Chief Reader Report on Student Responses:

2025 AP® Research Free-Response Questions

- Number of Students Scored 43,554
- Number of Readers 962
- Score Distribution

Exam Score	N	%At
5	6,426	14.8
4	12,222	28.1
3	19,877	45.6
2	4,024	9.2
1	1,005	2.3

- Global Mean 3.44

The following comments on the 2025 free-response questions for AP® Research were written by the Chief Reader, Kellee J. Kirkpatrick (Ph.D., Senior Research Fellow, Institute for Science, Technology, and Public Policy, Texas A&M). They give an overview of each free-response question and of how students performed on the question, including typical student errors. General comments regarding the skills and content that students frequently have the most problems with are included. Some suggestions for improving student preparation in these areas are also provided. Teachers are encouraged to attend a College Board workshop to learn strategies for improving student performance in specific areas.

Task: Academic Paper
Topic: Varies by student
Max Score: 10
Mean Score: 6.49

What were the responses to this performance task expected to demonstrate?

This performance task was intended to assess students' ability to conduct scholarly and responsible research and develop an evidence-based argument that clearly communicates a conclusion or new understanding stemming from a clearly articulated research question or project goal. 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 its implications to a larger community of practice;
- 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.

How well did the responses address the course content related to this question? How well did the responses integrate the skill(s) required on this question?

NOTE: The holistic rubric focuses on the following italicized course proficiencies. The bulleted list below illustrates how students demonstrated **strengths** with these proficiencies. Comparing Reader survey results from the 2025 AP Research Reading to surveys from previous readings (2024, 2023, and 2022) we can see there is strong consistency in students' ability to demonstrate that they have understood and are capable of realizing the basic expectations of the required 4000-5000-word research paper. There are also a number of areas in which student responses demonstrate a nuanced understanding of several elements of the performance task and have shown improvement from year to year.

- Overall, most students continue to demonstrate familiarity with and an ability to realize the core expectations of the academic paper. Most students also demonstrate reasonable proficiency in application of the course's skills, regardless of the discipline or methodology addressed within the student's research project. This is evidenced by a growing number of students earning a score of 3 or higher.
- In ***Understanding and Analyzing Context***, most students continue to develop appropriately clear and narrow research questions or project goals that might reasonably be addressed by a first-year undergraduate researcher, and many readers again noted that students are demonstrating creativity by pursuing a wide variety of inquiry topics this year. Most students were able to carry their focused topic of inquiry throughout the entirety of their

paper, even if that topic might still have been narrowing. Most students were able to situate their inquiry topic in relation to previous scholarly findings and arguments. Most students identified a scholarly gap to be filled by the student's research. Most students organized their literature reviews in such a way as to clearly clarify the gap to be filled by the student's research.

- In ***Understanding and Analyzing Arguments***, most students were able to review scholarly literature relevant to their inquiry. Most students were able to critically analyze scholarly work, and most were able to summarize multiple perspectives within the relevant scholarly literature on their research question or topic of inquiry. Most students developed literature reviews that placed relevant, scholarly sources into conversation with each other in order to clarify a research gap in the existing literature, even though there may have been varying levels of sophistication in demonstrating this skill.

- In ***Evaluating Sources and Evidence***, readers noted that students mostly drew upon credible and relevant sources, both scholarly and authoritative, in situating their question within a larger context. Further, most students were able to use those relevant sources to develop their arguments.

- In ***Research Design***, most students demonstrated an understanding of the need for a systematic method or approach to address their research question or project goal. In general, students were able to choose a research method aligned with their specific research question, and were able to explain, in basic ways, why (or how) the chosen research method would address the student's research question. Readers overwhelmingly noted that most students were also able to follow the steps of the chosen method correctly and systematically, and to provide enough detail about this method to suggest that process could be reasonably replicated. Most students continue to indicate a clear understanding of different types of data (e.g., quantitative and qualitative) generated by different research methods, and many readers indicated that this was a notable strength among the papers at the reading. Readers also noted that most students seem to understand that content and meta-analyses cannot be successfully pursued simply by presenting a second literature review. Most students were able to recognize and acknowledge the inherent limitations of a chosen method, and most indicated that they were additionally able to recognize and acknowledge limitations in their own use of this method in conducting research. Readers noted that most students acceptably addressed ethical considerations, and many readers noted this was a notable strength among student papers in this reading. Readers also indicated that most students showed a clear understanding sample selection and procedures for collecting data. Of those students who employed surveys as their research method, some demonstrated that surveys were the most appropriate means of answering the research method. Most employed questions (and response options) that aligned with the research question, and most sampled from an appropriate population given the research question or topic of inquiry.

- In ***Establishing* (Their Own) *Argument***, readers again noted that most students acceptably demonstrated these skills. For instance, most students stated a clear argument or claim. Most students acknowledged the limitations of their ability to extrapolate conclusions from their evidence, and most were also able to recognize and acknowledge the limitations of these conclusions. Most were able to synthesize the results of their research to elaborate on a new understanding, and most were able to discuss the practical implications of the research findings. Many students discussed how the research findings expand upon or relate to what is already known in the discipline, with most readers responding that this skill was acceptably demonstrated.

- In ***Selecting and Using Evidence***, reader responses suggest that this is one of the strongest areas of student achievement. Nearly all readers indicated that most students continue to provide evidence relevant to the topic of inquiry and that most were able to present evidence in a format typical of the discipline of inquiry. Most students clearly described how their research findings relate back to the research question, and most included tables, figures, or charts that effectively displayed key findings. Most students were able to support their conclusions using relevant and sufficient evidence from their own research. Most students were able to conduct appropriate statistical analyses when applicable, and most were able to describe statistical analyses correctly when applicable.

- In ***Engaging the Audience***, reader responses, again, suggest that this is a notable area of strength for most students. For instance, most students continue to write in a style that is easily accessible to an educated, non-specialist reader. Readers also noted that most students wrote in a manner that clearly communicated their ideas,

and most also wrote in a manner that enhanced reader engagement. Most students constructed and organized their papers in a manner that allowed the reader to follow the argument, the application of research method, and the examination of the evidence. Most students clearly organized the paper's sections, headings, and visuals. Again, readers consistently rated the skills in this section as acceptably demonstrated and many indicated that these skills were a notable strength in student papers this reading. and once again many students did this exceptionally well.

- In ***Applying Conventions***, readers indicated that most students followed the conventions of a discipline-specific style throughout their paper, and most adhered to established conventions of grammar usage and mechanics. Most consistently cited sources to support their arguments, and most used an appropriate citation style. Most students attended to ethical concerns relevant to the topic of inquiry or method of data collection. Although not addressed in previous year's reader response surveys, readers this year overwhelmingly indicated that most student papers appropriately and responsibly used AI tools.

What common student misconceptions or gaps in knowledge were seen on this question?

- Broadly speaking, students continue to demonstrate familiarity with the fundamental components and mechanics of the academic research paper as reflected within the task requirements of the course and elaborated within the academic paper rubric. However, the ability to demonstrate achievement of higher-level research skills continues to elude many students who find it more difficult to grasp and engage in the larger context within which their research is being conducted. For example, many students do not thoroughly discuss why they chose one research method over another, do not emphasize or highlight certain research findings over others (especially those most important to their research question), or do not expand upon the value or significance of their project within the community of practice. Rather, students often seem to see their research as a stand-alone project and forget to show how their research is part of a larger scholarly discussion. This "meta" level of awareness is required in order for a researcher to be able to review, summarize, and synthesize the existing scholarly literature in order to explain how the student's own inquiry process addresses a gap in existing research. It is required to relate their research findings and new understanding back to what is already known in the discipline. Finally, this broader awareness is required to understand and explain the inherent limitations and larger implications of the inquiry process. As a result, many papers are still able to pose interesting and original research questions, but they hold themselves back from a higher score because they do not complete a review of the existing literature that reveals an original and productive new avenue ('gap") for further investigation. This then leads to poor alignment of the research question with an appropriate research method, an incomplete explanation/analysis of collected data, and/or inadequate consideration of the importance of the question, process, and new understanding in relation to the existing field of inquiry. As evidenced by the scores, most students are able to conduct basic research with most of the key components of a typical research project from their chosen disciplinary field. Each year, we see more and more students engaging in the "meta" level awareness of how their research fits in the broader context, but this is the main area where students can improve. One will notice that the results of the reader survey are quite similar to previous years' results.

- In ***Understanding and Analyzing Context***, while overall students' papers generally posed specific and thoughtful questions, a few students developed overly broad topics that did not lend themselves to a feasible inquiry process or were not appropriate to the student's level of expertise. Some students did not present a clear and narrow question at the outset of their paper but rather continued to narrow their topics during the course of their discussion, making it difficult to identify a narrow research gap leading to a meaningful new understanding. As such, some student papers identified a gap of convenience (for example, a local student population at the researcher's high school), rather than a gap based in the literature. Many readers noted that identifying a gap based in scholarly literature was a notable weakness among student papers. Some students used their research to answer a question different than the one originally posed, or they posed several questions at the outset and only answered a portion of the questions posed, leading to misalignment between the results and research question(s). Some students seem to have spent considerable time developing a narrow and interesting question but then pursued a seemingly feasible and replicable yet inappropriate means of answering that question (such as a survey). Many students hyperbolically asserted rather than demonstrated that a knowledge gap existed in

the field of inquiry, and many did not organize their literature review in a manner conducive to logically revealing a true gap in the scholarly conversation that might then spark interesting and relevant new research.

- In ***Understanding and Analyzing Arguments***, some students did not firmly establish their research in relation to the existing scholarly literature, and while many students seem increasingly comfortable with the process of identifying and using scholarly sources, some rely heavily on non-scholarly sources such as blogs and magazine articles, and some seem not to understand the distinction between scholarly and non-scholarly sources, especially when pursuing research in fields such as sports, media, or music. While the inclusion of authoritative sources is appropriate, it should not be at the expense of scholarly sources. Some students include scholarly sources, but in insufficient numbers to sufficiently support their own scholarship. Many papers discussed multiple works in their review of the literature but did not explicitly relate these works to one another or to their own argument, and some students reviewed but did not synthesize scholarly sources, suggesting that these students inadequately grasped the distinctions between an annotated bibliography and an integrated and productive literature review, making an argument for their own research. This in turn compromised the ability of these students to identify themes and strengths/weaknesses across multiple sources, arguments, and methodological approaches within the larger conversation in order to reveal a productive gap in the existing literature and a suitable method for investigation.

- In ***Evaluating Sources and Evidence***, some students relied heavily on sources that were less than relevant or credible given the context of their inquiry, and some needed to devote more attention to sifting through evidence and excluding evidence that is less relevant to the research question.

- In ***Research Design***, while most students clearly identified which method or approach they were using, and provided enough detail about their chosen method as to render it reasonably replicable, many chose to pursue a research method that was not clearly aligned with the specific research question, and a great many were unable to adequately defend their particular choice of method in relation to other available options. In fact, many readers noted the two previous skills as a notable weakness among the papers they scored during the reading. Many students seemed to allow their chosen method to drive their inquiry process, rather than having their choice of method flow from their narrowed research question or project goal. While most students are demonstrating an ability to employ common research methods correctly, some students seem to remain insufficiently knowledgeable about the range of methods available to them, and many who attempt to employ content analysis and meta-analysis lack sufficient understanding as to the correct and appropriate means of conducting these forms of research.

  To this end, surveys still remain the most frequently used research method of AP Research students, but also the most regularly misapplied and misaligned. In fact, most readers overwhelmingly noted that surveys were used when not appropriate for the research question. Most students who included surveys this year (and in past years) were unable to clearly and convincingly defend their use of this method as the most appropriate means of answering their research question, and many failed to include questions (and response options) that clearly aligned with the research question. A great many students who used surveys did not sample from an appropriate population given the topic of inquiry, and most failed to employ validated survey measure, if available. Many students also seemed unfamiliar with tools and methods of statistical analysis required to accurately analyze and draw conclusions from survey results. It seems that a great many students who choose to use a survey rely on them to (1) conveniently gather data, and (2) fill a gap of convenience rather than to address a meaningful question or approach suggested by but not addressed within the existing literature. In so doing, they allowed their choice of a survey as a research method as a pragmatic mechanism to drive (rather than inform) the inquiry process.

  Some students inadequately signal that they sufficiently attended to potential ethical concerns when conducting research on human or animal subjects. Some students who worked with human subjects did not indicate that they had pursued institutional review board or teacher authorization, nor did they have sections in their papers that addressed ethical issues and explained how risks to subjects either had been minimized or avoided. Some students conducting surveys or interviews asked questions that were ethically problematic. In addition to the treatment of human and animal subjects, many students did not address ethical and responsible conduct of research in terms of protecting the environment, research materials (original documents, etc.), or themselves

(safety protocols). Discussing all aspects of the research method, including ethical, responsible, and safety consideration leads to a poorly defended research method that may not be reasonably replicable.

- In ***Establishing (Their Own) Argument***, many students were unable to clearly and effectively articulate a synthesis of the results of their research to support a new understanding, and indeed most students inadequately or hyperbolically discussed how their research findings extend upon or relate to what is already known in the discipline. Many discussions of conclusions and new understandings were hyperbolic, given the limitations of data and research (e.g., small sample size, insufficient data analyzed/coded). A great many students inadequately or only superficially recognized and acknowledged the limitations and implications of their research. In fact, readers noted this was a notable weakness among papers in this year's reading. When discussing the limitations of their study, many students continued to focus on practical hindrances (e.g. available time and resources) rather than the inherent limitations of a question, method, application of method, and especially their conclusion or new understanding. Again, readers said this was a notable weakness among papers. Here students seem to be undervaluing the importance and misunderstanding the purpose of broader reflective analysis within the scope of the inquiry process and continue to be challenged by the more meta-cognitive demands of the academic paper task description.

- In ***Selecting and Using Evidence***, most papers that utilized surveys failed to convincingly demonstrate that this was the best aligned method in relation to the purpose of inquiry, many engaged convenience sampling, and many lacked enough responses to support a convincing argument. Some students were unable to synthesize the results of their inquiry process convincingly in relation to their original research question, and many insufficiently elaborated the new understanding gained from the inquiry process. Many students continue to misunderstand the proper use of statistics, and misapply related concepts such as mean value, standard deviation, and t-test. Some students assumed their data would speak for itself or expected the reader to draw their own connections and conclusions, instead of explaining the meaning and significance of all presented data in relation to the research question or topic of inquiry, and clearly analyzing the data in a way that logically defended the new understanding.

- In ***Engaging the Audience***, many students continue to over rely on the convenience of automatically generated charts and graphs, especially those generated from Google Forms, rather than creating an original presentation of data that might speak more directly to their own research and encourage clear and detailed communication of relevant information. Furthermore, many of these graphs lacked clear labeling or were simply dropped into the paper without referencing them in the prose. This forced readers to imply context and thus detracted from audience engagement and communication. Some papers included a large amount of data that would be presented more effectively if culled and provided with a greater sense of context relative to the developing argument. For instance, a student paper may report on the gender distribution among survey respondents but did not make clear why that might matter in answering the research question. Many students did not label images, tables, graphs, or figures clearly, appropriately, or in sufficient detail (e.g. non-labelled axes). A few papers failed to include graphs in statistical analyses when appropriate.

- In ***Applying Conventions***, some students inadequately considered or failed to discuss the ethical implications of their research, including impact on human and animal subjects, harm to the environment, harm to research materials, or harm to self. Some students did not properly or consistently cite and reference sources as per style guidelines. Some students cited only non-scholarly sources, and many papers included only a few scholarly sources. Some students incorrectly formatted bibliographic information and in-text citations. Some students engaged in sloppy scholarship, though few engaged in overt plagiarism or improperly employed AI-generated content. A few students did not adequately proofread their papers and/or did not correct errors of grammar, style, or mechanics that interfered with communication. Some students communicated in a manner that clearly communicated their ideas but did not enhance the reader's engagement with the paper's flow of argumentation. Some students continue to submit papers well over the 5,000-word limit, detracting from clear and succinct communication of the students' ideas, and at times preventing students from receiving full credit for their efforts. As readers are instructed to read to 5,500 words, writing well above the 5,000-word limit is detrimental to a student's overall score.

Based on your experience at the AP® Reading with student responses, what advice would you offer teachers to help them improve student performance on the exam?

- ***Overall:*** Teachers continue to do an exceptional job in helping students move from understanding the basic concepts of scholarly research to executing an original research paper using an explicit method or approach. Students have a good understanding of how to take the skills learned in AP Seminar and how to then apply them in a substantively different way in AP Research. Teachers can help students facilitate this important skill transfer by continuing to emphasize how the writing, argumentation, and research tasks in AP Research build upon, but ultimately differ from, those developed in AP Seminar, thus requiring different strategies. For example, an annotated bibliography can prove very useful to the research process, but an annotated bibliography is substantially different in both form and purpose from a literature review required within an AP Research paper. As such, students will benefit from understanding that they must build upon and expand the skills learned in AP Seminar in order to complete a successful AP Research project.

- ***Review the Rubric:*** While there is much diversity in the years of experience of our AP Research teachers, all teachers of the course can benefit from establishing (or reestablishing) a strong relationship with the rubric prior to teaching the course each school year. The language of the rubric is clear but does require careful study. For instance, look at the connecting words (AND, OR) to ensure that you and the students understand what is required based on the rubric. Furthermore, zoom out and look at the description of each score in the top row of the rubric. This is important because, while there are defined rows of the rubric, papers are scored holistically, and the descriptors in that top row can help teachers and students to think of their papers in a holistic manner. As teachers develop a strong relationship with rubric, so too should the students. If students can use the language of the rubric to help guide their thinking about their own work and their peers' projects, it can help them to make sure their own projects meet the rubric's expectations. Have students score sample papers, or peers' papers, using the rubric, so that they better understand the difference across scores, as well as the different components of each score. However, also make sure students understand that in order to achieve a particular holistic score, they must address the substance and not simply the terms in the rubric. In other words, students must demonstrate their understanding of required paper element by applying that particular element to their work. Therefore, students need to actively demonstrate the concept rather than simply use the words of the rubric. For example, a student should not merely "state" they have a gap, but they should, using appropriate literature, demonstrate how a gap exists in the literature. This is one of many examples where knowledge of the rubric language differs from understanding what the rubric requires from student work in order to achieve a particular score. In other words, to achieve the related holistic score, it is insufficient to simply mention the concept, or to assert that one has applied it. Rather, the student must demonstrate that the concept or required element has been applied purposefully, within the context of the specific research project.

- ***Process:*** It is very important that students understand that research is an iterative and recursive process that requires time, reflection, problem solving, and revision. Research is almost never linear and approaching it in such a way will often lead to misalignment. In other words, students should not complete each section in isolation. For example, a student may settle upon a topic of inquiry but have to revise and refine the research question as they dig further into the existing literature. Or a student may have a research method in mind but may have to change course based on the available data. Additionally, students should understand that the research process is a social and community-based endeavor, where researchers are in conversation with other scholars, and they can learn from (and find inspiration in) each other's comments, ideas, and findings. Students should learn to recognize that research builds a collective body of knowledge, and that ideas for further paths of inquiry (as well as potential research methods within a discipline) may be found by carefully reviewing prior research with a particular field. Because the process often requires reflection and revision, students should leave plenty of time for this natural process to unfold. Teachers can encourage students by letting them know that it is a normal part of the research process to have to retool and revise and let them know not to be discouraged by perceived setbacks. This is the process of research.

- ***PReP:*** Encourage students to use the Process and Reflection Portfolio (PReP) to document and reflect upon the process, and to help stimulate their own creative thinking. Use the PReP to make that process visible and

transparent, to prompt student reflection, to enable you to provide both positive and constructive feedback, and to help verify the ongoing authenticity of student work.

- ***Peers:*** Encourage students to find peers to share ideas and drafts with. Utilize peer review early and often. This allows project development and writing to go through iterations, rather than be constructed in sections without revisiting them as students add to their papers. It also provides students with an opportunity to identify alignment issues early in the process. Peer review gives students valuable experience as presenters and as consumers of others' scholarly work. It also emphasizes the idea that research is an iterative and recursive process.

- ***Expert advisors:*** Encourage students to find expert advisors with whom to discuss their projects, and to help students ensure they perform research appropriate to the field. Also encourage students to discuss their limitations and conclusions with an expert advisor. Keep in mind that different expert advisors might be useful for different parts of the research process. Also know that expert advisors come in many forms including professionals in the field as well as academic researchers. Some teachers have noted that University faculty are often busy or sometime non-responsive. An advanced graduate student can also be a valuable resource as they are often conducting their own research and building expertise in a field.

- ***Higher Education Institutions:*** Endeavor to establish relationships with nearby colleges or universities. There are a variety of resources these institutions could provide. For instance, all research institutions have an Institutional Review Board (IRB) that address research proposals that involve human and animal research. The chairs of these boards generally have a wealth of information on the importance of IRBs in addressing the challenges and risks of human and animal subjects research, and the chairs can likely point out a variety of resources. Building these relationships may also help you to establish research connections and maybe even open access to university databases. Furthermore, Research Librarians at Universities are a wealth of information. They often compile and publish online a variety of different library guides. Larger institutions may have multiple Research Librarians who specialize in one or more subjects that can provide discipline specific advice on databases. Some even offer online and live workshops on how to best utilize library resources. Building a relationship with local Universities may also prove to be a good way to find expert advisers, oral defense panelists, and even venues for viewing or presenting student research. Contacting the Office for Undergraduate Research (or similarly named) might yield additional opportunities. Also encourage students to review university faculty web pages to see who might be conducting research in their area. Many faculty have research or lab websites that may provide students with an avenue to derive productive feedback for their project.

- ***Topics:*** Continue to encourage creative topics especially in the humanities, arts, engineering, and technology as the curriculum of AP Research is broad and comprehensive enough to accommodate work in any discipline. Remind students that in doing such projects they need to be explicit about their method, approach, and process. Encourage students to read widely within their chosen area of interest before choosing their research question to narrow their topic more effectively and to more clearly identify whether and to what degree a gap in our understanding exists. Remind students that once they choose a broad topic, there are many angles from which to approach the topic. For example, if a student is interested in clean water, it can be viewed from a historical perspective, a social perspective, a policy perspective, a science perspective, and engineering perspective, and so on. Finally, encourage students to pick a topic they are passionate about as they will be spending a significant amount of time working in this area.

- ***Research Questions:*** A well-developed, precise, and focused research question is a key component of the success of a student research paper. The question must be narrow enough to answer in a 4,000-to-5,000-word paper. Overly broad research questions often lead to misalignment as the student can't possibly answer such a broad question in one paper. It is important to remember that research involves a process of discovery, and as such, research questions are inevitably adjusted and narrowed during the course of the research process. Students are expected to have sufficiently narrowed their research question *before* writing write the paper, and the reader should not be seeing the question changing or narrowing during the course of a paper. Remind students that all elements of the research paper should relate to the research question and should speak back to their argument. Remind them to state their research question clearly and consistently, and to do so early in the

paper, to help the reader understand the direction and focus of the research project. Consider asking students to regularly update or reflect upon their research questions in their Process and Reflection Portfolios (PRePs). One suggestion is to have students write their research question on a note card and reflect on that note card during the entire process of the research paper. Keeping the research question front and center can help a student to make sure that each part of the paper is aligned with the research question, and if the research question needs to be adjusted based on new information from the literature, the research question can be updated in real time.

- ***Audience:*** Remind students to write as if the audience for their papers is an intelligent reader but is not an expert in their specific field of research. As such, students must ensure that they clearly convey their research question or project goal, the appropriateness of their chosen research method, the importance of their research findings, and the implications of their research. It is not the reader's job to infer any of this from the paper. Rather, it is the student's job to be clear and explicit. Therefore, students should avoid jargon as much as possible and also define all discipline specific terms. Also remind students that there is no guarantee (and it is actually unlikely) that their paper will be scored by an expert in that field, making it all the more important to write clearly and explicitly for an intelligent, non-expert reader.

- ***Abstracts:*** Remind students that abstracts may be useful organizational tools and may be an expected convention in certain academic fields, but that they will not be read or scored as part of the final paper. Therefore, have students verify that anything that appears in the abstract (if they choose to write one) also appears in the appropriate place in the body of the paper. Encourage students who want to write abstracts to do so after their papers are fully complete, and to do so as a summary of the paper, so that no new information, not already in the body of the paper, shows up in the abstract. Some student papers have made the mistake of including important information in the abstract but not including in the body of the paper.

- ***Introduction:*** It may be helpful to encourage your student to write their introduction last, or at least to revise the introduction at the end of the research process to clearly identify the question that guides the project and to situate the question within the broader context of the research paper. Remind students that introductions need to avoid overly broad generalizations and should also be informed by sources and evidence. Remind them that statements of fact or argument need to be cited, even within an introduction. Remind students that research yields new understanding incrementally, and that researchers increase their credibility by making reasonable, moderate claims. Hyperbolic language suggesting the importance or novelty of the research endeavor tends to suggest an inadequate appreciation of context and should be discouraged.

- ***Scholarly Sources:*** Review the distinctions between scholarly and non-scholarly sources as clarified in AP Seminar to help scaffold work in AP Research. Compare examples of scholarly and non-scholarly sources that address the same topic. Remind students that they should be including multiple scholarly sources in their AP Research papers in order to adequately situate and support their own research. With that being said, there are a variety of non-scholarly, but authoritative sources within a field that can help give context. Students are encouraged to incorporate authoritative sources in their papers, but not at the expense of scholarly sources. If students are struggling to find scholarly sources, advise them to reconsider their search terms (including synonyms) and strategies. Research librarians at higher education institutions can be a valuable resource for students in identifying scholarly sources.

- ***Literature Reviews & Establishing a "Gap":*** A well-done literature is most likely the most difficult part of any research project. Students often make two types of mistakes when writing a literature review. The first mistake is they think they must discuss all information on a topic and do not curate the literature review to develop an argument. The second mistake is the exact opposite, and they only discuss one or two articles, leaving out the broader context. Remind your students that the purpose of the literature review is to discuss pervious scholarship and to use that scholarship to develop an argument for why the current research is incomplete (the gap) and to set up expectations for what the student might find in their particular study based on what is already known. In order to address these two mistakes, show students examples of literature reviews from published works or from previous years' student papers to help them understand how researchers review the literature in a way that suggests a debate or illustrates a gap in our collective understanding. Remind students of the differences between an annotated bibliography and a literature review, and in particular the crucial roles played by a literature review in synthesizing but also noting various themes and trends in prior research, suggesting various

research methods that might be adopted, adapted, or rejected in the current inquiry, and ultimately identifying a gap in the existing literature that the current inquiry hopes to address. Discuss the need to explicitly identify a gap in the literature through analysis, rather than mere assertion. Ensure that students understand that identifying a gap in the literature is not meant to justify a predetermined convenient research method, such as a survey of peers. It seems from reading some student papers that the literature review is viewed as performative, or rather a box to check to move on to the next part of the research process as they many have been rather short and very underdeveloped. However, the literature review is the key to the success of the rest of the paper. The literature review suggests a gap in our knowledge, which leads to a well-developed research question that attempts to fill that gap. The literature review can then help inform the choice of an appropriate research method and shape what the students expect to find in their own research. Finally, the literature review helps put the research findings into context as a student cannot possibly know the value (implications) of the research without evaluating what is already known. A strong literature review is the first step in a student earning a high score on an AP Research paper.

- ***Database Searches:*** Help students consider database search strategies, as well as alternative database options. Spend time helping students conduct database searches and teach them that though they may not find articles that relate directly to their topic, they will find sources that relate closely. Consider encouraging them to access databases or to consult with research librarians at local institutions of higher education early in the process. Having students map out their searches on paper before ever going to a database can be useful. Have students devise a list key terms for their searches and then also list out as many synonyms for their key terms as they can. Most databases will have an advanced search option and having them utilize synonyms and Boolean search terms (and, or, not), can help their searches yield more, and more precise, results.

- ***Alignment:*** Teachers should spend ample time discussing the need for alignment throughout the research study. When a research method is insufficiently aligned with the question being asked, the evidence collected cannot actually answer that question. Alignment is an issue to be attended to throughout the study, but misalignment most frequently students draw conclusions that do not relate to the inquiry approach used, the literature evaluated, or even the question asked. Alignment should be reviewed regularly and reassessed at every step of the research process. Teachers should consider reviewing example papers with students, highlighting alignment or problems with alignment in those examples. Another method to help students to consider whether their alignment is to have students map or outline their research on paper. Have students map the research question, then draw lines to the various themes in the literature review, then to the methods, and then to the conclusions. Ask the students to evaluate whether the connecting lines logically flow from one to the next. Finally does the conclusion answer the research question. Students sometimes lose the “through line” of their project in the prose. Having them map it out can help them to see where the alignment is lost or where the logic fails.

- ***Research Design:*** Remind students that they need to clearly explain which research design, method of analysis, or approach they have chosen, how the research will be carried out, and why it is the appropriate method to address the research question. This means that students need to be aware of the advantages and disadvantages of their particular research methods in order to gauge their suitability for the project at hand, and in order to defend their specific research choices within the course of their paper. Remind students that they are completing the task as laid out in the Course and Exam Description (CED), which means that the discussion of their methodology needs to be explicit, even when it is generally understood within the field, or when scholars working within that field typically don’t clearly lay out or defend their methodological choices. This means that while using an academic paper as a guide might be useful, academic researchers rarely fully explain all of their methodological choices as they are writing to an audience who is well versed in that field or subfield. As such, a student completing a paper for AP Research must be much more detailed and explicit when describing their research methods. It is advisable to have students engage in peer review of each other’s methods and have them provide each other feedback on whether each step of the method was clear enough for the peer to complete without having to ask for clarification. If the peer needs clarification on a step, the student should go back and provide more detail and justification. This process will help ensure that a reader who is an intelligent non-expert will be able to easily understand that description and rationale and be able to reasonably replicate the approach.

- ***Different Research Methods:*** Help students understand that specific methods have specific requirements. For example, methods such as meta-analysis, content analysis, thematic analysis, statistical analysis, trend analysis, grounded theory, qualitative comparative analysis, systematic review, correlational analysis, and historical analysis have accepted guidelines and procedures that must be followed. Some students are using these methods, in particular correlational analysis, content analysis, and meta-analysis, without a clear explanation of what they have done, why they did it, and without clear understanding of how these methods are appropriately applied within disciplinary bounds. Encourage students to read within their discipline area to better understand appropriate methodological choices. Provide examples, where possible, and encourage students to closely read these samples to check for method explanation and alignment. Allow for time to teach deeply about different research methods and to ensure that students have the ability to make an informed choice between them in addressing their research question or project goal.

- ***Surveys:*** Given how frequently students rely on survey methodology, teachers should devote significant class time to reviewing the purpose of survey research and to the proper design of survey tools within research projects. A special emphasis should be placed on the types of questions to include on a survey instrument that will enable a student to actually address their research question. Lessons on survey methodology should address proper question construction, effective sampling, and the need to justify all the choices made along the way. When possible, students should consider using validated survey questions that have been used in published works or have been used by reputable survey companies such as Gallup, Pew, etc. Teachers should advise students to include the full survey instrument and all question wording in the paper or within a referenced appendix in order to demonstrate the reasonable replicability of their research method. Students should be advised that they should fully justify their sample selection, especially if they survey adjacent populations (e.g., classmates). Students should make it clear that their choice to interview an adjacent population is because it best answers their research question and not simply because it was convenient. Please remind students that the alignment of research methods with the research question is essential for any successful research project, and that this alignment should be convincingly defended within the body of the paper. Therefore, if students are having difficulty defending the choice of a survey of a convenient population as the most appropriate methodology for the project in question, they should reconsider the range of methods available to them. Remind them that the choice of a method should be guided by the research question, and not vice versa. Finally, remind students that they will need to allow time in their process to adequately analyze and assess survey results.

- ***Unfamiliar Approaches:*** If students are using a methodology with which the teacher is unfamiliar, the teacher can recommend that the student find an outside expert advisor who can review and comment on that approach. Teachers might also invite other instructors or bring various instructional materials into the classroom. For instance, teachers who do not feel comfortable with data might think about inviting an AP Statistics teacher to work with students or could assign statistics videos for students to watch and later apply to their papers. Or teachers not familiar with historical analysis might invite a historian familiar with academic historical analysis to give a guest lecture. There are a variety of university faculty that are required to engage in service to their discipline as a part of their workload and are happy to provide a guest lecture. Finally, finding exemplars of the type of method in published work or in previous student papers would be helpful to students.

- ***Analyzing Data:*** Teachers should consider including more activities on how to analyze data. Doing this can help students recognize that there are numerous ways to collect and analyze data. Some topics that could be especially helpful include how to analyze primary documents in historical analysis, how to conduct a content analysis, how to calculate and analyze descriptive statistics, or how to analyze the results from an interview or focus group.

- ***Statistical Analyses:*** First, remind students that statistical analysis is not a required component of research, and students should only use statistical analysis if their research question and data call for it. If a student project necessitates statistical analysis, teachers should remind students that they need to apply the appropriate statistical test to their question, justify that choice, and explain it clearly to the reader. Encourage students to always explain the meaning of their statistical results and to elaborate what these mean for their argument. Some students seem to focus more on describing how they performed a particular statistical test and what that test

means rather than on describing and explaining the statistical result and its implications for their argument and conclusion.

- ***Start Early, Plan Ahead:*** Consider creating a timeline for student success in the year-long research process. Emphasize the importance of starting to collect the evidence or data as early as possible in the year to leave ample time to carry out the study, complete the analysis, and leave time to write and revise the paper. Students appear to be spending a great deal of time on their reviews of the literature and the development of their methodology, but not as much on analyzing the information that they collect or drawing conclusions from that information. These sections tend to appear more rushed and less complete than the earlier sections of the paper.

- ***Conclusions:*** Teachers should encourage students to conclude with an analysis on how the paper's conclusion (drawn from evidence generated by the research method) contributes to the conversation. Summary is an important first step, but conclusions need to also contain reflection and analysis. In the conclusion, papers that refer back to and compare the new findings to previous findings demonstrate an ability to show how their results have meaning beyond their own study and therefore demonstrate a more nuanced and sophisticated understanding of the research process, and of the larger contexts in which research is conducted. The discussion of new understandings should be based on the evidence produced by the project, including results from their study's analysis, findings, or data, rather than simply a new awareness based on the reading they have done or the process they followed. Conclusions should be discussed and critically analyzed rather than just asserted.

- ***Limitations:*** Teachers should remind students that they should discuss the limitations of their study's design (question, method), their evidence, and their conclusions, and not on their circumstances such as access to resources or lack of time. Limitations should be tied to the conclusions of their project, and they should explain how certain the conclusions are and to what degree they are generalizable, reliable, and valid. One useful question for students to ask is how wide their conclusions can be applied. Humble researchers recognize that one single research project is unlikely to be definitive. Rather it is one step in better understanding their topic.

- ***Implications:*** The implications section of a paper answers the "so what" question for a research project. Thus, it is important to encourage students to see the implications and conclusions sections of their papers as critical components that allow them to situate their study's findings. This allows the findings to have meaning beyond a course project. Weaker papers tend to have brief implication sections and are often read like an afterthought rather than a critical component of the paper. The implications section provides students with an opportunity to discuss the importance of their work as well as the opportunity to engage in the broader academic and/or professional discussion. Encourage students to use this section to discuss how their findings either support or challenge previous research, how their findings could open new avenues of inquiry, and how their findings might be used by the community of practice to find solutions to complex questions and problems. In doing so, students should be careful to remain humble and not become hyperbolic. And as always, remind students to tie their findings back to the existing literature.

- ***Appendices:*** Appendices are a great way for students to direct readers to additional information that supports their papers. If students wish to use one or more appendices, remind them to discuss the most pertinent material or evidence in the body of the paper, and to explicitly reference and direct the reader to the Appendix in the main text of the paper. AP Research readers will read a paper's appendix, but they will have difficulty understanding the context of said Appendix if it is not clearly referenced within the body of the paper itself. Thus, is it imperative that students think through their choice to use an Appendix and how to best direct their audience to read the Appendix. In other words, it should not simply be a "dump" of all extra information. There is a variety of information that could be useful to include in the appendices (a copy of a full survey instrument, consent forms, IRB approvals, more extensive codebooks, draft mockups, etc.), and just like the paper, the appendices should be well organized, labeled, and curated.

- ***Writing and Citation Style:*** Make sure students know the writing and citation style expected within their paper's specific discipline. Spend time emphasizing proper and consistent citation techniques, including the need to cite works of art, images, tables, and figures throughout the entire body of the paper. Also, ensure that students understand that they need to fully cite all online sources and not just provide web addresses. There are a variety

of resources, beyond the large style guides, which can help students learn their chosen citation styles, including free online "quick guides" created and posted by many University libraries. Several citation software packages also exist that can help students to both track and annotate their literature and build their works cited pages. Please note, however, that these software packages are not infallible, and students must engage in due diligence to ensure that their citations are correct. Finally, remind students to thoroughly proofread their final papers to avoid unnecessary errors or incomplete works cited pages. Emphasize that running a spelling and grammar check is helpful, but not a replacement for the proofreading process, and remind students to complete their projects in enough time to fully engage in the proofreading process.

- ***Ethical Issues:*** Teachers should spend time discussing ethical research practices well in advance of students completing their research proposals. These discussions should help students think through the implications of their choices on human and animal subjects. A significant and growing number of papers are collecting highly sensitive information or asking clearly disturbing or triggering questions from protected classes without evidence of an IRB or some way to gain legitimate consent. Message the imperative to address ethical issues proactively, fully, and appropriately, particularly when dealing with human or animal subjects. While human and animal subjects are often the primary focus of ethical discussions, students should also be instructed to think about how their choices impact the environment, the physical materials they may be using (preservation of documents or materials), and themselves (safety measures to protect the researcher). Remind students that it is their responsibility to act in an ethical and responsible manner while carrying out their study, and in presenting the data honestly and accurately. Even if students will not go through an IRB / human subjects review process, encourage them to reflect on ethical issues of their projects' methodology or implications, as it is expected that they will do so. It is also imperative that students include their ethical considerations in the paper. Readers (and future researchers) will not know all the steps taken to ensure responsible research if it is not included in the papers, and if this information is not discussed in the paper, the research methods are thusly not logically defended, detailed, or replicable.

- ***Plagiarism:*** Emphasize to students that it is their responsibility to act in an ethical manner with regard to appropriate citation and attribution, and to appropriately use AI. Please refer to the College Board guidelines regarding permissible and non-permissible use of AI tools within AP Research. Use Turnitin.com to ensure that students are complying with AP Research course guidelines regarding plagiarism and AI-generated content. Please remind students that plagiarism often occurs accidentally due to sloppy research practices such as not keeping an organized record of sources utilized, forgetting to provide attribution, or not including quotation marks. Encourage your students to keep meticulous records and to always include attribution, even if the concept might seem like a well-known fact.

- ***Proofreading:*** Remind students that prior to their final submission they should proofread their work very carefully. At this time, they should remove their names, school information, teacher and expert advisor names, and other identifying information from works to be submitted.

- ***Peer Review:*** Encourage students to engage in peer reviewing at every stage of their projects. Students often do a great job of providing useful critique to their peers. As they see the successes and flaws in others' work, ask them to apply this critical eye to their own work as seeing their peers' work can help them to find areas of improvement in their own work. Peer review can be especially helpful when thinking through the methods section and whether the methods are described sufficiently enough to make the paper reasonably replicable. Ask students to read each other's methods section as a "recipe" and determine if there were areas where they were unsure how they would proceed. Students often "fill in the blanks" in their description of their methods and sometimes fail to include crucial steps. As reasonably replicable methods in a key component of receiving at least a score of 3, this exercise could help more students successfully complete this portion of their research process.

- ***Uploading:*** Sometimes conversions from Google Docs or other formats to PDF result in some content being lost. Remind students to make certain that the PDF they are about to submit is absolutely their final paper, contains all the desired text and elements, and is the version that they intend to be scored at the Reading.

What resources would you recommend to teachers to better prepare their students for the content and skill(s) required on this question?

- Use the rubric as a teaching tool and a guide for the students throughout the course. Periodically have students review the rubric and ask (perhaps in the PReP – Process and Reflection Portfolio) whether the elements of their academic paper have met the criteria in the rubric.

- Use the Student Workbook and associated PowerPoint presentations from the AP Research Teacher Community (https://apcommunity.collegeboard.org/web/apresearch) to help students focus their research questions, align their chosen method to the purpose of their inquiry, and to ensure they are addressing ethical research practices in writing and in the implementation of their method.

- Teachers should attempt to troubleshoot their curricula on the AP Research Teacher Community, encouraging and engaging in dialogue that supports their own development of the course and course expectations, particularly after they receive their score report data.

- Teachers should also consider applying to be readers during the AP Research Reading, as this professional development not only allows teachers to understand the rubric, but it provides access to student work that creates more context for the course and the various disciplines of scholarly research.

- Citations in many student papers were disorganized, missing sources, or formatted incorrectly. Effective use of free plug-ins or apps such as Zotero (https://www.zotero.org/) can help students organize their cited sources and cite them consistently and in the correct format.

- Purdue Owl (http://owl.english.purdue.edu/owl) is a great, free on-line source on citation and reference formatting. It contains information on many widely used citation styles and guidelines regarding best practices in source citation and attribution.

- Human Subjects / IRB training would be useful professional development for AP Research teachers but would also benefit AP Research students who will be engaging with people for their projects. While there is an IRB education exemption for most high school students' projects (based on U.S. Department of Health and Human Services guidelines), such training would help students to at least talk about the ethical issues involved in their study, which is still required. It also models better research practice, which would be required at the college or university level. One option is the on-line Protecting Human Research Participants module, from the National Institutes of Health's (NIH) Office of Extramural Research, at https://phrp.nihtraining.com.

- Teachers should look into alternative journal collections such as JSTOR, search engines such as Google Scholar, or consider a field trip to the local university library to use those resources. This way, students have a wealth of information outside of EBSCO. Teachers might consider building partnerships with local colleges or universities and their libraries to provide more resources for students, and to introduce local institutions of higher education to the great work AP Research students are doing.

- Encourage students interested in historical research to look into digital archives and data sets. There is a wealth of letters, diaries, and artifacts from under-represented groups that have been digitized and made widely available. Students looking for an innovative topic should look at the work of digital historians and digital history projects to find data that has only been lightly explored.

- There are various quantitative database websites with online analysis built into the platform (especially in the social sciences), such as Gapminder, Google Trends, Kaggle, the European Social Survey, GESIS, World Values Survey, or the General Social Survey. There are also numerous sources for aggregate public opinion data, such as the Pew Research Center, Roper iPoll, Gallup, and PollingReport.com. Free open source government and international organization data also exist at websites such as http://www.data.gov, http://www.census.gov, https://data.worldbank.org, http://data.un.org.

- Students who want to conduct statistical analyses can use a free online tool called PSPP, which can be accessed at http://www.gnu.org/software/pspp. It is designed to be similar to SPSS, a commonly used statistics software package, and is generally user-friendly.

- Professors at nearby colleges or universities could become resources: as expert advisors t, oral defense panelists, or as guest lecturers who might, for instance, come and talk about good qualitative methodology or about ethical issues in working with human subjects.

- If your local college or university holds an honors day or research symposium event where undergraduate students are presenting their research, consider finding out whether your class can attend (or even present their work). They could see different kinds of research and, hopefully, observe good presentations. For students who perhaps were not thinking about going to college, seeing where their research could take them could be meaningful and encouraging.