Chief Reader Report on Student Responses:

2024 AP® Research Free-Response Questions

- Number of Students Scored 35,469
- Number of Readers 802
- Score Distribution

Exam Score	N	%At
5	4,464	12.6
4	9,208	26.0
3	16,863	47.5
2	4,071	11.5
1	863	2.4

- Global Mean 3.35

The following comments on the 2024 free-response questions for AP® Research were written by the Chief Reader, Gregory Taylor (Associate Provost & Professor of Cinema Studies, Purchase College, SUNY). 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: 6.31

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. A data comparison with Reader survey results from the 2023 and 2022 AP Research Readings continues to evidence 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 students' ability to master more nuanced elements of the performance task continues to show 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.

- 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 with the creativity displayed by students in pursuing a wide variety of inquiry topics this year. Most students are able to carry their focused topic of inquiry throughout the body of their paper. 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 are 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.

- In ***Evaluating Sources and Evidence***, students mostly drew upon credible and relevant sources in situating their question within a larger context and in developing their arguments while demonstrating an understanding of and fluency with scholarly sources. Readers indicate that consistently solid literature reviews are a consistent strength of student work in AP Research.

- In ***Research Design***, most students demonstrated an understanding of the need for a systematic method or approach to their question in order to generate data to analyze. Most students were able to choose a research method aligned with the student's specific research question, and to explain why (or how) the chosen research method would address the student's research question. 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 most understand that content and meta-analysis 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. Most students showed a clear understanding of ethical considerations, 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 many sampled from an appropriate population given the research question or topic of inquiry.

- In ***Establishing* (Their Own) *Argument***, 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 many 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.

- In ***Selecting and Using Evidence***, most students continue to provide evidence relevant to the topic of inquiry, and 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, and most were able to describe statistical analyses correctly.

- In ***Engaging the Audience***, most students continue to write in a style that is easily accessible to an educated, non-specialist reader. Most wrote in a manner that clearly communicated the student's ideas, and most also wrote in a manner that enhanced reader engagement. Most students constructed their papers in order to allow the reader to follow the argument, the application of research method, and the examination of the evidence. Most clearly organized the paper's sections, headings, and visuals, and once again many students did this exceptionally well. Most were able to use organizational and/or design elements such as tables, figures, and charts effectively.

- In ***Applying Conventions***, 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.

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 the larger contexts within which their research is being conducted, and within which they are making key choices—for example, to choose one research method over another, to highlight certain research findings over others, or to suggest the larger significance of their project within the community of practice. Such a "meta" level of awareness is required in order for a researcher to be able (a) review, summarize, and synthesize the existing scholarly literature in order to explain how the student's own inquiry process addresses a gap in the extant research, (b) to tie the research findings and new understanding back to what is already known in the discipline, and (c) to ascertain and explain the inherent limitations and larger implications of the inquiry process. As a result, many papers are able to pose interesting and original research questions but are nonetheless hampered by (a) a review of the existing literature that fails to engage a level of analysis and synthesis required to reveal an original and productive new avenue ("gap") for further investigation, (b) poor alignment (or inadequately defended alignment) of the research question with an appropriate research method, chosen from a number of possible options to fit the specific research question or project goal , (c) an incomplete explanation/analysis of collected data in relation to conclusions drawn and project goal, and/or (d) inadequate consideration of the importance of the question, process, and new understanding in relation to the existing field of inquiry.

- 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, and suggesting in many cases that an identified gap of convenience (for example, a local student population at the researcher's high school) had actually driven the inquiry process. Some students used their research to answer a question different than the one originally posed, or only one of a number of questions posed. 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. 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. 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. 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 remain insufficiently informed on the range of methods available, and many who attempt to employ content analysis and meta-analysis are underinformed as to the correct and appropriate means of conducting these forms of research.

To this end, surveys still remain the most ubiquitously deployed research method of AP Research students, but also the most regularly misapplied and misaligned. In fact, most students who included surveys this year 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. Most broadly, a great many students who deployed surveys relied on them to 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 continually to inadequately signal that they had 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 human subjects research board) authorization, nor did they have sections in their papers that addressed ethical issues and explained how risks to subjects (e.g. in vulnerable populations) either had been minimized or avoided. Some students conducting surveys or interviews asked questions that were ethically problematic.

- 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. 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. 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. Many papers lacked a sufficient array of scholarly sources to adequately support their argument. 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. 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. 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.

- In ***Applying Conventions***, some students inadequately considered or analyzed the ethical implications of their human subjects research. 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 employed AI-generated content.

- In ***Applying Conventions***, a few students did not proofread their papers carefully, and/or did not correct errors of grammar, style, or mechanics that interfered with communication. Many 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 5000-word limit, detracting from clear and succinct communication of the student's ideas, and at times preventing students from receiving full credit for their efforts.

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 a wonderful job in helping students move from wrestling with the basics of systematic research to conducting original research using an explicit method or approach. Students have a good understanding of how to take the skills learned in AP Seminar and 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 is substantially different in both form and purpose from the literature review required within an AP Research paper.

- ***Rubric:*** Establish a relationship with the rubric prior to teaching the course every school year. Require students to establish this same type of relationship. If students can use the rubric to help guide their thinking about published work and/or peers' projects, it will help them in making sure that 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 of the rubric. In other words, they need to demonstrate that they understand the function and purpose of a required paper element (e.g., a "gap" in the existing literature), and are also able to apply it correctly and fruitfully. To achieve the related holistic score, it is insufficient simply to 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:*** Emphasize that research is an iterative and recursive process, one that requires time, reflection, problem solving, and revision. Teach students 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—but also potential research methods within a discipline or sub-discipline—may be found by carefully reviewing prior research with a particular field. Students must also carefully set aside time for all stages of the research process, including composition and revision of all sections of their final paper.

- ***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, 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/conclusions with an expert advisor.

- ***Higher Education Institutions:*** Reach out to nearby colleges or universities. This could help with understanding the importance of IRBs in addressing the challenges and risks of human and animal subjects research, building relationships and research connections, and gaining access for students to start seeking access to databases or research librarians early in the process. They might also be good sources for expert advisers, oral defense panelists, and even venues for viewing or presenting student research. Also encourage students to review university faculty web pages to see who might be conducting research in their area; most faculty have research or lab websites that may provide students an avenue to derive productive feedback for their project.

- ***Topics:*** Continue to encourage creative topics of study outside of the social sciences, especially in the humanities, arts, engineering, and technology as the curriculum of AP Research is broad and comprehensive enough to accommodate work in multifarious disciplines. Remind students doing such projects that 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.

- ***Research Questions:*** Emphasize the importance of developing a clear, precise, and focused research question that is narrow enough to be studied within the scope of the project but broad enough to develop a new understanding. Doing so affects the rest of the research project, and thus is essential. Importantly, while all research involves a process of discovery, and 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 discussion. 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 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).

- ***Audience:*** Remind students to write as if the audience for their papers is an intelligent reader who nonetheless may very well lack expertise in this specific field of research. Remind students that as the author and researcher, it is their job to clearly convey their research question or project goal, the relevance of their chosen research methodology to the topic of inquiry, the importance of their research findings and conclusion or new understanding, and the implications their conclusions have for our understanding of the question. It is not the reader's job to infer any of this from the paper; it's the student's job to be clear and explicit. Also remind students that there is no guarantee 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 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.

- ***Introduction:*** Emphasize the usefulness of revising the paper's introduction near the end of the entire research process, in order to clearly identify the question that guides the project and to situate the question within a broader context. 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 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.

- ***Literature Reviews & Establishing a "Gap":*** 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 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. Remind students that the existence of a gap in the field of inquiry does not inherently generate a research question that is interesting or worthy of in-depth study. Encourage students to think more broadly about why certain questions might be worthy of deeper exploration in the first place.

- ***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.

- ***Alignment:*** Teachers should spend more 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 throughout the study, however, as occasionally conclusions drawn 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.

- ***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 student need to be aware of the advantages and disadvantages of 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. A reader who is an intelligent non-expert should 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 (or historiography) have particular guidelines and procedures that must be followed. Students are using these methods—and especially correlational analysis, content analysis, and meta-analysis--without clear explanation of what they have done (and why), and without clear understanding of how these methods are appropriately—and sometimes sparingly—deployed. Encourage students to read within their area to better understand appropriate methodological choices; previous researchers are a reliable source of inspiration for methodological options. Provide examples where possible, and close read these samples to check for method explanation and alignment. Allow for time to teach deeply about different research methods (including modeling, building together, peer review), 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 and design of survey tools within research projects, and in particular the sorts of questions surveys are well-positioned to answer (e.g. questions of perception), and less well positioned to answer. Emphasis is needed particularly on question construction, effective sampling, and the need to justify all of the choices made along the way. Students should be strongly advised to include all survey questions in the paper or within a referenced appendix in order to demonstrate the reasonable replicability of their research method. Note that if students survey adjacent populations (e.g., classmates), it should be for clearly defensible reasons, *vis-a-vis* the research project, and not for the sake of convenience. 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 researchers, and remember that choice of method should be guided by the research question, and not vice versa. Finally, also remind students that they will need to allow for 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 who can review and comment on that approach. Teachers might also invite other instructors or bring 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. Finally, finding exemplars of the type of method in published work or in previous student papers would be helpful to students.

- ***Statistical Analyses:*** 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. 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.

- ***Peer Methods Communities:*** Encourage students to engage in peer reviewing even while developing their methodologies. This might be made easier if students create "method communities" in the classroom, where students with similar research methods can give each other feedback on their approach while communicating ideas and conclusions.

- ***Ethical Issues:*** Teachers need to spend more time prior to the research proposal discussing ethical issues, and helping students think through the effects of their choices on their human or animal research 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. Remind students that it is their responsibility to act in an ethical manner while carrying out their study responsibly, 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.

- ***Plagiarism:*** Emphasize to students that it is their responsibility to act in an ethical manner with regard to appropriate citation and attribution, and to appropriate use of AI. Please refer to the College Board guidelines regarding permissible and non-permissible use of AI tools within AP Research, and to the related requirements for AP Research teachers. Use Turnitin.com to ensure that students are complying with AP Research course guidelines regarding plagiarism and AI-generated content.

- ***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 enough time to carry out the study, complete the analysis, and leave time to write up 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 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.

- ***Analyzing Data:*** Teachers should construct more activities on how to analyze data—for instance, on how best to utilize primary documents in historical analysis, or how to conduct content analysis, or descriptive statistics calculation.

- ***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 referred back and compared 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. New understandings discussed should be evidence-based (a result from their study's analysis, findings, or data), rather than simply a new awareness based on the reading they have done or the process that they have undergone. They should also be discussed and elaborated upon, rather than simply asserted.

- ***Limitations:*** Teachers should remind students that they should discuss the limitations of their study's design (question, method), evidence, and conclusions, not on student circumstance or access to resources or time. Limitations should be tied to the conclusions in that they explain how certain the conclusions are, or to what degree they are generalizable, reliable, or valid.

- ***Implications:*** Encourage students to see the implications and conclusions sections of their papers as critical components that allow them to situate their study's findings and help the findings to have meaning beyond the study. The brevity and cursory nature of implication sections in weaker papers suggested that this step was an afterthought or an attempt to simply catalog possible sources of error, rather than an opportunity to address the crucial "so what?" implications of their research or the opportunity to speak back to the professional discussion that provides the context and catalyst for research in the first place. Encourage students to reflect on and write about why their results are what they are; have them point out where their results matched previous research (and explain why this could have happened) and where it did not (and explain why this could have happened). Remind students to tie their findings back to the literature.

- ***Appendices:*** If students wish to use an Appendix, 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 will have difficulty understanding the context and content of this appendix if it is not clearly referenced within the body of the paper itself.

- ***Writing and Citation Style:*** Make sure students know the writing and citation style expected within their discipline. Spend time emphasizing proper and consistent citation techniques, including the need to cite works of art, images, tables, or figures throughout the entire body of the paper, and the need to fully cite all online sources (not just the URL/web address). Teach, model, discuss, and work with students throughout the year regarding the mechanics of citations. Remind them to proofread to avoid incomplete or error-filled "works cited" sections.

- ***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.

- ***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 free option is the on-line Human Research Protection Training modules, from the United States Department of Health and Human Services, at https://www.hhs.gov/ohrp/education-and-outreach/human-research-protection-training/index.html.

- 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 to 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 to 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 in to 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.