

2023



AP[®] Research Academic Paper

Sample Student Responses and Scoring Commentary

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AP® Research Academic Paper 2023 Scoring Guidelines

The Response...				
Score of 1 Report on Existing Knowledge	Score of 2 Report on Existing Knowledge with Simplistic Use of a Research Method	Score of 3 Ineffectual Argument for a New Understanding	Score of 4 Well-Supported, Articulate Argument Conveying a New Understanding	Score of 5 Rich Analysis of a New Understanding Addressing a Gap in the Research Base
Presents an overly broad topic of inquiry.	Presents a topic of inquiry with narrowing scope or focus, that is NOT carried through either in the method or in the overall line of reasoning.	Carries the focus or scope of a topic of inquiry through the method AND overall line of reasoning, even though the focus or scope might still be narrowing.	Focuses a topic of inquiry with clear and narrow parameters, which are addressed through the method and the conclusion.	Focuses a topic of inquiry with clear and narrow parameters, which are addressed through the method and the conclusion.
Situates a topic of inquiry within a single perspective derived from scholarly works OR through a variety of perspectives derived from mostly non-scholarly works.	Situates a topic of inquiry within a single perspective derived from scholarly works OR through a variety of perspectives derived from mostly non-scholarly works.	Situates a topic of inquiry within relevant scholarly works of varying perspectives, although connections to some works may be unclear.	Explicitly connects a topic of inquiry to relevant scholarly works of varying perspectives AND logically explains how the topic of inquiry addresses a gap.	Explicitly connects a topic of inquiry to relevant scholarly works of varying perspectives AND logically explains how the topic of inquiry addresses a gap.
Describes a search and report process.	Describes a nonreplicable research method OR provides an oversimplified description of a method, with questionable alignment to the purpose of the inquiry.	Describes a reasonably replicable research method, with questionable alignment to the purpose of the inquiry.	Logically defends the alignment of a detailed, replicable research method to the purpose of the inquiry.	Logically defends the alignment of a detailed, replicable research method to the purpose of the inquiry.
Summarizes or reports existing knowledge in the field of understanding pertaining to the topic of inquiry.	Summarizes or reports existing knowledge in the field of understanding pertaining to the topic of inquiry.	Conveys a new understanding or conclusion, with an underdeveloped line of reasoning OR insufficient evidence.	Supports a new understanding or conclusion through a logically organized line of reasoning AND sufficient evidence. The limitations and/or implications, if present, of the new understanding or conclusion are oversimplified.	Justifies a new understanding or conclusion through a logical progression of inquiry choices, sufficient evidence, explanation of the limitations of the conclusion, and an explanation of the implications to the community of practice.
Generally communicates the student’s ideas, although errors in grammar, discipline-specific style, and organization distract or confuse the reader.	Generally communicates the student’s ideas, although errors in grammar, discipline-specific style, and organization distract or confuse the reader.	Competently communicates the student’s ideas, although there may be some errors in grammar, discipline-specific style, and organization.	Competently communicates the student’s ideas, although there may be some errors in grammar, discipline-specific style, and organization.	Enhances the communication of the student’s ideas through organization, use of design elements, conventions of grammar, style, mechanics, and word precision, with few to no errors.
Cites AND/OR attributes sources (in bibliography/ works cited and/or in-text), with multiple errors and/or an inconsistent use of a discipline-specific style.	Cites AND/OR attributes sources (in bibliography/ works cited and/or in-text), with multiple errors and/or an inconsistent use of a discipline-specific style.	Cites AND attributes sources, using a discipline-specific style (in both bibliography/works cited AND in-text), with few errors or inconsistencies.	Cites AND attributes sources, with a consistent use of an appropriate discipline-specific style (in both bibliography/works cited AND in-text), with few to no errors.	Cites AND attributes sources, with a consistent use of an appropriate discipline-specific style (in both bibliography/works cited AND in-text), with few to no errors.

Academic Paper

Overview

This performance task was intended to assess students' ability to conduct scholarly and responsible research and articulate an evidence-based argument that clearly communicates the conclusion, solution, or answer to their stated research question. More specifically, this performance task was intended to assess students' ability to:

- Generate a focused research question that is situated within or connected to a larger scholarly context or community;
- Explore relationships between and among multiple works representing multiple perspectives within the scholarly literature related to the topic of inquiry;
- Articulate what approach, method, or process they have chosen to use to address their research question, why they have chosen that approach to answering their question, and how they employed it;
- Develop and present their own argument, conclusion, or new understanding while acknowledging its limitations and discussing implications;
- Support their conclusion through the compilation, use, and synthesis of relevant and significant evidence generated by their research;
- Use organizational and design elements to effectively convey the paper's message;
- Consistently and accurately cite, attribute, and integrate the knowledge and work of others, while distinguishing between the student's voice and that of others;
- Generate a paper in which word choice and syntax enhance communication by adhering to established conventions of grammar, usage, and mechanics.

Introduction

A lot of us know what baseball is, MLB - Major League Baseball, has been around for about 146 years or founded around 1876. Everyone has their opinions in sports on what the hardest sports is or what the hardest task in sports is. In my opinion hitting a baseball is no doubt the hardest thing to do in all sports. A hall of fame player in the MLB fails at doing their job 7 out of 10 times let that sink in! (USA Baseball) On January 1 2018 the USA Baseball the national governing body for the sport of baseball in the United States adopted a new method for measuring bat performance in the testing of youth bats. The new USA Baseball bat standard was developed by a USA Baseball committee of scientific experts. USA bats and USSSA bats are designed for different leagues and have different specifications. USA bats are used in youth leagues that follow the USA Baseball bat standard, while USSSA bats are used in travel ball and other youth leagues that follow the USSSA bat standard. USA bats are designed to have a lower maximum exit speed, which means they have less pop and are less likely to cause injury. USSSA bats have a higher maximum exit speed and are designed for more advanced players who can handle the increased power. Ultimately, the choice between USA and USSSA bats comes down to your league's rules and your personal preferences. If you play in a USA league, you'll need a USA bat, while if you play in a USSSA league, you'll need a USSSA bat. I think the USSSA bats are a much better option for youth baseball, as a kid growing up we used USSSA bats during travel baseball and USA bats during rec league ball. To me it seems like using the USA bats take fun away from the game and causes it to be less competitive. If a kid hits the ball solid with any bat anybody on the field can get hurt which is just part of the game of baseball

Hitting is already the hardest part of Major League Baseball so why make it even harder for little kids? Since the middle of the 1960s, when metal bats were first used in youth baseball, there has been heated discussion on whether or not they should be outlawed. Comparing metal bats to wooden bats, supporters claim that metal bats offer a better balance of performance, cost, and durability. Metal bat critics contend that players gain an unfair advantage from them and that this increases the frequency of injuries among pitchers and fielders as well as increases the number of injuries overall. The debate over whether metal bats should be outlawed in youth baseball is still relevant and debatable given the possibility of damage and unequal competitiveness. USA Baseball's main reason for changing these bats is for player safety. They base this off of how hard kids were hitting the ball with the bats other wise know as the pop. (Williams) The pop, currently measured at a 1.15 Bat Performance Factor (BPF), will be restricted even further to more like a .50 BBCOR standard. BBCOR bats have a similar trampoline

effect to wood bats. Since these bats will be composite and aluminum, you should not expect perfect replicas of wood bats. Instead, sweet spots will be longer, and swing weights will be lower. The new youth bats will be no better than a wood bat in terms of dead center sweet spot hits. Barrel sizes, currently restricted to 2 1/4 in Little League, will now be allowed to reach 2 5/8. However, with bats limited to a certain pop and constrained by a low swing weight for smaller players, reaching the full 2 5/8 diameter will be an engineering feat. Expect many single piece composite bats that can reach full diameter and stay within swing-able swing weights. Although they will never state it, the fact is, "little kids" who can come shaped like men are hitting a 65 mph pitch on a bat speed of 75 mph, back to a pitcher who is standing all of 48 feet away. This can be dangerous. In a world where concussions are the new buzz word, the last thing Little League needs is for some little kid to get drilled in the brain in a championship Little League World Series game. USA Baseball has spoken out publicly that safety was not a reason for the change of bats but instead to ensure long term integrity of the game.

All of this brings me to the question how much does this change really affect the gameplay and stats of the little league players? In 2017 there were over 60 homeruns hit and the year after the rule was put in the players didnt even hit 20 home runs! In 2019 there were 9 out of the 16 teams who didnt hit a homerun. In 2017 there were on average 2 homruns per game during the LLWS. In 2018 that average dropped to 0.6 thats significantly less than the CWS - 1.23 and the MLB - 1.15. After 2018 LLWS season there were only 18 homerus in 31 games played, in 2017 60 homeruns were hit in 31 games. Younger players use USA bats because it is lighter and easier to swing. On the other hand, USSSA bats are heavier and usually used by players eligible to participate in USSSA Baseball Tournaments. The newly engineered bats also do not feature a drop-weight limit, allowing youth baseball players to use lighter-weight bats in games as well as ultimately improve their hitting abilities. Convinced with the new USABat Standards, organizations adopting it will also allow its youth players to use bats with 2 5/8 inch barrel diameter. Baseball bats that are approved by the USSSA Standards and manufactured by an approved USSSA bat manufacturer can be evidently considered USSSA Bats.

The new USA Bat rules have not affected the regulations provided by the USSSA, and hence all players willing to participate in USSSA baseball tournaments must use bats that are approved by USSSA Bat Standards. Furthermore, according to the USSSA Bat standards, the bats must have the 1.15 BPF USSSA stamp on the taper, or have the certified .50 BBCOR stamp (-3), or should be a wooden bats. In any case, the barrel diameter of the bat cannot exceed 2 3/4 inches and all bats must be manufactured by an approved USSSA bat manufacturer. (Jessey Williamson) Because of its numerous advantages, metal bats have become more popular among high school and college baseball players. Baseball balls are driven farther by metal bats because they are

lighter and faster to swing than wood bats. Furthermore, due to the larger hitting area, even if the ball is not in the “sweet spot,” it is easier to get a hit. In addition to saving money, aluminum bats are more durable than wood bats and can be used for much longer periods of time.

The fact that metal bats can hit the ball much faster and farther than wood bats is why metal bats are frequently preferred during practice. This type of bat is designed to provide a wider sweet spot, greater power, and a more satisfying feel. As a result, they are an excellent practice tool that will help players get used to the feel of the bat and how to swing it correctly.

As a result, metal bats are commonly preferred over wooden bats for both game and practice due to their advantages such as lighter weight, greater hitting area, and better performance. Furthermore, because they are more durable and cost-effective, high school and college baseball players will appreciate them more than alternatives. Baseball bats are typically made of wood. Metal bats have become popular among players looking for an edge over their wooden counterparts over the years. Metal bats are not allowed in Major League Baseball, but they can be used in some youth and amateur leagues. Metal bats are banned from Major League Baseball for a variety of reasons. Wooden bats not only provide additional safety for players and spectators, but they also provide a safe environment. If you used a metal bat, you would be able to hit a more effective pitch with it. Metal baseball bats are not permitted by Major League Baseball. Metal bats have been prohibited in both the major and minor leagues since the start of the season. As a result of the new regulations, USA Baseball has mandated that all bats be made of aluminum and that they be more similar to wood in terms of performance. Anyone who enjoys the natural characteristics of maple and ash bats is an excellent choice for bamboo bats. Minor league baseball and the National League allow the use of metal bats. Metal bats have been permitted by Major League Baseball for a variety of reasons over the years. Metal bats produce a higher volume of sound and may be more dangerous to the player’s hand than wooden bats. When bats are made of aluminum, the ball comes off the bat faster, making it more difficult for pitchers and fielders to react. The use of aluminum bats in high school, college, and little league ball is a contentious issue due to safety concerns. Because aluminum bats have the ability to travel much faster than wood bats, players can hit the ball much harder, potentially resulting in serious injuries to pitchers and fielders. Furthermore, aluminum bats are lighter than wooden bats, making them easier to swing and increasing the speed of a bat when it is struck by a ball.

As a result, Major League Baseball has chosen to uphold tradition while also maintaining the integrity of the game by using wood bats. Despite the fact that aluminum bats can be entertaining for fans, MLB has decided that they pose a threat to pitchers and fielders. Wooden bats are the most appropriate tool for the league because they allow for the best possible game experience. Baseball has traditionally used wood bats to great effect because they are more practical. Wooden bats are classic in appearance and feel, but they can break, resulting in teams running out of bats in games. "I remember when we were playing here," recalled former baseball coach Joe Valesente, "we had two large bags of wooden bats, and we cracked a lot of them." As a result, aluminum and composite bats are now the norm in the game. Composite bats have greater performance than aluminum bats but also pose a risk of cracking and a higher price tag. Bats made of aluminum are less expensive, but they may not be as powerful as those made of composite materials. Both types of bats can be used to play the game; however, it is critical to understand the advantages and disadvantages of each before deciding which one to use. The debate over which type of bat is appropriate in professional baseball has been going on for a long time, with the major leagues requiring wooden bats for player safety reasons. College baseball, and high school baseball all use aluminum bats, but they are illegal in the major leagues. This is due to the increased speed of bats exiting, which can cause more serious injuries if metal bats are allowed.

It is much safer for infielders to use wooden bats because they can react faster to balls that leave the bat at a lower speed. Furthermore, because they are much cheaper to manufacture, they can be easily replaced if a player breaks one. Vladimir Guerrero JR., for example, only uses wooden bats to slow the ball down so that players and fans are not thrown into a potentially dangerous situation.

In conclusion, professional baseball players use wooden bats for safety rather than aluminum bats, which are illegal in major league baseball. This allows players and fans to be protected from an increased bat exit speed as well as to be more easily replaced when bats break. (Daniel A Russell) aluminum bats have a greater impact on wood bats. Because aluminum is a hard material with a high elasticity and few give properties, little of the ball's initial kinetic energy is converted to energy as it is permanently deformed. As a result, the force of the ball is distributed more effectively, allowing it to travel further than if it were made of wood.

Metal bats, due to their higher exit speed, are not permitted in professional baseball. Metal bats are prohibited as a result, as they provide players with an unfair advantage.

Metal bats, as opposed to wooden bats, have a higher exit speed, which gives the user an advantage

Since USA bats are made to be no better than wood bats I found a project by Skylar T. Frantz at the California State Science Fair, after 25 trials of hitting baseballs with wood and aluminum bats using a pendulum. The aluminum base ball shortest distance was 4.64 meters, farthest distance was 7.59 meters which accounted for a average distance of 6.55 meters. Wooden baseball bat shortest distance was 3.67 meters, farthest distance was 6.98 which accounted for a average distance of 4.84. Aluminum and wooden bats behave quite differently when they strike a ball. Both types of bats vibrate at the moment of impact, but wooden bats do so in one direction only -- along their length. These low-frequency bending vibrations dissipate much of the energy associated with the bat-ball collision, which means wooden bats don't return as much energy to the ball.

Aluminum bats vibrate in two directions -- along their length and radially as the metal shell squeezes in and then contracts out. This second class of vibrations occurs in a set of frequencies known as hoop modes. The fundamental frequency, or first hoop mode, acts like a spring during collision, compressing in and then expanding out and returning a large amount of energy to the ball. This "trampoline effect" is another reason why aluminum bats lead to higher batted ball speeds.

Solution One controversial idea is simple enough. Move the fences back to their original distance of 205 feet (down from 225). More than a few kids have destroyed the ball this year, with a swing and trajectory that deserve a home run, but still fall 10 or 15 feet short. In 2006 Williamsport had the fences in at 205 and moved them out because of too many home runs and a game that didn't allow for extra-base hits (that weren't home runs). Now, the bat standard made dingers in the big dance a fantasy for 96% of players who make it to Williamsport. If we move the fences back in, we take away extra-base hits, and if we keep it out, we remove one of the best parts of the game for Little Leaguers. Isn't there a happy medium around 210? Comparing bats is no easy task. Too many pseudo-scientists in the blog-sphere put together some type of exit speed test and think they've cracked the code. But comparing one bat to another is anything but apples to apple comparison even if you can control for things like swing speed, hitter confidence, and ball type.

Swing weight, something you can't easily control for (because swing weights are hard to find) dramatically changes results. To say nothing of the fact that you can't find a single bat that is representative of the whole. Who's to say, for example, that Easton's Ghost in USSSA is the same level of the bat as the USA Version. Below is a experiment done by a 10 year old and the results from the experiment The Exit Velocity was measured for 20 Hits of the Tee for each bat.

After looking at the average exit speed for each bat, the USSSA Bat produced an exit speed that was 3.4 MPH higher than the USABat. However, when we looked at the Maximum Carry Distance the USABat hit the ball 10.5 Feet farther than the USSSA Bat.

(Benny Rodriguez) All swings were taken of the tee by a 10 yr old. The two tests in the experiment were counter-balanced. Which consisted of eight blocks of 5-swings done in the following order ABBA BAAB.

- Swings with the USSSA bat were letter 'A',
- Swings with the USABat were letter 'B'.
- 40 total swings were completed in the experiment, 20 per test.
- The USSSA bat produced higher ball exit velocity (on average 3.4 MPH higher).
- There was only a 1.3 MPH difference between the maximum exit velocity produced by the two bats (USSSA- 51.7 MPH & USABat-50.4 MPH).
- The USABat produce a longer (maximum) carry distance by 10.5 Feet (USSSA-114.8 Feet & USABat 125.3 Feet). We thin this can be attributed to the larger barrel size helping getting to a better contact with the ball.

according to the experiment data, it looks like the USSSA bat holds the performance edge when it comes to Ball Exit Speed, almost a 3.4-MPH difference. Now, this data doesn't mean that EVERY USABat will under-perform a USSSA bat, it just means you need to tinker with more bat and test to find out.

Conclusion

To test my research question "How does the change in bats from USSSA to USA in the LLWS affect the average distance hoomeruns were hit. I am going to use a Tanner TEE The Original Premium Pro-Style. I will hit 10 diamond baseball of the tee with a USA bat and a USSSA bat. The tee will be at the same height for every ball that is hit. To keep the research as equal as possible I will make sure I hit 10 homeruns with each bat according to LLWS dimensions. I will have another person in the outfield setting a

marker down according to where each ball lands that I hit off the Tee. After I hit 10 homeruns with one of the bats I will use a distance finder/tape measure to measure from home plate to each of the markers. I will then repeat the process for the other bat. After finding the distances I will combine them for each bat to find the average distance each home run was hit in feet. Then I will compare the averages and find the difference between the average distance each bat hit the ball. The USSSA bat I will be using is Marucci CAT6 GEN 2 and the USA bat I will be using is the Easton Ghost X. Here is what I found after I tested my question. The average ball I hit with the USSSA Ghost X traveled 262 feet and the average distance the ball traveled with the Marucci CAT6 GEN 2 was 278 feet. In conclusion the ball hit with the USSSA bat traveled 15.8 feet further than the balls hit with the USA bat. The ball came off of the USSSA bat alot harder than it came off of the USA bat during my experiment. The farthest ball I hit with the USA bat was 284 feet wich was just a little over the average distance the ball was hit with the USSSA bat. The USSSA bat outdid the USA bat in every category and should be brought back into the LLWS as there is no proof that the injury rate has increased when using USSSA bats.

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Academic Paper

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Sample: G

Score: 2

This paper earned a score of 2. Initially, the paper presents the research objective: “All of this brings me to the question how much does this [use of either USA or USSSA bat] change really affect the gameplay and stats of the little league players?” (page 2). This is slightly narrowed to the research question presented on page 6: “How does the change in bats from USSSA to USA in the LLWS affect the average distance hoome runs [*sic*] were hit [?]” The paper reviews concepts relevant to this topic throughout, starting with distinguishing between USA and USSSA bats on pages 1–2, how these different bats can affect game statistics in different leagues on page 2 (e.g., Little League World Series, Major League Baseball, Club World Series), and USA vs. USSSA bat performance and safety issues on pages 2–5. Throughout this discussion, only nonscholarly sources are used.

This paper did not earn a score of 1 because the topic, while narrowing from the research objective to the research question mentioned above, is not overly broad. The paper describes a reasonably replicable research method, hitting 10 home runs each with USA and USSSA bats and comparing the mean distance the ball traveled from each of these types of bats. The paper shows evidence of an attempted use of this method, evidenced by the following: “The average ball I hit with the USSSA Ghost X traveled 262 feet and the average distance the ball traveled with the Marruci CAT6 GEN 2 was 278 feet (page 7).”

This paper did not earn a score of 3 for a couple of reasons. First, although there is a reasonably replicable research method presented, comparing the mean distance the ball travels from USA and USSSA bats is overly simplistic. Second, the student performs this method and collects data, presented on page 7, but these results are already known to the student from their review of sources on this topic throughout the paper, especially on pages 1–2. Therefore, the new understanding presented in the paper does not emerge from student-generated data. This is a report on existing knowledge with simplistic use of a research method.