



Polygence

White Paper
Education
Stanford, California

High School Research Projects - The Key to Test-Optional College Admissions

October 15, 2021

Janos Perczel, PhD

Jin Chow

George Philip LeBourdais, PhD

Oasis Zhen

“An applicant receiving a “2+” academic rating is typically an applicant with perfect, or near-perfect, grades and testing, but no evidence of substantial scholarship or academic creativity.”

- Harvard, Statement of Material Facts

Contents

The Dawn of the Research Portfolio.....3

What is Research?.....3

Standing Out From the Crowd as Test-Optional Gains Foothold.....4

The Harvard Admissions Lawsuit — How Harvard Scores Applicants.....5

Research Projects Demonstrate Academic Excellence in Harvard Admissions.....5

Evidence for the Value of Research in Admissions.....7

Why Colleges Value Research-Focused Academic Projects.....8

Student and Mentor Reflections on Personal Growth Through Research.....8

The Dawn of the Research Portfolio

In the fall of 2013, the Massachusetts Institute of Technology added a novel supplement to its undergraduate application process. Called “Research and [Maker Portfolios](#),” the supplement allowed students who had created an individual project—a computer program, a sculpture, a rocket—to describe their efforts in detail.

Portfolios had long been a cherished method in the arts. As such, they allowed professors (or admissions officers) to assess student growth not strictly by accomplishments but also by their development and their path towards mastery of their chosen field.¹

For MIT, with 13,396 applicants vying for only 1,554 spots in 2013 (an 11.6% acceptance rate), portfolios promised a powerful means of identifying the truly exceptional.

By most measures, the program was a huge success. In the first two years the supplement was made available, more than 2000 students shared “maker” projects, “from surfboards to solar cells,” and more than 3000 submitted “Research Portfolios.”² Many other schools followed suit. Yale, Columbia, and the University of Chicago are among those prestigious universities that explicitly mention “Research Projects” in their supplementary application materials. In fact, such supplements have become a crucial means of assembling a driven, diverse, and creative class of new students.⁴

But why is it that research stood out from the myriad of extracurricular activities as a primary distinguishing factor in college applications? Why have admissions officers carved out areas to share this specific form of creative output?

This white paper will address these questions and argue that independent research is uniquely powerful for helping students distinguish themselves in the increasingly test-optional world of

But why is it that research stood out from the myriad of extracurricular activities as a primary distinguishing factor in college applications?

college admissions. It draws from a number of recent research studies, including data released from the Harvard Admission Lawsuit, and also shares proprietary data about these student outcomes collected through [Polygence](#), an online academy that guides students through the research process, many of them for the first time.

What is Research?

While most non-academics think of white lab coats and pipettes upon hearing the word “research,” it is important to clearly define this overused term. Tracing the etymology of this word back to 1577, the Old French word “recherchier” quite literally describes the process of “searching again”. Nowadays, the word is used to describe the systematic approach to search intensely and to investigate a subject with particular thoroughness.⁵

In practical terms, research falls into five main categories:

1) Creative: This category of research includes diving deep into an area of interest with an existing body of knowledge or past work (e.g. literature, philosophy, anthropology or music) and creates a new take on the previous body of work, revitalizing it through novel insights.

¹ “Introducing... Maker Portfolios!” MIT Admissions, August 22, 2013, <https://mitadmissions.org/blogs/entry/introducing...-maker-portfolios/>.

² Paulson, F. Leon, Pearl R. Paulson, and Carol A. Meyer. “What makes a portfolio a portfolio.” *Educational leadership* 48.5, 1991.

³ “Gender Imbalance in MIT Admissions Maker Portfolios,” MIT Faculty Newsletter, accessed October 1, 2021, https://web.mit.edu/fnl/volume/282/peterson_abelson.html.

⁴ Kim Elsesser, “SAT, ACT Policies May Improve Diversity at Colleges and Universities,” *Forbes* (Forbes Magazine, April 27, 2020), <https://www.forbes.com/sites/kimelsesser/2020/04/27/sat-act-policies-may-improve-diversity-at-colleges-and-universities/?sh=1d34557e3bd5>.

⁵ “WHAT IS RESEARCH?,” MCJ Research Cell, May 2020, https://mcjresearch.com/tdb_templates/attachment-template-2/.

- 2) **Review:** This kind of research activity surveys past work in a given field and provides a comprehensive overview of the state of the art of that field by describing past achievements and identifying outstanding research questions. Review papers are often the highest cited publications in any given field and can have sweeping influence on research agendas.
- 3) **Exploratory:** This type of research defines new areas or problems by generating and interpreting data collected from direct observations.⁶ Whether using instruments to quantify phenomena or reading ancient texts to uncover new details about the past, exploratory research helps to expand the horizons of our imagination.
- 4) **Constructive/Applied:** this category of work defines and solves real-world problems through tactical engineering or craftwork, such as the development of algorithms, frameworks against preset benchmarks or physical models in a maker portfolio.⁷
- 5) **Empirical:** This fifth type of research uses reproducible experimentation to measure phenomena and to formulate concrete theories and draw conclusions.⁸

Within these categories, researchers apply both qualitative and quantitative methods to expand our collective knowledge through various modes of scholarship, from [using satellites to uncover ancient Egyptian ruins](#),⁹ to developing [“genetic scissors”](#)¹⁰ to open new frontiers in medicine. They also take on the critical work of writing review papers of previous and current scholarship, some taking a synoptic approach that attempts to trace the origin of certain concepts and how they evolve through time.

⁶ “Exploratory Research - Research-Methodology,” Research, accessed October 1, 2021, <https://research-methodology.net/research-methodology/research-design/exploratory-research/>.

⁷ Kari Lukka, “The Constructive Research Approach,” 2003, https://www.researchgate.net/publication/247817908_The_Constructive_Research_Approach, 83.

⁸ Person, “What Is Empirical Research? Definition, Types & Samples,” Research.com, September 8, 2021, <https://research.com/research/what-is-empirical-research>.

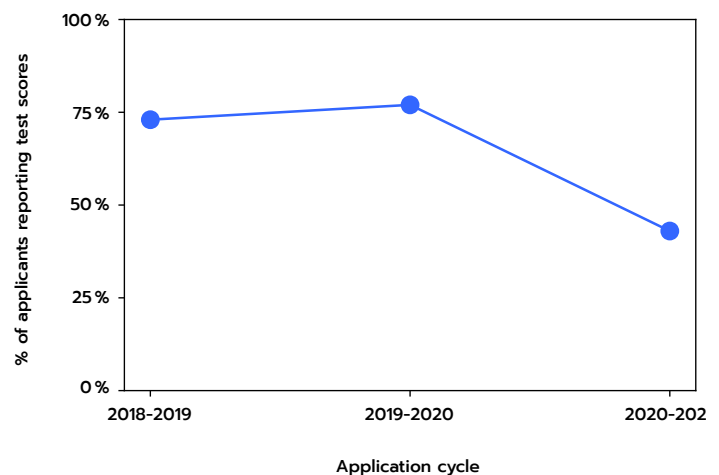
⁹ Smithsonian Magazine, “Space Archaeologist Sarah Parcak Uses Satellites to Uncover Ancient Egyptian Ruins,” Smithsonian.com (Smithsonian Institution, December 1, 2016), <https://www.smithsonianmag.com/innovation/space-archaeologist-sarah-parcak-winner-smithsonians-history-ingenuity-award-180961120/>.

¹⁰ “The Nobel Prize in Chemistry 2020,” NobelPrize.org, accessed October 1, 2021, <https://www.nobelprize.org/prizes/chemistry/2020/press-release/>.

Standing Out From the Crowd as Test-Optional gains foothold

As stated by CommonApp, “90% of Common App colleges and universities offered students the opportunity to apply without standardized test scores” in the 2020-2021 admissions season¹¹.

Correspondingly, only 43% of applicants reported their test scores to one or more institutions in 2020-2021, a sharp drop from 77% during the pre-pandemic era¹². In January 2021, the CollegeBoard announced permanently scrapping the SAT Subject tests and the SAT writing test.¹³ In May 2021, the University of California system announced that it would no longer consider SAT or ACT scores as part of its future admissions process.¹⁴ As of September 2021, over 1750 accredited, 4-year colleges and universities have confirmed that they will not require ACT/SAT scores in the 2021-2022 admissions season.¹⁵



Percentage of applicants reporting test scores to at least one university by academic year. Test score reporting dropped by 32% during the pandemic.

¹¹ CommonApp, “Reports and Insights,” Apply to college with Common App, accessed October 1, 2021, <https://www.commonapp.org/about/reports-and-insights>.

¹² Ibid.

¹³ “College Board Will No Longer Offer SAT Subject Tests or Sat with Essay,” College Board Blog, accessed October 1, 2021, <https://blog.collegeboard.org/January-2021-sat-subject-test-and-essay-faq>.

¹⁴ Nanette Asimov, “UC Settles Student Lawsuit, Agrees Not to Use SAT, ACT Scores in Admissions,” San Francisco Chronicle (San Francisco Chronicle, May 15, 2021), <https://www.sfgate.com/local/article/UC-settles-student-lawsuit-agrees-not-to-use-16178677.php>.

¹⁵ “1,760+ Accredited, 4-Year Colleges & Universities with ACT/SAT-Optional Testing Policies for Fall, 2022 Admissions,” FairTest, accessed October 1, 2021, <https://fairtest.org/university/optional>.

In fact, test scores aside, even students who are academically accomplished with high GPAs often suffer in the game of standing out from their peers. As a former Cornell admissions officer Nelson Ureña noted, even academically stellar students can fail to stand out, as *“their applications lacked tangible indicators of their passions: a project, experiment, portfolio, or an endeavor on which they spent substantial time learning, tinkering, or creating.”*¹⁶ If research projects and creative portfolios provide this “tangible indication” of a student’s passion, creativity, and intellectual vitality, how exactly do they sway admissions decisions?

The Harvard Admissions Lawsuit – How Harvard Scores Applicants

As colleges go test-optional, educators wrack their brains for ways to help students distinguish themselves during the admissions process. Institutions, however, reveal precious little about their admissions processes and internal evaluation metrics.

Yet, in the on-going affirmative action lawsuit filed against Harvard University – [Students for Fair Admissions v. Harvard](#) – the prestigious university was required to release a trove of documents detailing their admissions criteria and process. These documents provide a rare glimpse into the black box that is competitive admissions. Prior to the publication of this white paper, filings in the lawsuit have been analyzed extensively by the media (e.g. [the Washington Post](#))¹⁷ and in [an influential blog post by Prompt.com](#), writing service company.¹⁸

Research Projects Demonstrate Academic Excellence in Harvard Admissions

Harvard explicitly states that *“Most applicants are academically qualified to attend Harvard.”*¹⁹ and scores of candidates apply with

Optimizing for a 2 or a 1 academic score is one of the most effective ways to dramatically increase one’s chances of admission. *“An applicant receiving a “2+” academic rating is typically an applicant with perfect, or near-perfect, grades and testing, but no evidence of substantial scholarship or academic creativity.”*

near-perfect GPAs and test scores. Indeed, as Harvard reveals, *“More than 8,000 applicants for the class of 2019 had perfect GPAs, approximately 3,500 applicants had perfect SAT math scores, and nearly 1,000 applicants had perfect ACT and/or SAT composite scores.”*²⁰ In order to select from a vast pool of qualified applicants, the university “takes an individualized approach to admissions that accounts for the whole person.”²¹ What does this look like in practice?

In effect, Harvard has developed an internal rating system. The first reader of a given application and a subcommittee chair “assign academic, extracurricular, athletic, and personal ratings to the applicant,”²² while looking for “distinguishing excellences.”²³ Each of the four areas (academic, extracurricular, athletic, personal) is scored on a scale of 1–4, where 1 signifies exceptional achievement and 4 is the lowest possible score. Typically less than 1% of applicants (less than 500 students out of 57,786 applicants 2020–2021)²⁴ receive a score of 1 in any given one of the four areas.

¹⁶ Contributor, “A Former Ivy League Admissions Officer Explains How Students Can Stand out in a Sea of Excellent Grades and Test Scores” (Business Insider, April 15, 2017), <https://www.insider.com/ivy-league-admissions-officer-college-application-tips-2017-4>.

¹⁷ Nick Anderson, “Dockets, Ratings and ‘Tips’: How Harvard Admissions Selects a Student,” The Washington Post (WP Company, October 22, 2018), <https://www.washingtonpost.com/education/2018/10/21/dockets-ratings-tips-how-harvard-admissions-selects-student/>.

¹⁸ “Strong Essays Increase Your Admissions Chances by up to 10 Times: Prompt Writing Center,” RSS, accessed October 1, 2021, <https://writingcenter.prompt.com/posts/strong-essays-increase-admissions-chances-by-up-to-10-times>.

¹⁹ Filing - Harvard Statement of Material Facts - as Filed, Case 1:14-cv-14176-ADB, June 15, 2018, https://projects.iq.harvard.edu/files/diverse-education/files/filing_-_harvard_statement_of_material_facts_-_as_filed.pdf, §23.

²⁰ David Card, “REPORT OF DAVID CARD, Ph.D.” Case 1:14-cv-14176-ADB (Document 419-141). Accessed October 1, 2021. https://projects.iq.harvard.edu/files/diverse-education/files/legal_-_card_report_revised_filing.pdf

²¹ Filing - Harvard Statement of Material Facts - as Filed, Case 1:14-cv-14176-ADB, June 15, 2018, https://projects.iq.harvard.edu/files/diverse-education/files/filing_-_harvard_statement_of_material_facts_-_as_filed.pdf, §25.

²² Ibid, §43.

²³ Ibid, §28.

²⁴ “Admissions Statistics,” Harvard College, accessed October 1, 2021, <https://college.harvard.edu/admissions/admissions-statistics>.

The table below shows the ratio of students who received a 1 in only one area (multiple 1's are extremely rare) and their chances of admission. This is based on a sample of 160,000 domestic applications between 2014-2019 studied in the [Arcidiacono](#)²⁵ data set:

"Harvard Admissions: Ratings of Exceptional Achievement over a 5 year period"

	Academic rating of 1	Extra-curricular rating of 1	Personal rating of 1	Athletic rating of 1
Number of applicants receiving rating	663	453	41	1340
% of applicants from pool	0.4 %	0.28 %	0.02 %	0.8 %
Admission rate	68 %	48 %	66 %	88 %

Data from a pool of 57,786 applicants over a 5-year period.
Source: Arcidiacono data set.

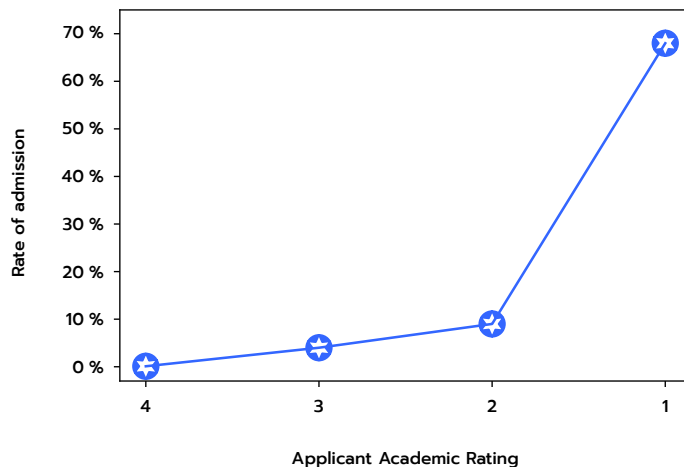
Another way to interpret this data is that in any given year, Harvard expects to award an academic score of 1 to 100-200 students out of the entire applicant pool, and fewer than 100 students for an extracurricular score of 1. While statistically it may seem easier to score a 1 on athletic abilities, for most non-varsity students, this route to admissions remains out of reach as athletic recruits are often chosen primarily for their athletic merits. It is virtually impossible to get a 1 as a personal rating.

While there may be a myriad of ways for students to improve upon their personal and extracurricular ratings, the path to increasing one's academic rating is clear and may be the most accessible gateway for academically-minded students. Harvard's materials state that "[t]he academic rating summarizes the applicant's academic achievement and potential based on grades, testing results, letters of recommendation, academic prizes, and any submitted academic work."²⁶

²⁵ Peter Arcidiacono, "EXPERT REPORT OF PETER S. ARCIDIACONO, No. 14-Cv-14176-ADB (D. Mass)," accessed October 1, 2021, <https://samv91khoyt2i-553a2t1s05i-wpengine.netdna-ssl.com/wp-content/uploads/2018/06/Doc-415-1-Arcidiacono-Expert-Report.pdf>.

²⁶ Ibid, §49.

The graph based on the Arcidiacono data set²⁷ below illustrates how academic scores affect one's chance of admission.



As an applicant's academic rating rises from 4 to 1, their rate of admission changes from 0.07% to 68%. Source: Arcidiacono data set.

Clearly, as students' academic ratings rise from 4 to 1, the respective probability of acceptance rises from 0.07% (essentially no chance of admission) to 3.9% (consistent with the overall admission rate) to 8.6% (close to double the overall admission rate) to 68% (2 in 3 chance). Thus, students choosing to distinguish themselves through the academic path can essentially double their chances of admission by striving for a rating of 2 (only about 42% of all applicants get this rating) and can come close to guaranteeing their admission by getting a rare rating of 1 (only a few hundred applicants per year). In other words, optimizing for a 2 or a 1 academic score is one of the most effective ways to dramatically increase one's chances of admission to Harvard (or other selective universities that follow Harvard's admission practices).

So what does it take to get a high academic rating of 1 or 2? Harvard states that "An applicant receiving a "2+" academic rating is typically an applicant with perfect, or near-perfect, grades and testing, but no evidence of substantial scholarship or academic creativity."²⁸ It is evident that traditional high-flyers can do well if they have excelled in school (doubling their chance of admissions by getting an academic rating of 2), but unless they have a track record of "substantial scholarship or academic creativity", that elusive rating

²⁷ Ibid, Appendix, Baseline data set, Model 6.

²⁸ Ibid, §52.

of 1 will remain out of reach. To further corroborate this point, Harvard makes it clear that *“In many circumstances, an applicant receiving a “1” academic rating has submitted academic work of some kind that is reviewed by a faculty member.”*

So what kind of work gets reviewed by a faculty member? According to Harvard, *“If the applicant has submitted material that Admissions Office staff believe would be best evaluated by a Harvard faculty member, such as an academic paper or a recording of a musical performance, the application may be sent to a faculty member [...] for review and assessment.”*

In summary, based on Harvard’s statement, to get the highest academic rating and have a 68% chance of admission, a student must submit an academic paper or another portfolio item that showcases their ability to carry out substantial academic scholarship.

Evidence for the value of research in admissions

At [Polygence](#), an online research academy that pairs students with PhD-level experts to craft original research projects, we’ve drawn on our own proprietary data to study how high-school research leads to markedly stronger admissions outcomes.

We sampled 128 Polygence alumni for the 2021 application cycle. Our data shows that 95% of Polygence alumni were admitted to R1 universities, defined by the Carnegie Classification as [doctoral universities](#) that perform “very high levels of research activities.”²⁹ Of the Polygence alumni admitted to such R1 schools in 2021, 78% chose to enroll in one, a strong indication that high school research correlates with sustained interest in engaging in research.

While high school researchers are a self-selecting group for research universities, it is significant that 80% of Polygence students also reported that their exposure to intensive research experience heavily influenced the way they approach their college major. What this clearly shows is that research at the high-school level influences not only college admissions outcomes, but the intellectual growth of the students in question.

²⁹ “The Carnegie Classification of Institutions of Higher Education,” Carnegie Classifications | Basic Classification, accessed October 1, 2021, https://carnegieclassifications.iu.edu/classification_descriptions/basic.php.

95%
of Polygence seniors were
accepted to an R1 university



78%
of Polygence seniors reported
going to a top research university
(R1 in the US or top research university abroad)



80%
of students say Polygence has
influenced what they’d like to study
in college or do for their career



Why Colleges Value Research-Focused Academic Projects³⁰

The DNA, radar, game theory and the Google search algorithm were all discovered at top research institutions, such as Cambridge, MIT, Princeton and Stanford. Research at these top R1s institutions is a collaborative effort between professors, graduate students, and undergraduates. This is why these schools look for students who are capable of doing high-quality independent academic work when evaluating prospective applicants. Even at predominantly undergraduate institutions, students engage in serious research, because such an open-ended activity cultivates creativity, persistence, and team spirit in students.

According to the U.S. News and World Report, *“High school students who have an impressive personal project they are working on independently often impress colleges, because their commitment to a successful solo endeavor conveys initiative, self-discipline and originality”*³¹.

Indeed, high school grades are often terrible predictors of future success (Sir John Gurdon, Nobel Prize winner in Medicine ranked last out of 250 in his year group in biology³²). Similarly, test scores, AP exams, and summer camps with a set curriculum give students little opportunity to showcase their academic creativity and intellectual rigor. This makes it difficult for colleges to identify the most promising students, particularly if they have a non-traditional background.

In contrast, a research project is by definition a unique and highly personal achievement that allows students to showcase their intellectual abilities. This is why colleges, from top research institutions to small liberal arts colleges, look favorably upon students who distinguish themselves through independent projects.

Student and Mentor Reflections on Personal Growth Through Research

“I went into the Polygence program having a relatively vague interest in neuroscience and cognitive disorders, but Polygence helped me narrow my focus and prepared me well for my undergraduate studies!”

Tori von Redden (student)
Freshman at Brown University
[Tori's research journey](#)



“Polygence offers a friendly learning environment where high schoolers are given the freedom and responsibility to design and direct their project - a critical skill in university-level learning that is seldom taught at the high school level.”

Niokhor Dione (mentor)
Postdoc in Microbiology
Stanford University



³⁰ This section has been adapted from Polygence's previous piece on <https://www.college-plannerpro.com/blog/the-power-of-research-projects-in-college-admissions>

³¹ U.S. News and World Report, <https://www.usnews.com/education/best-colleges/articles/2018-10-25/how-colleges-weigh-applicants-extracurricular-activities>

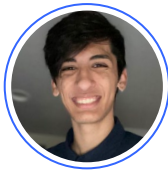
³² <https://achievement.org/achiever/sir-john-gurdon/#interview>

“I included my Polygence research in two major places on my college application: in supplemental materials sections, and in the essay to describe my own passions in the world of academia. My Polygence project was a perfect way to display my intellectual interests, as well as my own initiative and passion to pursue said subjects when they weren't available to me immediately. Most importantly, I was able to disclose something close to me that was not only extremely personal, but also impactful in the subject I wished to study.”

Luke Jain (student)

Freshman at MIT

[Luke's research journey](#)



Conclusion

From our analysis of the Harvard Admission Lawsuit and the insight of Polygence proprietary data, it is evident that original research stands out as a strong indicator of student academic achievement. Facing a seemingly unending flow of high-achieving applicants, universities have identified independent research as an effective measure to distinguish those with exceptional academic curiosity and grit.

For students themselves, original research allows them to showcase their passion and creativity as well as actively participate in an inherently collaborative intellectual endeavor. With each trial and iteration, research pushes individuals to examine their own role in a larger project of the advancement of knowledge.

As we forge ahead in a test-optional admissions world in the wake of a lingering global pandemic, it is high time we publicly recognize independent student research as the key to college admissions moving forward. In an environment where grades and test scores no longer suffice, project-based learning is the new way for students to let their intellectual vitality shine.

Works cited

"1,760+ Accredited, 4-Year Colleges & Universities with ACT/SAT-Optional Testing Policies for Fall, 2022 Admissions." FairTest. Accessed October 1, 2021. <https://fairtest.org/university/optional>.

"Admissions Statistics." Harvard College. Accessed October 1, 2021. <https://college.harvard.edu/admissions/admissions-statistics>.

Anderson, Nick. "Dockets, Ratings and ,Tips': How Harvard Admissions Selects a Student." The Washington Post. WP Company, October 22, 2018. <https://www.washingtonpost.com/education/2018/10/21/dockets-ratings-tips-how-harvard-admissions-selects-student/>.

Anderson, Nick. "What Gives You an Edge in Harvard Admissions? Check the Trial Evidence." The Washington Post. WP Company, October 18, 2018. https://www.washingtonpost.com/local/education/what-gives-you-an-edge-in-harvard-admissions-check-the-trial-evidence/2018/10/17/c8004068-d17d-11e8-8c22-fa2ef74bd6d6_story.html.

ARCIDIACONO, PETER. "EXPERT REPORT OF PETER S. ARCIDIACONO Students for Fair Admissions, Inc. v. Harvard No. 14-Cv-14176-ADB (D. Mass)." Accessed October 1, 2021. <https://samv91khoyt2i553a2t1s05j-wpengine.netdna-ssl.com/wp-content/uploads/2018/06/Doc-415-1-Arcidiacono-Expert-Report.pdf>.

Asimov, Nanette. "UC Settles Student Lawsuit, Agrees Not to Use SAT, ACT Scores in Admissions." San Francisco Chronicle. San Francisco Chronicle, May 15, 2021. <https://www.sfchronicle.com/local/article/UC-settles-student-lawsuit-agrees-not-to-use-16178677.php>.

"The Big Reveal from Harvard's Admissions Lawsuit: Essays Really, Really Matter: Prompt Writing Center." RSS. Accessed October 1, 2021. <https://writingcenter.prompt.com/posts/the-big-reveal-from-harvards-admissions-lawsuit-essays-really-really-matter>.

"The Carnegie Classification of Institutions of Higher Education®." Carnegie Classifications | Basic Classification. Accessed October 1, 2021. https://carnegieclassifications.iu.edu/classification_descriptions/basic.php.

"College Board Will No Longer Offer SAT Subject Tests or Sat with Essay." College Board Blog. Accessed October 1, 2021. <https://blog.collegeboard.org/January-2021-sat-subject-test-and-essay-faq>.

CommonApp. "Reports and Insights." Apply to college with Common App. Accessed October 1, 2021. <https://www.commonapp.org/about/reports-and-insights>.

Contributor. "A Former Ivy League Admissions Officer Explains How Students Can Stand out in a Sea of Excellent Grades and Test Scores." Business Insider, April 15, 2017. <https://www.insider.com/ivy-league-admissions-officer-college-application-tips-2017-4>.

Elsesser, Kim. "SAT, ACT Policies May Improve Diversity at Colleges and Universities." Forbes. Forbes Magazine, April 27, 2020. <https://www.forbes.com/sites/kimelsesser/2020/04/27/sat-act-policies-may-improve-diversity-at-colleges-and-universities/?sh=1d34557e3bd5>.

"Exploratory Research - Research-Methodology." Research. Accessed October 1, 2021. <https://research-methodology.net/research-methodology/research-design/exploratory-research/>.

"Filing - Harvard Statement of Material Facts - as Filed." Case 1:14-cv-14176-ADB, June 15, 2018. https://projects.iq.harvard.edu/files/diverse-education/files/filing_-_harvard_statement_of_material_facts_-_as_filed.pdf.

"Gender Imbalance in MIT Admissions Maker Portfolios." MIT Faculty Newsletter. Accessed October 1, 2021. https://web.mit.edu/fnl/volume/282/peterson_abelson.html.

"HARVARD ADMISSIONS LAWSUIT Supporting Documents." Supporting Documents. Accessed October 1, 2021. <https://admissionscase.harvard.edu/supporting-documents>.

"Introducing... Maker Portfolios!" MIT Admissions, August 22, 2013. <https://mitadmissions.org/blogs/entry/introducing...-maker-portfolios>.

Lukka, Kari. "The Constructive Research Approach," 2003.
https://www.researchgate.net/publication/247817908_The_Constructive_Research_Approach.

"The Nobel Prize in Chemistry 2020." NobelPrize.org. Accessed October 1, 2021.
<https://www.nobelprize.org/prizes/chemistry/2020/press-release/>.

Person. "What Is Empirical Research? Definition, Types & Samples."
Research.com, September 8, 2021. <https://research.com/research/what-is-empirical-research>.

"Strong Essays Increase Your Admissions Chances by up to 10 Times:
Prompt Writing Center." RSS. Accessed October 1, 2021.
<https://writingcenter.prompt.com/posts/strong-essays-increase-admissions-chances-by-up-to-10-times>.

Magazine, Smithsonian. "Space Archaeologist Sarah Parcak Uses Satellites
to Uncover Ancient Egyptian Ruins." Smithsonian.com. Smithsonian
Institution, December 1, 2016. <https://www.smithsonianmag.com/innovation/space-archaeologist-sarah-parcak-winner-smithsonians-history-ingenuity-award-180961120/>.

"WHAT IS RESEARCH?" MCJ Research Cell, May 2020.
https://mcjresearch.com/tdb_templates/attachment-template-2/.