UWorld | COLLEGE READINESS

Creating Equity for Underserved AP® Students

With UWorld's Learning Tools for AP Courses

THE ADVANCED PLACEMENT ECOSYSTEM

Advanced Placement® courses allow high school students to earn college credits by taking academically advanced classes in various subjects. Designed to give students the experience of college-level courses, each class ends with an optional AP exam that can earn them college credits if they score high enough. Even during the pandemic, more than 1 million students took at least one AP exam. Both the number of students taking the exam and the number of students with higher scores increased year over year. This is important because AP students are more likely to enroll in a four-year college.

In recent years, the College Board®, which owns and manages the Advanced Placement program, has worked to expand access to AP courses for historically underrepresented students. They believe that closing the equity gap in participation is essential to providing all students access to the rewards of challenging coursework. The courses are rigorous, and the exams reflect that. In order to ensure success, especially as AP courses are offered to more students, supplementing AP instruction with high-quality practice materials is highly recommended.

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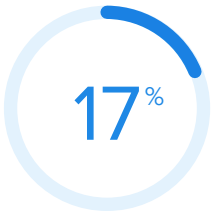
EQUITY IN AP CLASSES IS ELUSIVE

A 2020 report from The Education Trust estimated that nearly 225,000 Black and Latino students are not taking advanced courses in high school because they don't have access. Researchers discovered that Black and Latino students, and students from low-income backgrounds, were not able to take courses such as AP Biology, AP Physics, and AP Chemistry, even when they had expressed interest in college and pursuing a STEM career (Patrick, et al., 2022).

The Pew Research Center found that Black people represent 11 percent of the workforce but represent only 9 percent of STEM jobs. Latinos comprise 17 percent of the workforce, but only 8 percent of STEM jobs. Also, students who are exposed to more rigorous courses, including AP classes, are more likely to choose STEM careers. Some of the reasons why these students cannot access AP classes include:

- Educator bias that limits student access.
- Racialized tracking in early grades.
- Lack of communication with students and families about advanced course benefits and opportunities.
- Not offering challenging STEM courses that expose students to rigorous and engaging study in middle school.
- Instructional needs of underserved students are not being met due to lack of understanding and professional development.
- Underserved students are dropped from AP classes at the start of the year when learning gaps appear rather than providing instructional support.
- Most of the inexperienced or undercredentialed AP teachers are found in schools with higher underserved populations.
- Funding inequities, which means fewer seats in AP STEM courses.
- Districts serving the largest population of Black/Latino/Native students receive 13 percent less per student in state/local funding. For a district with 5,000 students, that gap adds up to $9 million per year.

Black people represent **11**% of the workforce



Latino people represent **17**% of the workforce

Black people represent only **9**% of STEM jobs

Latino people represent only **8**% of STEM jobs

> *"Nationally, what we've found is that Black and Latino students can be very successful in advanced courses when given the opportunity, but unfortunately, they are not fairly represented in advanced courses. The story gets more complicated when we dig deeper into state-by-state data to understand what is driving those national trends. The barriers to access and success in advanced coursework are different from one state to the next, and within states may be different for Black students than Latino students."*
>
> — Ivy Smith-Morgan
> Associate Director of P-12 Analytics
> The Education Trust

USING MISTAKES AS A LEARNING STRATEGY

Students who take rigorous, advanced courses are often afraid of failure. They and others around them have high expectations for their academic success. By adopting a growth mindset and learning how to turn mistakes into opportunities to learn, AP students learn a valuable skill that will serve them well in college and life. Owning their mistakes and misconceptions provides AP students the opportunity to identify what they don't understand, and to remedy it. This happens more readily when students are surrounded by a school culture where mistakes are seen as a natural part of the learning process.

Historically, teachers told students which questions they missed and provided the correct answer. Clear, concise explanations were provided verbally by the teacher or not at all. Academically advanced students were rarely taught how to utilize answer explanations to understand misconceptions or to relearn the content. However, students are empowered by detailed explanations, and once they learn how to use them, they move a step closer to owning their learning where mistakes become opportunities.

It's important for students to engage in productive struggle—allowing them to work independently before educators step in to help. Students can only become independent learners when they learn how to persist in the face of a challenge. Pairing productive struggle with growth mindset—the belief that if they study and practice, they will learn and grow—sets students up for success. These students are more likely to seek out challenging work, learn from their mistakes, seek help when they need it, and learn from the experience of others. These are all skills that will benefit them in college and beyond.

RESEARCH: RETRIEVAL PRACTICE AND FORMATIVE FEEDBACK

While there are many AP prep guides and review books that aim to prepare students to take the AP exams by providing practice questions and test-taking strategies, decades of research provides evidence that high quality, formative feedback improves learning and skill development, as well as student motivation to learn (Shute, 2008, citing multiple sources). Empirical research in cognitive science supports learning strategies focused on "retrieval practice," which is when students attempt to recall and apply previously learned knowledge. This feedback improves learner metacognition—their understanding of what they do and don't know (Agarwal & Bain, 2019).

Research has found that the most effective type of feedback is "elaborated" feedback that provides students with an explanation of correct and incorrect answers. This practice has been shown to be more effective than just informing students they have answered correctly, or providing them with the correct answer (Shute & Rahimi, 2017; Van der Kleij et al., 2015). Immediate feedback has shown to improve retention, while delayed feedback can support the transfer of learning to new situations (Agarwal & Bain, 2019; Dihoff, Brosvic, Epstein, & Cook, 2004; Shute, 2008; Swart et al., 2019; Van der Kleij et al., 2015).

Retrieval practice occurs in activities where "learners recall and apply multiple examples of previously learned knowledge of skills after a period of forgetting... Retrieval practice enhances learning by providing students with the opportunity to know what they know, and know what they don't know." (Agarwal & Bain, 2019). Agarwal and Bain explain that when retrieval practice is combined with feedback, the feedback counterbalances the learner's tendency toward overconfidence, thinking they understand or remember, when they do not. The researchers note that providing students the opportunity to make mistakes, and then correct them, improves learning (Agarwal & Bain, 2019).

How to Use High Quality Formative Fedback

Based on her review of the research literature, Shute (2008) offers guidance for effective feedback, including:

- Elaborated feedback can address the topic, the response, or the particular error(s). It should describe the what, how, and why of a given problem.
- Provide feedback in mangeable units that are specific and clear.
- Provide feedback after learners have attempted a solution.
- Clarify how well learners perform on a task, and what needs to be accomplished to reach the goals.
- Give unbiased and objective feedback. Computer-based feedback is perceived as unbiased.

Van der Kleij's finding that students prefer immediate feedback is supported by research results that found prompt feedback increases retention, accuracy, and confidence, while reducing incorrect responses (Dihoff et al., 2004). Shute's meta-review of formative feedback research determined that immediate feedback is appropriate for verbal and procedural skills and provides a helpful safety net when learning a new task (2008). She also found evidence that delayed feedback is helpful when learning a simple task and may be more effective when transferring learning to a new situation.

These researchers also found that computer-based systems that provide practice with elaborate feedback are effective alternatives to human tutoring, which is often cost-prohibitive for many students. The Van der Kleij team concluded that well-designed computer-based systems can help meet the need for individualized learning by including practice questions, timely feedback, and automated scoring (2015). Shute notes in her research that an advantage of computer-based systems is that they deliver feedback perceived by students as unbiased and objective.

"Computer-based systems that provide practice with elaborated feedback are effective alternative to human tutoring."

CASE STUDY: ARLINGTON (TX) ISD PROMOTES AP OPEN ENROLLMENT

As detailed above, there are often many challenges for Black and Latino students to overcome in order to enroll in AP courses. However, Arlington ISD encourages any and all students to try AP courses through the district's open enrollment process. Their goal is to increase the number of students in AP courses and find a way to help students with the background knowledge they needed to be successful. District leaders also want an AP resource that provides assessments more frequently than the College Board.

"I had worked with the folks at UWorld in my previous district," said Karen Zeske, director of advanced academics. "I believe in the product, as I saw the process of developing questions and feedback, and the care that went into that."

The challenges of the pandemic and its aftermath meant a slower adoption of UWorld than Zeske would have liked, but pilots at various district high schools led to teachers trying it out. "The teachers who used the program were impressed by the rigor and prescriptive nature of the questions and the ability to find questions in areas that students needed to work on," said Zeske. "Teachers really liked having an additional resource they could offer for practice, especially for students who need to work on filling in background knowledge."

Zeske and her team have developed suggestions for using the data from the UWorld-provided assessments—how to go back into the unit and teach using the results. Teachers are learning how to provide the developmental feedback to their students. That is a unique feature of UWorld. “AP students are self-driven to improve,” Zeske said. “We will also soon have a specialist visiting the campuses to offer coaching and encouragement for the spring exams, and she will begin the process of correlating usage to scores as we expand adoption across the district.”

When asked what she would say to another district about UWorld, Zeske remarked, “It helps students explain why an answer is correct or incorrect, and it is a tool to work as hard as they will for their own success. When teachers use it correctly, it provides more rigorous questions and repetition than any other practice for students—plus the developmental feedback.”

HOW UWORLD ALIGNS WITH THE RESEARCH

UWorld technology-enhanced college readiness tools are designed to improve retrieval practice with a variety of explanatory feedback. Informative feedback helps reinforce previously learned content and enables students to address misunderstanding and avoid mistakes in the future. Featuring automated scoring and detailed reports, UWorld enables teachers and students to determine their next steps for AP success.

UWorld feedback is specific to each response choice. Explanations provide a detailed justification of the correct answer and background on the question content, visual representations to reinforce concepts, connections to the prompt or question text, and additional context where needed. This type of feedback enables students to quickly fill in knowledge gaps and correct misunderstandings. Feedback is presented in an objective manner and students regard UWorld’s computer-based learning tools as providing unbiased and trustworthy information.

Explanations are in manageable units, as they are organized into a few concise paragraphs. The *Things to Remember* feature restates the most important takeaways from the explanation in a sentence or two and helps ensure that feedback messages are easy to digest.

For most students, AP exams have high stakes, as they are a gateway to college credits. Additionally earning a good grade in AP courses can boost their GPA and improve their college admissions chances. Supplementing instruction throughout the year and during exam preparation will provide students with the retrieval practice and developmental feedback needed to improve student success by promoting engagement, retention, and learning.

ABOUT UWORLD

UWorld's goal is to make AP curriculum understandable for every student and manageable for every teacher. The Learning Tools for AP Courses provide teachers with practical applications of the standards and objectives outlined in AP Courses, as well as insightful data to drive instructional decisions. The research-based methodology ensures students understand and retain information, while also developing the valuable critical-thinking skills they need to be college coursework ready.

KEY BENEFITS

LEARN

Perfectly modeled College Board-level questions and answer choices written by former AP educators are updated weekly to ensure rigor and alignment to current AP courses and tests.

PRACTICE

Unparalleled answer explanations provide immediate feedback, vivid illustrations, and built-in tools for individualizing learning to help students correct misconceptions, build critical-thinking skills, and retain information.

IMPROVE

Unit tests and performance reporting at the student, class, school, and district levels ensure program effectiveness, measure test-readiness, and identify student needs.

MANAGE

Everything from initial setup to finding and assigning content is designed to be quick and easy for both teachers and students, so no instructional time is wasted.

Experience Our Content for Yourself

Preview how students see the rigorous, College Board-aligned questions and detailed explanations that help make difficult AP content more accessible.

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