E, W) when needed. (5 points each)**

28. Zach drives directly west for 15 km, then turns to the east and drives for another 25 km.

Distance=

Displacement=

29. Jason walks east for 6 km, stops for a break, and then runs the same direction for 5 km before he stops.

Distance=

Displacement=

30. McKenzie rides her bicycle 50 km north, turns around, and then rides the bicycle 50 km back toward her starting point.

Distance=

Displacement=

Directions: Complete the following problems using the VEMA process. **BE SURE TO LABEL USING THE APPROPRIATE UNITS AND USE DIRECTIONS (N, S, E, W) WHEN NECESSARY. (8 points each)**

31. A dolphin swims 55 m east in 5.0 s, moving towards the shoreline to catch a fish. What is his velocity in m/s?

Variables	Equation
Math	Answer w/ units

32. In a summer storm, the wind is blowing with a velocity of 10 m/s north. Suddenly in 4 seconds, the wind's velocity picks up to 22 m/s north. What is the wind's acceleration?

Variables	Equation
Math	Answer w/ units

33. If a car is moving at an average speed of 55.0 mi/hr for 4.25 hours, what is the distance in miles (mi) traveled by the car?

Variables	Equation
Math	Answer w/ units

Appendix C - Likert-Scale Survey Following Completion of Both Assessments

I prefer completing the Race Car Post-Lab (alternative assessment) rather than taking a traditional test. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

In the alternative assessment, I enjoyed having a choice in how I explained my answers to questions 1 and 2. (how you were able to choose if you referred to the data or created diagrams) *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

In the alternative assessment, having a choice in how I completed my explanations made me feel more motivated to complete the task. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

In the alternative assessment, having a choice in how I completed my explanations made me feel more confident in my ability to do well on the task. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

In the alternative assessment, I enjoyed having the ability to use creativity with answering the "Predict!" and "Get Creative" prompts (questions 3-5). *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Overall, I enjoy being able to demonstrate my creativity/ use visuals in the science classroom to help explain my thoughts. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I feel less pressure when completing a post lab / alternative assessment project in comparison to when I am taking a test. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I feel that I learn more when completing a post lab / alternative assessment project in comparison to when I am completing a test. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree