# YOUNG INVINCIBLES

**COLLEGE SEARCH 101:**

# A College Search Tool Design Manual

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## Introduction: So you want a better college search tool?

Students and families trying to pick the "right" college understand how much is at stake in their decision. Postsecondary education is essential for individual economic success, social mobility, and labor market competitiveness. Students want an affordable college where they can succeed academically, get the education and skills they need to succeed in the workforce, and where they can feel comfortable and supported by the college community. With so many variables, the "right" college is different for different students. So how do students and families find the right college? Are students and families receiving the best information in making that choice? What kinds of technology and tools could help students find the right college for them?

Young Invincibles started this college search project in 2017 to try to answer those questions. We had three primary goals: 1) We wanted to understand how new online tools, social media, and search engines assist the college search process; 2) We wanted to explore tools that would help students who are less likely to have access to traditional counseling or other support, including working adults and first-generation students; and 3) We wanted to identify ways to incorporate online platforms into college search tools to more effectively guide students in their decision making. Exploring the student perspective is nothing new for Young Invincibles - we have been focused on the student voice and experience since our founding in 2009 and have done extensive research on ways to improve higher education for students. We previously conducted research on how to improve college information design and delivery, research which we were able to build on for this paper (Whitsett & Allison, 2015). However, we knew that a deeper dive on college search was necessary, particularly to look at how new technology and social media were shaping college search.

With support from the Gates Foundation, Young Invincibles kicked off our college search project in 2017, talking to dozens of partners in the college search space, from post-secondary data experts and policy advocates, to high school counselors and technology companies. We hosted a convening in DC for dozens of the leading thinkers about college search to try to understand the challenges and opportunities in creating a better college search tool (Allison 2017a). We came out of the convening with a set of ideas and further research questions which we have been exploring over the past six months. This "College Search 101" report is designed to synthesize the best academic research on the college search process, what works and what doesn't for modern students, and provide a blueprint for partners seeking to make a more-perfect college search tool.

In our research, we found that students must navigate a labyrinthine system of conflicting information from family, peers, counselors, data and rankings, and colleges themselves. Though somewhat outdated, there are five commonly identified steps in the pipeline from high school to a four year college: (1) have a desire to attend college; (2) complete any necessary academic preparation to apply to college; (3) take necessary admissions tests; (4) apply to a four year college; and (5) enroll in one institution (Choy et al. 2000, p. 5). Additionally, students must determine how they will pay for college. Navigating these critical steps is particularly daunting for first-generation students (FGS) and non-traditional students who may not have access to the support infrastructure that traditional, continuing-generation students (CGS) have.

This model does not consider, among other things, the steps for attending community college, nor what major to select, how many credits to take. All of these considerations are also crucial to the success of disadvantaged students.

Before the ubiquity of the internet, students relied on their parents, peers, school guidance counselors, and brochures or other materials prepared by universities (Gallotti & Mark, 1994). Later in the search process, students relied on campus visits, and college catalogs (Matthay 1989). The profile of college applicants who relied on these resources was typically whiter, higher income, and more enfranchised. The current profile of college applicants is far more diverse; a greater proportion of students are older, may have children, or are working while going to college (Anderson 2016; Westervelt 2016; Barrett 2018). As such, tool developers must rethink how to help these students.

There is a range of online college search tools already in use, and most include post-secondary data that can be helpful to students and families in making a college search decision. While many of the existing college search tools are well-designed and powerful for helping students, perhaps their biggest challenge is that they do not have an easy means of reaching the millions of students and families who need the information the most. YI analysis of the 2010 Survey of Consumer Finances found about 60% of respondents reported conducting no searching or moderate amount of searching for decisions related to credit and borrowing (Whitsett and Allison 2015, p.4). Working adults and first-generation students may not know that these tools exist and are instead relying on other sources, both traditional (ex. family, friends) and non-traditional (social media, smartphones and internet search).

One of the central ideas driving our college search project is that underrepresented student populations, namely working adults and first-generation students, need to receive better college search information through the channels they know and understand for it to be impactful. With that idea in mind, Young Invincibles has been working collaboratively with Google over the past year to brainstorm and explore the college search landscape, to provide insight on the student voice, and to understand what data can be most useful for students in making college search decisions. Quite simply, Google is where the greatest number of consumers turn for information online, and college search is no different. Google, which accounts for 87% of all United States searches, can play an important role in the college search landscape. (NetMarketshare 2018). Google just recently released new updates to their Knowledge Panel and search functionality which will have a significant impact on how students search for college and the information they receive. The updates now include critical information for choosing a college, ranging from completion rates to the cost of attendance, pulling from datasets like the College Scorecard and the Integrated Postsecondary Education Data System (IPEDS), as well as a more engaging user interface. We believe that creative approaches like this will be essential to reaching the millions of students who need this information.

## THE STRUCTURE OF THIS REPORT

This report is laid out like an instruction manual or blueprint for a better college search tool, and each section captures a piece of the existing research on the college search process.

Section 1 of this report examines the "what," "why," and "where" of building a better college search tool. Tools are made up of many parts, and understanding each part's function, why it is necessary, and where it goes results in a more useful and easier to build tool. Choosing the data points which students most prioritize is essential to creating a useful tool. To do this, one must understand how people obtain information about college as well as what information is available and most useful. Incorporating the right data will lead to a better decision and should be prominently incorporated into a tool.

After getting a better appreciation for the individual parts which make up our tool, we can manufacture and use our tool. Section 2 examines the "how," or, the design of a new tool. Interactivity and personalization are important factors to consider when designing a tool. The delivery medium is also essential to effectively reaching students. Positive user experiences also encourage further use and dissemination of the tool.

All tools need maintenance and online college search tool is no different. Section 3 focuses on getting prospective students across the finish line. Technological innovations can be incorporated into new and existing tools to improve prospective student outcomes.

Finally, Section 4 is our troubleshooting guide. Problems arise when creating a new college search tool. In this section, we analyze the most significant hazards in creating online tools and in higher education.

# Section 1 – Context and Content of a College Search Tool

The first step to building a better college search tool is incorporating information that students prioritize and trust. Social media and websites present unique opportunities for researchers, administrators, and institutions to reach students. Unlike a printed catalog, online resources provide a bevy of analytics, including sources of incoming traffic, how long users stay on the website, and what they click, allowing information providers, from colleges, to search engines, to increase the efficacy of their sites. What information students value in choosing a college may vary widely, from cost to class schedules to labor market outcomes, but the key to creating an effective college search tool is a clear sense of what students prioritize.

## HOW DO PEOPLE GET INFORMATION ABOUT COLLEGE?

Students get information about college from a wide variety of places, but we see some consistent trends. There are numerous studies on the influential role parents play in the college search and choice process (Ceja 2006; Knight et al. 2004; Perna 2006; Martinez et al 2013; Rios-Aguilar and Kiyana 2012). Friend networks, peers, and community also play a role in the college choice process. Information on college, however, is not distributed evenly. Students with college-educated parents and mentors, or who live in predominantly college educated communities, or whose friends and peers expect to go to college, have a distinct advantage in the college search landscape. Navigating the labyrinthian college search and application systems can be frustrating and may drive first-generation students away from college (Conley 2008, p. 10-11).

## PARENTS AND SIBLINGS

Parents are "the main source of support and inspiration for postsecondary plans" for young adults considering attending college (Langenkamp 2018, p.70). Despite the importance of this relationship, parents do not always have the answers to questions about college. First-generation students are at a particular disadvantage because their parents lack the personalized experience which comes from going through the college search process themselves.

Parents' educational attainment predicts their children's postsecondary success regardless of income, educational expectations, academic success, and parental and academic support in the college application process (Choy, 2001; Choi et al 2008). It also affects on-time completion and degree attainment. When comparing socio-economic status and parental education level, students from families in the bottom quartile of income and neither parent with a college education are only 19 percent likely to graduate within four years. For their counterparts with parents with a college education, the rate is 39 percent. A student from the top income quintile but whose parents did not graduate from college is only 3 percent more likely to attain a bachelor's degree than a student from the bottom income quintile who has a parent with a college degree (Bowen et al, 2009).

First generation students are at a distinct disadvantage in the college search process because they cannot rely on their parents for specific postsecondary advice (Engle 2007). Rowan-Kenyon, Bell, and Perna (2008) outlined a number of reasons why:

> **Parents who have not attended college are less likely to participate in college planning activities because they do not perceive such activities to be consistent with their view of appropriate behaviors (i.e., their role construction), because they do not believe that their involvement can have a positive effect on their child's college outcomes (i.e., their self-efficacy), or because they do not believe that the school wants them to be involved.** (p. 567).

Despite this, parental involvement in academic matters, such as keeping track of school performance or engaging with teachers, is positively related to college enrollment (Perna and Titus 2005). Similarly, Wang & Sheik-Kahill (2014) found that parental involvement in academic matters predicted adolescent academic success and mental health both directly and indirectly through behavioral and emotional engagement.

On the other hand, parents of first-generation students can support their children's college search in other ways. Messages and stories about family struggles are used to propel students into college and affirm their commitment to education (Bruner 2017; Rondini 2016). Wang (2014) identified five categories of "memorable messages" which center the transition to college around familial relationships, including "remembering family," "focusing on family," "counting on family," "not worrying about family," and "setting a good example" for other family members (p.276). These "memorable messages" serve to view "family struggles and life in the home community as experiences that had made FGC students into the people they were as they entered college." (p. 282).

Centering postsecondary success around family struggle is in contrast to continuing-generation students, who might see their college attendance as preordained or inevitable (Langenkamp 2018, p. 73). Continuing generation students see their parents as "examples of success, providing concrete examples of the benefits of going to college and earning a degree" while first-generation students focused on "their parents' struggles" (p. 70). This creates dissonance for first-generation students who are striving for a college education which will make them distinct from their family, friends, and community (p. 78-79). Nichols and Islas (2016) characterize this dynamic as "pushing" and "pulling." Continuing generation students are "pulled" through their college transition "with specific advice from their parents about how to succeed in college" while first-generation students are "pushed" through their college transition with general emotional support and encouraging messages (p. 24-25).

Older siblings also serve as valuable information sources to prospective college students. For first-generation college students, older siblings can establish a college-going culture in the house and expose both siblings and parents to the college application and choice process (Ceja, 2000). Older siblings understand this responsibility. Not only do they supplement parents as college information

sources, but they also serve as examples to their younger siblings (Ceja 2006, Elias McAllister 2012, Langenkamp 2018).

Older siblings also have a profound influence on where their younger siblings apply. Younger siblings learn about their siblings' schools through campus visits, conversations, and their siblings' social media accounts. They ultimately tend "to have more information about their siblings' institutions than others" they are considering (Kaczynski 2011 p. 124). Goodman et al, (2015) examined the relationship between siblings' college choices by matching College Board data from 1.6 million sibling pairs to records in the National Student Clearinghouse.

**The researchers found that younger siblings tend to apply to and enroll in the same institutions as their older siblings.**

Even when controlling for other variables, the decision of an older sibling to enroll in a high-quality school was predictive of their younger sibling's decision to also apply to a high-quality school. This is true for siblings regardless of income, race, or proximity to colleges (Goodman et al., 2015).

Other studies have emphasized the effects of older siblings college attendance on younger siblings in the African American and Hispanic communities specifically. Having college-educated siblings raises the likelihood of college attendance for younger siblings in African American families (Loury 2004). Another study focused on college outreach programs and the linkages between family, school, and peers among African American and Hispanic youth in California. College outreach directors "viewed parents and families as overriding determinants of students' engagement and continued participation as well as their ultimate success in higher education" (Cooper et al. 1995, p. 6). Students also noted the importance of siblings and parents. Hispanic students relied on older siblings for mentorship and as an advocate to convince parents to allow younger siblings to attend college. African American students noted the critical role of their parents and grandparents in their academic success (p. 9).

## FRIENDS AND PEERS

Friends who intend to go to college are also an important source of information for prospective students. One study used data from the 2009 and 2011 High School Longitudinal Study to identify the role friends play in educational expectations. The authors determined whether friends' college plans influence one another, or if people simply choose friends with similar goals. The analysis found that friends' plans for college have a "substantial and significant effect" on an individual's education expectations (Carolan 2017, p. 9).

**Another study examined the role played by peer networks in African American students' college choice process. The author found that peers influence their friends' academics and college choice, particularly in recommending that they attend college, advising on college visits, and whether or not to accept a specific college admission offer** (Holland, 2011). Low-income youth, foster-youth, and English learners show similar peer influence effects on academic expectations and college choice (Sokatch 2006, Kilgore 2017, Huang 2017).

In some instances, this peer level support is institutionalized. Numerous programs exist around the country to provide students with peer-to-peer support and guidance through the entire college application and enrollment process. The Texas Go Centers are a great example of this. High school student peers run the Go Centers, which act as "information centers" in Texas high schools (Cunha, et al., 2017). These peer networks provide information to high school students on "college choice, the application process, financial aid, and standardized tests" (ibid.)

There is no support for Texas GO Center students once they reach college. Students served by GO Centers are typically Hispanic or low-income. The study notes that peer-to-peer persuasion and information dissemination are cost-effective and powerful (Ibid.). They can also create a college-going culture and "normalize" the college application and choice process for students without traditional support networks for college access (Ibid.).

Another study analyzed the COACH program in Massachusetts which brings Harvard students into Boston high schools to assist students with the college choice and application process. The authors compared students from urban and suburban schools and found that these groups had similar perspectives on college cost. They also had similarly ambitious plans for college attendance. The COACH program set goalposts and helped students prepare to face minor hurdles, like taking the SAT or financial aid deadlines, in the college application and preparation processes. These minor hurdles, however, sidelined low-income students from the college application process (Avery & Kane, 2004).

## SCHOOL COUNSELORS

School counselors are a source of information for all students and can provide college-specific information which is not readily available from non-college educated parents (Robinson and Roska, 2014). Meeting with a counselor by 10th grade increases the overall likelihood of applying to college and the total number of completed colleges applications. (Bryan et al 2011 p. 194). More counselors also correlate to "statistically significant positive effects on students applying to two or more universities" (p.195).

Access to counselors is particularly important for under-resourced schools where students lack easy access to college information. Counselors at these schools emphasize facts about college and information on the mechanics of the application process but do not provide critical context such as how a students' GPA compares to the average GPA of incoming college freshmen at a particular school (Shamsudden 2016 p. 27-28). Students are left to piece together the information from their counselor with information from their research, putting first-generation students at a distinct disadvantage compared to their continuing-generation peers (p.29).

## COMMUNITY LEADERS AND MENTORS

Adults within a prospective student's community can also provide information and support through the college choice process. High-resource adults in the community can provide information, socialization, and access to youth who may have little access to these necessities (Sullivan & Larson, 2009; 100). These relationships provide the foundation for mentorships, job references, and help with "navigating

the college application process." (p. 116). They establish a college-going atmosphere among students and provide a spark to get students excited about going to school, graduating, and getting a job in a field which interests them.

## SEARCH ENGINES AND SOCIAL MEDIA

Search engines and social media play complementary, yet very different, roles in the search process. Online search helps most in the early stages of college search as students narrow down a list of potential schools, while social media helps students decide which specific school to enroll at (Rogers and Niles 2017).

## SEARCH ENGINES

Nearly 90% of adults in the United States use the internet (Pew 2018(a)). For young Americans, internet usage is nearly universal. Internet usage is 98% among 18-29-year-olds and 97% among 30-49-year-olds (Pew 2018(a)).

Universities used to rely on brochures, viewbooks, catalogs, and other mailers to reach students who would not otherwise be exposed to their programs (Gallotti & Mark, 1994; Matthay 1989). Students may still use these resources, but they are also turning to the internet (Hartley and Morphew 2008).

**Over 90% of high school juniors and seniors are using at least one college search or aggregate review site in their college search** (Rogers and Niles, 2017, p. 5).

When using search engines, students begin their search by broadly looking at what informational resources are available (Brown et al., 2016, p. 108). From there, students look at individual programs as well as school aggregating websites like CollegeBoard (Ibid). These searches "led to the development of routines in which students often started with a broad question...and would then proceed to individual institutional sites to access more information about a specific school that fit their search criteria" (Ibid).

College information is widely available on the internet, but it may not be easily found or particularly useful for students (Brown et al., 2016). College websites have similar designs and information, featuring online tours, programs and classes, application links, and financial aid information. Students have a hard time discerning the difference between them (Saichaie 2011, Saichaie and Morphew 2014, Brown et al 2016). This is particularly important for first-generation students who may lack traditional resources to help sort and contextualize college information. Students who lack context rely on sources who can translate the information, ensuring that it makes sense and applies to the students' situation (Brown et al., 2016 p. 110).

## SOCIAL MEDIA

The need for individualized attention, as explored above, is a unique opportunity for social media to

play a role in the college search process. How we interact with people and institutions changed with the astronomical growth of social media platforms. In 2005, only 7 percent of American 18-29-year-olds used at least one social media site. Today that number is 88 percent (Pew 2018(b)). For 17-18-year-olds in 2016, Snapchat was the most frequently used social media app (67% use at least once per day), followed by Instagram (63%), Facebook (48%), and Twitter (35%) (Rogers and Niles 2017, p.14). The explanation for Snapchat's popularity is three-fold: anonymity (snaps disappear after a designated time), it works off Wi-Fi instead of SMS messenger (and thus does not count against a mobile data limit), and the app works on non-smartphone devices like iPads and computers (Lagorio-Chafkin, 2018)

Young adults use social media to seek information on everything from health information to news to colleges (Rodriguez et al., 2017; Shearer and Gottfried, 2017, Joen et al., 2016). According to a 2016 survey of over 3,500 high school juniors and seniors,

> **37% of students have used social media to research colleges and universities, 60% have liked or followed a school from their considered schools, and roughly 40% say that social media conversations influence where they plan to enroll** (Rogers and Niles 2017, p. 14).

When students use social media for college search, they are getting a better sense of campus life by consuming videos from a specific college (82% have done this during their college search) or from current students at a specific college (47%), reading student blogs (40%), and searching for specific hashtags (31%) (Rogers and Niles 2017, p. 14-15). The most frequently used social media apps for college search are Instagram (68% have used this during their college search), Facebook (63%), Twitter (46%), and Snapchat (42%) (Rogers and Niles 2017, p.13).

Social media has an outsized impact on college search for first-generation students. Wohn et al (2013) found that, though first-generation students had fewer Facebook friends who graduated college, social media contacts "still significantly predicted" how confident students felt about applying to college (p. 434). When presented explicit information about their social media contacts' college credentials, students are more likely to reach out to contacts whom they perceive as "more likely to provide easy-to-understand answers, more knowledgeable, and more likely to give reliable answers" (Jeon et al 2016, p. 10). In fact, "this difference was significant only for those who lacked access to college information sources" (Ibid). Social media has an opportunity to reach first-generation students and influence their search process by connecting them with schools, students, and other contacts who can provide institutional and anecdotal evidence about college.

First-generation students develop greater confidence in their knowledge of the college application process through their social media contacts (Wohn et al., 2013). They can do this by developing social capital, or the "extent to which individuals are able to access and mobilize resources in their social network" (Wohn et al, 2013, p. 425). Low-income teens, specifically, relied on contacts which were made more accessible by social media sites throughout their college planning process (Greenhow and Robelia 2009).

## WHAT INFORMATION SHOULD BE INCLUDED?

Young adults want to go to college for numerous reasons, including better-paying jobs, pursuing a passion, becoming better citizens, and learning about the world. College search tools must determine what information will best meet these needs while at the same time considering reliability, timeliness, and current data limitations. For example, transfer students and students not enrolled in Title IV programs are often not accounted for in the data. Important metrics like loan repayment and program-level workforce outcome are all things that students care about, but we have trouble collecting.

## HIGHER EDUCATION DATA

The higher education data landscape is fractured across the federal and state agencies, private entities like the National Student Clearinghouse, and institutions (Young Invincibles 2016; McCann and Laitinen 2014). The student unit record ban, which limits the Department of Education from creating a database of information on all students enrolled in postsecondary education, further complicates the landscape (Miller 2016).

The inability to link higher education data is bad for institutions, policymakers, and students. Evidence shows that higher education data empowers prospective students to make better decisions and find their best-fit, shifting students away from low-earning programs (Hastings et al. 2018, p. 24). Linking this data at the federal level will give students a deeper understanding of how students like themselves do in college (Whistle, 2017).

This information can come in the form of outcome data such as graduation rate and salary information, cost and debt data, campus safety measures, or measures of civic learning and engagement.

## OUTCOMES AND COST

Numerous studies show that students believe a college credential will lead to better employment outcomes (Paulsen 1990; Nafukho 1998; Fishman 2015). Noel-Levitz (2017) surveyed students at four-year private institutions, four-year public institutions, two-year public institutions, two-year career and private schools, adult learners, and online learners.

> **Future employment opportunities ranked as one of the most important factors in college choice for students at 2-year career and private schools, adult learners, and online learners**
> (Ibid).

Though students prioritize earnings and employment outcomes, they also tend to overestimate graduate earnings by as much as 100% (Hastings et al. 2018). Data interventions, however, can lead students to revise their expectations and change their enrollment and program plans (Wiswall and Zafar, 2013). This effect is most pronounced for students with the least information about post-secondary education (Pekkala et al. 2015). Outcomes information "shifts students away from low-earning, low-selectivity

programs and towards low-selectivity programs with higher earnings for past students, with demand for spots in the lowest-earning programs falling by 5% overall" (Hastings et al. 2018, p. 24).

Prospective students can now find graduate salary information by institution, thanks to the College Scorecard, but this is insufficient for students who need to make a fully-informed decision about which school to attend and major to study. Salaries vary widely by program and studies show that major matters much more than the institution attended. Median earnings for architecture and engineering graduates is $39,000 greater than for education graduates (Carnevale and Cheah 2018). Choosing a high paying major also matters more than choosing a selective institution. Graduates in high earning majors from open-access Texas schools earn more than graduates in low earning majors in selective Texas schools (Carenvale et al 2017). In fact, "graduates who majored in architecture and engineering at UT System open-access college have median earnings that are higher than 61 percent of all UT System graduates at selective colleges" (p.12). Ultimately, institutional-level salary data is "either unhelpful or misleading for large numbers of families and students" (Chingo and Whitehurst 2015, p.4).

Cost and financial aid opportunities are another critical factor in college choice. Overall, students place a significantly high level of importance on the manageable costs of college when deciding where to attend (Scott-Clayton 2013). Both overall cost and financial aid opportunities ranked among the top factors for every student group surveyed by Noel-Levitz (2017). It was ranked first for students at four-year private universities, four-year public universities, and two-year community and technical colleges.

Financial aid has a demonstrable effect on college enrollment - as more aid is made available, the likelihood of matriculation increases. In one study, researchers examined the matriculation decisions of Williams College students from 2008 to 2012. They found that the net price of tuition is a strong predictor of matriculation. Students who received no aid offer, and thus were expected to pay tuition sticker-price, were 12% less likely to matriculate (Nurnberg et al., 2012).

## CAMPUS SAFETY

Colleges are required by law to report crime statistics to the public in the form of annual security reports, crime logs, timely warnings, and crime statistics (Cleary Act of 1990). This data is available from the Department of Education and allows for analysis of individual campuses, comparing multiple schools, and pulling data on specific crimes. Institutions provide statistics for on-campus facilities, on-campus student housing, university buildings not on campus, and public property which is on-campus or abutting the campus.

Awareness of campus annual security reports is low, despite the requirement that schools disseminate their reports to current and prospective students. One survey found that 22% of students read the annual security report disseminated by their university and, of that number, only 8% used the report to help make their college choice (Janosik and Gehring 2003). Another found that only 6% of parents used a school's annual security report when helping their children select a college (Janosik 2004). Low awareness and low usage, however, do not negate the importance of this information in making an informed college choice. Prospective students and their parents may be absorbing this information through other outlets or by finding it on their own through school websites (Carrico 2016).

## CIVIC ENGAGEMENT

Colleges are not workforce incubators churning out the next generation of workers, but rather serve a larger role in creating engaged and knowledgeable citizens (Dorn 2017). Some prospective students are driven by civic engagement work and may consider when they are finding their best-fit institution or major. While civic engagement may be difficult to quantify, measures exist which can give a sense of its overall importance on campuses.

The National Task Force on Civic Learning and Democratic Engagement (2012) suggest a framework definition for civic engagement consisting of:

- Knowledge (of democratic processes, history, and other cultures/traditions)
- Skills (critical thinking, reasoning, and collaboration)
- Values (respect, empathy, responsibility), and
- Collective action (taking action with other people based on one's knowledge, skills, and values). (p.4)

This framework fits well with college mission statements, which typically "contain some reference to the civic preparation of younger generations" (Flanagan and Levine 2010, p. 169). Higher education initiatives like Students Learn Students Vote and the American Association of State Colleges and Universities' American Democracy Project are focused on organizing colleges to encourage voting and promote civic engagement among students.

Civic engagement on college campuses is hard to quantify, but voter turnout, voter registration, and overall campus political attitudes are available at some level. The Institute for Democracy and Higher Education (IDHE) at Tufts University's Tisch College manages the National Study of Learning, Voting, and Engagement (NSLVE), which combines student records from the National Student Clearinghouse with voter registration and turnout records (NSLVE FAQ 2018). NSLVE reports for individual campuses are not available to the public, but IDHE does make some data available at the state and Congressional district level. The Princeton Review also measures campus political involvement and partisanship in its annual survey of college students (Princeton Review 2018).

# Bringing The Data Together - The College Scorecard

One of the best places to get information on the workforce outcomes, cost, and financial opportunities of college is the College Scorecard. The U.S. Department of Education introduced the College Scorecard in 2015 to give consumers a way to compare data (such as the cost of attendance, graduation rate, and earnings) from higher education institutions throughout the country. The data has been updated twice since its debut, and new features have been developed based on consumer feedback (Hirschfeld 2017). The Scorecard can help in the development of new tools because it warehouses education data and makes it available to the public.

The Scorecard relies on data from the Integrated Postsecondary Education Data System (IPEDS), National Student Loan Data System (NSLDS), and administrative earnings data from the Department of Treasury. IPEDS is an annual survey mandated for universities participating in Title IV federal student aid programs. The Scorecard relies on IPEDS data for institutional information, performance information, and characteristics of enrolled students (College Scorecard 2018, p.29). NSLDS is a database for federal student aid with student borrower information dating back to the 1960s. The Scorecard uses NSLDS data to measure performance metrics like median cumulative loan debt, institutional cohort repayment rate, cohort completion and transfer rates, and student demographic information (College Scorecard 2018, p.29-31). The Treasury Department provides administrative earnings data from tax records to measure labor market outcomes by postsecondary institution. This allows the Scorecard to provide outcomes measures like mean and median earnings among workers 6 to 10 years after first enrolling in an institution, the fraction of former students earning more than $25,000, and the percentiles of earnings distributions for workers (College Scorecard 2018, p.32-33).

The Scorecard uses an open application program interface (API) so outside organizations, researchers, and policymakers can extract, customize, and utilize the data to develop new tools and conduct analysis (White House 2015). At its site

launch in 2015, 11 organizations had already integrated Scorecard data into their tools (ibid). By late 2016, over 600 developers had accessed the Scorecard API (Mitchell 2016).

People are using the Scorecard site. Michael Itzkowitz, a senior fellow for education at Third Way and the former director of the College Scorecard, regularly tracks Scorecard usage. In May 2016, Itzkowitz cited 1.3 million unique users of the Scorecard website (EAB 2016). By September 2017, the Scorecard had registered 2.5 million users (Krieghbaum 2017). In May 2018, Itzkowitz reported 93,000 views of the Scorecard site in the previous month and 1 million expected users by the end of 2018 (Itzkowitz 2018). Despite high usage statistics, student awareness lags.

YI asked 73 high schoolers from around the country about the College Scorecard. While the students thought the tool was designed well and had information which would help in their college search, 97% of the students had never heard of the Scorecard (Ohene-Okae, 2016). The release of the Scorecard led to more Google searches related to college attendance metrics (tuition, graduation rate, earnings), as well as for high-earnings, high-graduation rate, and low-tuition schools, but the size was negligible (Huntington-Klein 2017).

Further, research shows that the College Scorecard is not utilized enough by students who would benefit the most from the data. In one innovative study, researchers used SAT score sends to colleges to examine how students responded to the College Scorecard (Hurwitz & Smith, 2017). The authors found no impact due to annual cost or graduation rate data but did find that, as reported earnings data rose, so too did score sends. While this is promising, the increases were concentrated among well-resourced students (p. 29).

In addition to spending money and time trying to bring prospective students to the College Scorecard, we should also bring this data to them. Integrating the data into search results is a simple solution to disseminate Scorecard data and ensure that students, regardless of resources, utilize the information.

## STUDENT REVIEWS

In general, consumers trust outside validators. For colleges, this comes in the form of reviews from current students and alumni and rankings from sites like Princeton Review and US News and World Report. Google has already incorporated rankings information into its updated knowledge panel.

Authenticity matters to users searching for information online. Walther and Parks (2002) examined ideas around authenticity, namely signaling and warranting, in their seminal work on computer-mediated communications. Signaling theory analyzes cues from individuals to determine if they are honest or not (Donath, 2007). Assessment signals are "inherently reliable because producing the signal requires possessing the indicated quality" (p. 3). Scoring a perfect 1600 on the SAT is a reliable signal of cognitive ability, as someone less able would not be able to achieve this score. Conventional signals, such as posting one's age or weight on an online profile, are less reliable because they are easy to manipulate. Social mores and costs for getting caught act as a check on conventional signals (p.4). Warranting theory holds that, in an anonymous environment, information generated by another person is more believable than self-generated information from institutions because there is less opportunity for manipulation (Walther & Parks, 2002). For colleges, this means that current students and other outside resources can serve as an information validator for prospective students because outside validation from current students is difficult to mimic.

The internet creates a resource-rich environment to study authenticity. Self-referential claims made online are not trusted without validation by other people. Prospective college students may not trust a college's claim about the quality of their programming without support from current students, alumni, professors, and other outside validators. Users consider information sources which are costly to obtain or mimic, such as professional credentials, as more reliable for assessing information quality and source expertise (Donath, 2007). Another study evaluated warranting in social media by asking subjects to analyze Facebook comments. When evaluating Facebook comments about a profile owner's attractiveness, subjects attached significantly more weight to comments made by the profile owner's friends than the profile owner themselves (Walther et al., 2012).

A schools' social media presence will make that school more approachable to prospective students. Shami et al (2009) created a program which analyzed outgoing emails and instant messaging transcripts at a major multi-national company. This data inferred social connections and subject expertise. Study participants used the software to search for experts on a given topic. The search results for each contained their corporate directory information, writings, social connections, social bookmarking tabs, and mailing list memberships. The authors found that "information that is costly to fake was influential in how people perceive and utilize different information" (Shami et al. 2009). Study participants relied on social software participation as a signal for the approachability of an expert and as a way to verify expertise.

Authenticity is not limited to human expertise and trustworthiness. Consumer reviews are a stronger predictor of trustworthiness of online retailers than assurance seals. (Utz, et al., 2012). Information generated by others has a higher impact on interpersonal behavior than self-generated information (Utz,

2010). There is a limit to this phenomena. Low volumes of user-generated information result in greater reliance on expert analysis. (Flanagan & Metzger, 2013).

Online tools like Niche, Princeton Review, StudentsReview, and Unigo provide platforms for peer-to-peer information sharing in the college space. These websites allow students to rate their professors, schools, programs, and peers on topics such as clarity, helpfulness, easiness, and attractiveness. Additionally, students can leave open-ended comments to explain their ranking.

Two studies of RateMyProfessor.com analyzed how the site influenced students' expectations. Both found that the influence of others'-information guides individual students' expectations of an individual class and professor (Kowai-Bell et al., 2011; Kowai-Bell et al., 2012). The first study asked students to remember a time they visited RateMyProfessor and enrolled in a class from the professor reviewed (Kowai-Bell et al., 2011). These students reported that using RateMyProfessor led to a "favorable impression of the prospective professor" (p. 3). This, in turn, led students to report feeling more in control of their course grade and more positive of the class as a whole. The authors found that positive comments on RateMyProfessor led students to believe they could better control their academic outcome and made students look forward to class. The second study applied these concepts to graduate students and found similar results (Kowai-Bell et al., 2012). The concept of peer-to-peer reviews of individual classes and professors can be applied to institutions because they adjust student expectations and students believe them in the first place. Providing information to prospective students from students already enrolled at an institution gives them a greater sense of control over their academic outcomes.

# Section 2 - Design and User Experience

Ultimately, a new tool is only as useful as its design. History shows that an ugly tool with a poor interface and user experienced is underutilized (Allison 2017b) while an aesthetically pleasing tool is perceived as more useful (Tractinsky et al 2000). Prospective students have many options, and a new online tool which does not meet their needs, data, aesthetic, or otherwise, will not maximize its effectiveness (Moss et al., 2006). YI has studied college search tool design and found that tools must be mobile friendly, have visualizations and pages which rely on one-to-two color palettes, a limited number of fonts, adequate use of white space, and must have easy to understand language (Hirschfeld 2017).

## MOBILE OPTIMIZATION

Web developers must consider a site's mobile interface as smartphones become universal. Pew found that 94% of 18-29-year-olds and 89% of 30-49-year-olds own a smartphone (Mobile Fact Sheet 2018). Smartphones represent the primary source of home internet access - 28% of 18-29-year-olds and 24% of 30-49-year-olds (Ibid).

> **Optimizing websites for smartphone access is particularly important for reaching non-white and lower-income Americans who rely disproportionately on mobile broadband to access the internet**
> (Mobile Fact Sheet 2018, Prieger 2013, Perrin 2017).

African Americans, Hispanics, and other racial minorities have fewer options than whites for fixed broadband providers but more options for mobile broadband providers (Prieger 2013). Prieger attributes this gap, in part, to the greater likelihood for racial and ethnic minorities to live in urban cores (p. 9).

## COLORS, FONTS, AND WHITE SPACE

Utilizing a meaningful color palette, a limited number of fonts, and adequate white space creates a solid foundation to add text to the tool. Color adds depth and emphasis to a webpage and can evoke emotions or represent the collective understanding of specific concepts (Visual Design Basics 2018). Using the right colors and shapes in a design can induce a positive emotional state which, in turn, can produce better comprehension, reduce the perception of task difficulty, and increase a users' learning motivation (Um et al. 2011, Plass et al. 2014). Common practice dictates that visualizations and websites use one or two color palettes, often of complementary colors such as purple and yellow or red and green (Guy 2012, Visual Analysis Best Practices 2018). Colors and visualizations should be significant, such as using green for money or yellow to signify happiness.

> **Designers should use a limited number of fonts and use different fonts to categorize information, making it easier for users to identify information types**
> (Guy 2012, Visual Analysis Best Practices 2018).

Font size can also establish a hierarchy, with larger fonts signifying more important information (Visual Design Basics 2018).

Emotionally, white is associated with simplicity (Chapman 2010). Adequate white space in a tool or website's background creates a flow and establishes separate elements within the overall design (Guy 2012). It helps to "reduce noise, increase readability, and create illusion" (Visual Design Basics 2018).

## LANGUAGE, LABELS, AND INTERACTIVITY

Each prospective student begins her college search with different levels of inherent knowledge. One student may, through years of exposure from parents, peers, and teachers, understand the role of financial aid and how to sign up. Another student may have no idea what FAFSA is nor how to fill it out. In this case, our first student may not balk at a high sticker price because she knows that financial aid will help ease the burden. Our second student may see the price and decide he cannot afford to attend his best fit institution. He may enroll at another university or drop out of the process altogether.

Tool builders can level the playing field by including information on specific data points in easy to understand language and in an easily accessible manner. Messages which appear when the cursor hovers over an icon, otherwise known as tooltips, can provide supplementary information to users in an immediate, simple, and non-intrusive manner.

A number of studies have examined the effects labels have on choice and information processing. Well-designed labels, with interactivity and information which the consumer found important, led to better decisions.

Design and interactivity can have a significant effect on retirement savings decisions (Gunaratne & Nov 2015). In one, three groups of participants used retirement-saving simulators to make 34 yearly asset allocation decisions, with a savings end goal of $1.5 million. The researchers paid the subjects for their participation in the study and gave a bonus for achieving the retirement goal, rather than maximizing their returns or evading risks. The bonus decreased proportionally to the deviation from the end goal of $1.5 million. One group received "expert level" advice from a simulator using the standard formula used by most financial firms to determine stock and bond allocation in target-date retirement funds. The simulator informed users, as they made their choices, that "current research" recommends this allocation. Users then received information on yearly percentage allocation and how it would affect the overall balance of the entire retirement portfolio. (2015, p. 211). Another group received information on the average yearly asset allocation percentages from other participants in the study. The third group received a standard user interface similar to other online retirement-savings simulators without the added "expert" or "peer" information. In the end, users who received the "expert advice" were closest to the end goal of $1.5 million, made the most number of asset allocation changes, and were far more likely to end within 10% of the savings goal (2015).

In another study, researchers created an interactive financial information label for investment products (Gunaratne & Nov 2017). Users then played a retirement savings simulator which asked them to make

investment decisions over a period of 35 years. They were divided into four groups — one had an interactive label which they were required to use, another had an interactive label with the option to use, a third had a static label, and a control group with no label. The study found that information labels help users increase their long-term saving performance significantly. Users also better understand fund performance when it is in the interactive label. This study shows the importance of formatting and type of information that is presented to users during the decision-making process. The study also found that the label's impact on user performance changed with the user's expertise level. Novice users were able to perform as well as or better than expert financial analysts. The authors note that an interactive information label which "increases transparency and enables users to get a sense of the impact of choices on future outcomes" leveled the playing field (p. 1847).

Further research suggests that the design process can be used to develop informational labels for numerous complex topics. One study applied the nutrition label concept to website privacy agreements and found that users were better able to understand complex privacy policies (Kelley et al., 2009; Kelley et al., 2010). Another study proposed a design for an internet ISP nutrition label to help consumers better understand broadband access plans (Sundaresan et al., 2011). Another study used information labels to explore trade-off transparency in the purchasing of consumer electronics (Xu et al., 2014). The authors found that the more transparent the trade-off decision was, the higher the perceived quality of the decision. Users also reported that the interactive interface "triggered more sensory channels" and was more attractive, leading users to report higher satisfaction (p. 399). This, in turn, led users to increase their intention to use the interactive interface as well as to report lower decision effort.

Data labels are an effective way of conveying complex ideas in an easily digestible format. Interactivity can level the playing field between novice and expert level users. A similar label containing the data most relevant to college search and choice could also help level the playing field for first-generation and non-traditional students.

# Section 3 - Maintenance and Continuing Support

Effective tools are not a one-and-done experience, but rather should assist the user throughout the process, and integrate with tangible next steps like submitting a Free Application for Federal Student Aid (FAFSA). Integration with other technologies, such as calendar apps, text messaging, and reminder emails, can also provide the user with a gentle reminder and make the difference between a prospective student ultimately enrolling in college or not.

## REMOVING BARRIERS

Every barrier that students encounter in their college application and enrollment processes is another opportunity for them to give up and drop out. Students with traditional support infrastructure can rely on counselors or college-going family members to answer questions, keep on track, and avoid or get through any barriers as they arise. Web tools should include actions items to proactively guide students through common issues, including signing up for financial aid. Barriers also exist in search tools themselves, including creating an account to use the tool or being redirected to third-party sites.

## ENCOURAGING STUDENTS TO SIGN UP FOR FINANCIAL AID

The Free Application for Federal Student Aid (FAFSA) is the gateway to federal, state and institutional grants, work-study, and loans, yet nearly 30% of students did not apply for federal aid in the 2015-2016 school year (National Center for Education Statistics 2018). Students fail to apply for many reasons: because of the paperwork burden, they did not want to take on debt, lack of information about applying for financial aid, they believed they were ineligible for aid, or they had no need for aid.

Putting FAFSA front-and-center in a tool, and encouraging users to visit the site or fill out the forms, will increase awareness of available financial aid and the number of applicants. Reforms implemented in 2016 - allowing filers to use old tax data, opening the application in October instead of January, and using a data retrieval tool to pre-populate application fields with IRS data - led to an increase in the overall number of FAFSA applications by 10% (Argenti 2017). The Department of Education is making the FAFSA application more accessible to students by making its website mobile friendly and by creating a mobile app (Kreighbaum 2018, Carrns 2018). They also announced One way the Department of Education is looking to make the FAFSA application more accessible to students is by making it mobile friendly (Kreighbaum 2018). This provides a perfect opportunity for developers to link the FAFSA application to their tools.

## CREATING ACCOUNTS WITH SOCIAL LOGINS

Online tools often require accounts to fully utilize all of their functions, yet for many users, having to create a new account, fill out forms, and verify with a phone number or email address, causes significant user drop-out (Malheiros & Preibusch 2013). Websites and tools are turning to social logins, or the ability to sign in or create an account using existing social media or email accounts, to reduce the burden of creating new accounts for every site. Users trust social logins and use them - they improve user

experience and reduce transaction costs (Kramer et al 2018). Tool developers can also integrate links between social logins and cloud document storage - for example, signing in with a Google account automatically links Google Drive to the tool.

## EMBEDDING THE TOOL IN EXISTING CURRICULA

Online tools should strive to meet students where they are already looking for colleges. Many organizations help prospective students get to college. These organizations can direct students to existing tools or incorporate those tools into their existing curricula. For high school students, this means counselors or other college preparatory classes or instructors. Community-based and job training organizations who work with prospective students can also incorporate new tools into their curricula. Designers must create resources for these organizations to properly utilize their tools. Website developers need API to embed tools into existing websites. Practitioners and counselors need guides and training on using the tools.

## SETTING REMINDERS

Not only do college search tools have an opportunity to get information in front of prospective students, but they also have the opportunity to gently push prospective students to finish an application, apply for financial aid, file required paperwork, and enroll in classes.

Getting information in front of prospective students who may not have access to other resources in their college search and application is challenging. Nudging, or gentle reminders in the form of emails, text messages, and push notifications, gives information-providers an opportunity to encourage the use of their resources. **Integration with other technologies, such as calendar apps, can also provide the user with a gentle reminder and make the difference between a prospective student ultimately enrolling in college or not.**

## NUDGING OVER THE FINISH LINE

Technology creates a pathway for multiple reminders from multiple modes of outreach. Text messages, emails, and push notifications provide developers an opportunity to nudge students over the finish line in a cost-effective way. Designers should integrate these nudging methods into tool functionalities.

The research on student reminders focuses on two areas: improving outcomes for Pre K-12 students and on improving college-bound students' completion of FAFSA and, ultimately, college enrollment. In one study, parents of preschoolers received a weekly set of three text messages about literacy skills. The first text generated buy-in from parents by providing a fact about literacy development. The second text provided a tip designed to bolster parents' confidence in working with their child. The third text encouraged parents and provided another tip for teaching the weekly lesson. These text nudges to parents lead to improved early literacy among preschoolers (York & Loeb, 2015). Another study examined the use of text messaging to send parents automated alerts about their child's missed assignments, grades, and absences (Bergman & Chan, 2017). The researchers found that these interventions lowered the amount of missed assignments and increased class attendance.

Getting information in front of prospective students who may not have access to other resources in their college search and application is challenging. Nudging gives information-providers an opportunity to encourage the use of their resources. Bergman (2016) analyzed high school-parent communication portals and found that schools with higher income and higher student performance had higher login rates, indicating that merely making the information available does not alleviate the achievement gap for low-income and low-performance schools. Nudges in the form of mailers and phone calls not only increased parent logins but also spilled over to parents who did not receive the intervention, suggesting that developers can also reach peers.

Low-cost intervention methods such as text messaging can be undertaken early in the college application process and can target students who will most benefit. Colleges and universities can play an important and active role in the nudging process. In one experiment, researchers sent text messages to admitted students at the University of Virginia (UVA) reminding them of upcoming deadlines for FAFSA and College Scholarship Service (CSS) Profile. This intervention increased the number of students filing their CSS PROFILE on time by 3.1 - 4.3 percentage points. The text messages were most effective on students who had applied to the UVA early admission program (Castleman et al., 2017). The authors further note that predictive analytics strategies enable universities to "provide personalized, behaviorally informed guidance information" about majors, courses, and policy changes (p. 19).

This method also has the potential to impact college enrollment rates for low-income high school graduates. Castleman and Page (2015) created two text-message nudging interventions for low-income students to reduce the number of students who fail to matriculate in the summer between high school graduation and the freshman year of college. The first intervention reminded students of pre-matriculation tasks and connected them with counselors who could aid in the process. The second intervention connected students with near-age peers who could provide support over the summer. Both interventions had a positive effect on enrollment for students with limited access to college counseling or information.

Nudging is also effective for students enrolled in college and still making decisions about financing. In one experiment, researchers sent letters with information about student loan debt to students at a large public university with debt levels above a specific, high threshold. Students below the threshold received no letter. Using administrative data, the researchers found that the nudging information led to moderate decreases in the amount of funds borrowed. Students who received the information also performed better academically in the next semester (Schmeiser et al., 2017).

## CALENDAR INTEGRATION

Every step in the college application process has a deadline - from the application to FAFSA to course enrollment. For many students, missing one of these deadlines is enough to knock schools out of contention or even derail the entire college enrollment process. Integrating important deadlines into online calendars through services like Google and Outlook can address this problem. With one click, users can enter deadlines for the Department of Education, institutions, and scholarships into their calendars. Users can also create reminders for themselves and their parents. For prospective students, this functionality will save time and encourage efficient use of calendars (Mei 2016).

## SAVE FUNCTION

When users rely on search engines for their college search, they typically have to start over every time they come to the tool. Users can jury-rig a rudimentary save function using bookmarks and search alerts, but search engines and other tools should add a function for users to save their preferred colleges. Search engines can also collect information from users to remind them of what they have looked at. This serves as validation for students and reinforces the importance of the information and deadlines.

# Section 4 - Troubleshooting

The overall goal of a college search tool is to put information into the hands of consumers and help them make the best possible decision for their personal and academic goals. Numerous pitfalls await an information provider as they develop tools to assist in this process. Information processing bottlenecks and failing to understand the geographic constraints of students are two of the most critical hazards to avoid.

## INFORMATION BOTTLENECKS

In 2015, Young Invincibles identified seven bottlenecks in the information processing system: the importance of context; order effects; choice overload; data misalignment; the format of numeric information; ambiguity; and the quality of information (Whitsett & Allison, 2015).

## THE IMPORTANCE OF CONTEXT AND ORDER

Providers must consider how they are presenting information. If consumers do not understand the data, they may be unable to determine its relative importance. College information can be confusing, especially for first-generation and non-traditional students. Providers can best serve their consumers by being mindful of how they present college information.

Numerous studies have shown that the "context in which information is presented is critical to how consumers actually make decisions" (Whitsett & Allison, 2015, p. 7). Studies on this topic are similar to the scholarship around nudging. One study manipulated four different factors of loan offer information, including the description of loan terms, the inclusion of competitor information, the gender or race of the person in the photograph on the loan offer, and nudging through suggestive phone calls. The authors found that variability in all four factors impacted response to the loan offer (Bertrand et al., 2005). Another study provided information to consumers in both a standard font and a hard-to-read font. The researchers found that the hard-to-read font had a negative impact on how consumers perceived the difficulty of making a decision (Novemsky et al., 2007).

Information order can also cause processing bottlenecks. Information order can affect the overall total amount of information search conducted by a consumer and their perception of the results. One study of hotel search results found that consumers considered more options when results were listed in declining order (best to worst) than when results were listed in increasing order (worst to best) (Diehl & Zauberman, 2005). Another found that the presentation order of a list of cancer symptoms influenced participants' perceived risk of cancer (Kwan et al., 2012).

The presentation order of data during the college search process may affect how consumers perceive the importance of the information. For example, if designers list the cost of attendance above earnings data, research suggests users will give more weight to the first data point over the second. This has significant implications for how consumers think about the value of higher education.

## CHOICE OVERLOAD

Overloading the consumer with information leads to decreased decision-making effectiveness and may even lead consumers to forego a decision entirely (Botti & Iyenger, 2006; Dhar, 1997). This phenomenon is widely observed, including with grocery products, medical decisions, academic choices at community colleges, and tourism (Iyenger & Lepper, 2000; Redelmeier & Shafir, 1995; Scott-Clayton, 2011; Thai & Yuksel, 2017).

To combat overload, information providers must focus on simplifying and condensing all explanatory language and documentation for each choice. One study noted that particular emphasis should be given to the format and language to ensure that they are easy-to-use and understand (Lacko & Pappalardo, 2007).

In the context of the college search process, information providers must be careful not to overload their consumers with data. The College Scorecard has 2,000 variables in its data file and 25 information categories (average annual cost, number of students, and socio-economic diversity) on its consumer-facing dashboard. Including all of this data in a new tool is not practical and will overload potential students, diminishing the effectiveness of the tool and potentially causing harm to consumers.

## DATA ALIGNMENT AND THE FORMAT OF NUMERIC INFORMATION

Data alignment, or the commonality of attributes across choices, is essential for information processing. Studies have shown that consumers give greater weight to information which is alignable and discount information in which comparisons are not possible (Kivetz & Simonson, 2000). Non-alignable information also leads to more search effort and lower satisfaction in their final search outcomes (Griffin & Broniarczyk 2010).

Not only must information providers ensure alignment of attributes across choices, but they must also make sure that the format of any numeric information is also aligned and easy to understand. Even when consumers understand the relative importance of a piece of data, they may not understand what the data is trying to say (Durkin 2006; Martin 2010). Other studies show that consumers have trouble interpreting percentages and do better when financial information is presented in terms of absolute dollars (Ranyard & Craig, 1993; Lawrence & Elliehausen, 2008). The format of numeric information has important implications for the display of college data such as the number of students in repayment.

The challenges of data alignment and the format of numeric information underscore why standardized federal data, such as the College Scorecard, should be used in the development of a college search tool. Some states have developed college information portals and made data available to the public. While useful to prospective students considering colleges in those states, the data is spotty and misaligned. Each state determines its priorities and what data to make available. Confidentiality laws related to administrative data differ from state-to-state, potentially making it even harder to obtain information for national comparisons. Information in the Scorecard, by comparison, is standardized for schools across the country.

## AMBIGUITY AND THE QUALITY OF INFORMATION

Ambiguous information is a frequent bottleneck for consumers. Effective information must be easily available, complete, and understandable. One study analyzed the effect of ambiguous information on decision making by asking respondents to make a hypothetical business decision. Some respondents were given specific information on the amount of money already invested in their business. Another group was told that money was already invested in the business, but not how much. A third group was given no information on investments. The group given ambiguous information made similar decisions to the group which was given no information (Van Djik & Zeelenberg, 2003). Ultimately, ambiguous information is as effective as no information at all (Whitsett & Allison, 2015).

Young Invincibles defines quality information as that which is "parsimonious, unambiguous, and relevant to the target audience (Whitsett & Allison, 2015, p 10). Determining what information is important to a group of people and using the results to inform available options helps to improve the quality of the information presented. In one study, a survey was used to determine what characteristics of mortgages were most important to a group of respondents. The researchers created a prototype mortgage disclosure form from this information and presented it to a group of respondents. Another group was given the standard "Truth in Lending Act" (TILA) form. Respondents with the prototype form had a better understanding of their mortgage terms and reported a better understanding of the process (Lacko & Pappalardo, 2007).

Government data is objective and requires transparency in its collection and analysis. It is collected at regular intervals, prescribed by law or regulation. This may not be the case for non-governmental resources. Government data requires less data vetting in making a new tool. The government also has a public process to stop the collection of data, so resources will not vanish overnight as they can from non-governmental resources.

## GEOGRAPHICAL CONSTRAINTS, EDUCATION DESERTS, AND UNDERMATCHING

Tools which target 18-year olds looking for a residential college experience are biased against students who live at home, work, or wish to stay local while they attend school. This especially affects first-generation, low-income, and non-traditional student populations. Students may not be able or have a desire to move to another city to attend a "perfect" match school. Instead, they need information on best fit local colleges which can help them achieve their ultimate goal.

Studies have shown that proximity to colleges affects the decision of whether to go to college. Lopez-Turley (2009) found that each additional college in proximity to a student's home is "associated with a small but significant increase in the odds of applying to college, especially a 4-year college" (p. 126). Additionally, there is evidence that college proximity functions as a convenience mechanism - that is, proximity increases the odds of applying to a college because the transition to college will likely be logistically, financially, and emotionally easier (p. 129). Factors which play an important role in the college choice process, including campus visits and meeting current students or alumni, are logistically easier when the school is close-by.

What happens when there are no colleges nearby? Hillman and Weichman (2016) define education deserts as locations with either zero colleges or; where one community college is the only public broad-access institution (admitting more than 75 percent of its applicants) nearby. In their study, Hillman and Weichman used commuting zones and core-based statistical areas (CBSAs) to identify education deserts. They find that approximately 12.9 million adults live in commuting deserts while 25.3 million adults live in CBSA deserts. Working-class families and students of color are most affected by their distance to higher education institutions (Ovink & Kalogrides, 2015; Desmond & Lopez-Turley, 2009).

Students of color and from working-class families are also most likely to undermatch - or decide not to attend the highest quality colleges available to them (Smith et al., 2012). Students who undermatch are less likely to graduate in 4 or 6 years, even when controlling for student and high school characteristics (Kang and Torres 2018). These students also report lower levels of college satisfaction and self-perceived gains than students who did not undermatch (Fosnacht 2014). This exacerbates the achievement gap between students of color and white students (Nichols and Evans-Bell 2017).

Computers and phones have developed the capacity to identify a user's location. Many websites and apps already require the user's location to function fully. Tool developers can utilize the location service to list the user's distance to area schools. This will alert students to other schools which may be cheaper or a better fit. The Here to Career mobile app, developed by Young Invincibles, the Foundation for California Community Colleges, and the California Community Colleges Chancellor's Office, with funding from the W.K. Kellogg Foundation, uses GPS technology to connect students to the right community college. This solution can be applied more broadly to overcome geographic isolation.

# Conclusion

We have pulled together the best research on what works and what doesn't work in building college search tools for modern students. The most significant gaps in the existing research are 1) around how students use existing online tools and social media for college search and 2) how to distribute information to students whom most need it. The biggest problem with existing tools is that they only reach a small number of students. Even when information gets to students, it often does not reach the students who need it most.

To fill these gaps, Young Invincibles is conducting focus groups, interviews, and consumer surveys to add the student perspective to the design of these tools. We will also examine the design and user experience for existing college search tools. Companies like Google are building new college search tools which can help solve the distribution problem. Young Invincibles is currently working with Google to offer feedback and research on their new college search tool. In October 2018, we will be hosting a major convening of technology companies and college search experts to discuss new ideas for unlocking the power of technology to make college search better and more effective for more students.

We look forward to continuing to grow and advance this important work.

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