BEYOND THE CLASSROOM:

HOW THE INTERNET IS TRYING TO SAVE EDUCATION

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Contents

For the past several decades, there has been widespread and bipartisan support for education reform, with everyone hoping to reach the same general goal of improving education, but arguing over methodology–things like exactly what constituted effective reform and who would implement or fund them. Many of today's current paradigms for education reform were set forth by the Reagan administration's 1983 education report, *A Nation at Risk*. It lamented the many problems of the United States' failing education system and advocated for the implementation of content standards as well as the idea of using standardized tests to measure how well these standards were implemented. These proposed reforms were all geared towards the intertwined goals of improving education at the school level and producing a generation of students equipped to enter the world as lifelong learners, an outcome the report termed a "Learning Society." Moving forward, however, policy largely focused on the first goal, giving rise to the standards and testing movement, which was met with various levels of success and mixed reactions, most famously with No Child Left Behind.

Alongside this persistent legislative debate, a combination of rapidly improving technology, growing accessibility to the internet, and interest from those not directly involved in education resulted in the creation of a number of free online education resources. Two notable examples of these resources are Khan Academy and Crash Course, created by an ex-hedge fund manager with a background in business and computer science and two brothers who made YouTube videos, respectively. While Khan Academy approached education reform by providing tools to help teachers, students, and parents improve and transform the learning experience, Crash Course instead used its platform to make highly polished, scripted, and entertaining video lessons freely available to anyone. Rather than using *A Nation at Risk*'s policy recommendations to work towards its goal of producing a Learning Society, these non-professional educators believed that the best course of action would be to create resources

that armed individuals with the tools necessary to improve their own education. In other words, the creators of Khan Academy and Crash Course used their unique backgrounds to approach improving education in a way that circumvented traditional legislative and policy-based methods.

Each resource also combines elements of prevailing education theory into their own beliefs about what makes effective educational materials. Sal Khan designed his website to facilitate the implementation of a mastery learning model, while Crash Course focuses its energy on producing high quality curricular materials that are in line with ideas of curriculum theory, like the need for materials to exist within the context of a student's everyday experience.[1] However, what is most revolutionary about both of these resources is that they are free and online, making them accessible to virtually everyone. While this may seem trivial to some, this effectively gives those most closely involved in education the power to immediately improve it; rather than try to advocate for sweeping reforms whose benefits are often reaped unequally, Khan Academy and Crash Course provide tools and resources to help tackle problems in education at the individual level.

Historiography

Historical academic attention to education tends to focus on "real" brick and mortar schools and has generally overlooked the outpouring of free, online, educational materials that has arisen beyond the realm of official policy and standards. However, historians have written prolifically on education policy and education theory, both of which provide an important context for the significance of resources like Khan Academy and Crash Course. In

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[1] John Dewey, *The Child and the Curriculum* (Chicago: University of Chicago Press, 1902), 17.

regard to education policy history, two of the most well-known historians are Chester E. Finn, Jr. and Diane Ravitch, who worked with the Ronald Reagan and George W. Bush presidential administrations, respectively, on education. Both authors use their personal involvement in education as a frame for their exploration of education policy history, but while Ravitch focuses on the standards- and testing-based education movements of the late 1990s and 2000s, Finn follows education policy all the way back to the 1950s. Finn structures his history of education alongside his own life, following his path through education from student to educator to policy maker, while Ravitch uses her own changed opinions towards these standards- and testing-based policies as a frame. Another source that offered a more general, removed, look at a history of education reform was an article by Thomas Kessinger, tracing major reforms from the National Defense of Education Act (1958) to No Child Left Behind (2001). Though these sources do not comment directly on how free online classes and resources have affected the educational climate, they provide a helpful framework for understanding the problems in education that motivated those outside of the educational field to create these sources.

For instance, most histories of education policy from the last several decades cited the aforementioned Reagan Administration report, *A Nation at Risk,* as marking the beginning of the modern concerns about education. Both Finn and Kessinger traced the roots of the fear that characterized ANAR to the Soviet Union's launch of Sputnik; Americans were concerned that the nation had fallen behind and believed that the source of this mediocrity was in a failing education system.[2] Ravitch also pointed to ANAR as an important turning point in the history of education, providing it as the answer to the question of "where did education re-

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[2] Thomas Kessinger, "Efforts Towards Educational Reform," *American Educational History Journal* 38, no. 2 (November 2011): 264.; Chester E. Finn Jr., *Troublemaker: A Personal History of School Reform since Sputnik.* Princeton: Princeton University Press, 2008, 8.

form go wrong?"[3] Kessinger used the theory of "essentialism" to explain how, from ANAR forward, only the methodology for education reform changed, while the same basic concerns stayed consistent. He began by describing ANAR as echoing many of the tenets of essentialism–"higher standards, regular assignments, homework, recitations, and frequent testing and evaluation"–and located these same goals in nearly all subsequent major educational reforms moving forward: the 1958 National Defense Education Act, the 1965 Elementary and Secondary Education Acts, the creation of the National Assessment of Educational Progress, America 2000 started by President Bush and implemented by President Clinton, and finally, President George W. Bush's 2001 No Child Left Behind.[4] Many of these surveys of education history end at No Child Left Behind, having been published before the implementation of the most recent and oft-debated Common Core Standards Initiative, illustrating one of the main issues with establishing a historiography for so recent a topic.

While the YouTube education movement may be too recent and outside the realm of official policy to have yet warranted academic attention, it is furiously debated in the news and online amongst die-hard supporters, critics, and everyone in between. This argument is most visible in regard to Salman Khan and his program, Khan Academy, specifically regarding the website's lessons in mathematics. One of the few academic articles on the on-line education movement was about Khan and largely focused on this national debate, with the author, Dian Schaffhauser, actually celebrating how the controversy about Khan had sparked "a national conversation about math instruction and the role of technology, data, and teachers in helping students learn."[5] She included criticisms from what seemed to be a YouTube com-

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[3] Diane Ravitch, *The Death and Life of the Great American School System* (New York: Basic Books, 2010), 22.

[4] Kessinger, "Efforts Towards Educational Reform," 264.

[5] Dian Schaffhauser, "The Math of Khan," *T.H.E. Journal* 40, no. 1 (January 2013): 19.

ment–"Someone needs to take khan academy and push it down the well"– to professors who have career experience in pedagogy, such as Peter Kelman, a historian of the use of technology in teaching. Kelman believed that Khan's "revolutionary breakthrough" actually set education back; by uploading a streaming video, Khan was simply doing what an ordinary teacher could do, "except with Khan, you [couldn't] ask questions. The teacher [couldn't] see the look on your face."[6] Other critics of Khan include Karim Kai Ani, the founder of the website Mathalicious, arguably a rival of Khan Academy, who simply stated that the videos "aren't very good," spending most of his argument criticising Khan's casual, off-the-cuff teaching style.[7] Ani used an example from one of Khan's math lessons on finding slope to illustrate his arguments against Khan. Ani explained that Khan defined slope as "rise over run," when this was in fact only how to calculate slope rather than a formal definition, and corrected Khan by explaining that slope was instead "a rate that describe[d] how two variables change in relation to one another."[8] Ani acknowledged that to some, this difference may have seemed like mere semantics, but, in fact, it would do irreparable damage to a student's future endeavors in mathematics, describing the slippery slope of math failure that would subsequently occur: "If students [didn't] understand slope . . . , they [wouldn't] understand functions. If they [didn't] understand functions, they [wouldn't] understand Algebra. And if they [didn't] understand Algebra, they [couldn't] understand Calculus."[9] Ani echoed many critics of Khan Academy, claiming that "there [was] nothing revolutionary about Khan Academy at all" and "Khan's style of instruction [was] identical to what students [had] seen for

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[6] Schaffauser, "Math of Khan," 20.

[7] Karim Kai Ani, "Khan Academy: The revolution that isn't," *The Washington Post*, July 23, 2012, accessed November 25, 2016, https://wpo.st/cn-f2.

[8] Ani, "Khan Academy."

[9] Ani, "Khan Academy."

generations: a do this then do this approach to teaching that present[ed] mathematics as a meaningless series of steps."[10] Ravitch even cited Ani's article on her blog, agreeing with the argument and referring to Khan's methodology as "the latest fad." Here, she specifically emphasized Ani's warning against putting stock in "'silver bullets,'. . . simple solutions to complex problems, and in so doing become deaf to what really needs to be done."[11] This kind of language concerning one "magical" solution for all of education's problems can be found in Ravitch's book, where she qualifies her proposed policies by saying that she "will not claim that [her] ideas will solve all our problems once and forever" and "will not offer a silver bullet or a magic feather."[12]

Diane Ravitch also established another critical context to examine these resources: the need for a good curriculum. In her final chapter, she offered her own recommendations for education, stressing the importance of a curriculum, for schools without it would be left "at the mercy of those who demand a regime of basic skills and no content at all."[13] A nation without curricular standards, she continued, also gave the final decision on what students should learn to textbook publishers. In her scathing criticism of the "boring abbreviated, pap" that made up the "bulky, expensive books" that "children [were] forced to endure," Ravitch advocated for clear, curricular standards to be made at the legislative level.

Ravitch's arguments and others like it are rooted in the ideas of curriculum theory. However, curriculum theory was and still is an amorphous section of the larger field of edu-

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[10] Ani, "Khan Academy."

[11] Ani, "Khan Academy;" Diane Ravitch, "Math Teacher Debunks Khan Academy," *Diane Ravitch's blog*, July 23, 2012, accessed November 25, 2016, https://dianeravitch.net/2012/07/23/math-teacher-debunks-khan-academy.

[12] Ravitch, *The Death and Life of the Great American School System*, 14.

[13] Ravitch, *The Death and Life of the Great American School System*, 237.

cation theory, with early theorists like John Dewey arguing for an academic curriculum to be better integrated with a child's daily experiences, while confusingly, later theorists like Gail McCutcheon and George A. Beauchamp were simply arguing that curriculum theory should exist at all and then be integrated into classroom practices.[14] Even if the way they spoke about curriculum varied, their argument remained consistent: what was learned in the classroom must be tied to what happens outside of it. Writing in the early twentieth-century, John Dewey referred to subject matter as "spiritual food," and believed that learning must involve "reaching out of the mind."[15] He also cited "the subordination of the life and experience of the child and to the curriculum" as the source of all that "was dead, mechanical, and formal in schools."[16] In other words, the experience of learning should have been both educationally enriching as well as enjoyable, but instead decontextualization of curriculum turned "study" into a "synonym for what is irksome."[17] While Beauchamp and McCutcheon were both writing at the same time, around eighty years after Dewey, they focused on different aspects of curricular theory in their work. McCutcheon declared that curricular content was inextricably tied to a society's value and base, and for that reason, curriculum theorists needed to first work to "unearth [their] educational and social values" as well as their "beliefs about what constitute[d] good schooling and a just society," before attempting to apply their theories to an actual school's curriculum.[18] Beauchamp instead began by offering three "legitimate definitions" of what a curriculum should be, including as a "document prepared for purposes of

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[14] Dewey, *The Child and the Curriculum,* 9; Gail McCutcheon, "What in the World is Curriculum Theory?," *Theory and Practice* 21, no. 2 (1982): 18-22; George A. Beauchamp, "Curriculum theory: Meaning, development, and use," *Theory and Practice* 21, no. 1 (1982): 23-27.

[15] Dewey, *The Child and the Curriculum,* 9.

[16] Dewey, *The Child and the Curriculum,* 9.

[17] Dewey, *The Child and the Curriculum*, 9.

[18] McCutcheon, "What in the World is Curriculum Theory?," 9.

describing the goals and the scope and sequence of culture content selected for purposes of attaining the selected goals."[19] He then continued by claiming that the goal of curriculum theory should be to function as a "directive force" for educators who "plan, use and evaluate curricula in their own school settings."[20] Many of these facets of curriculum theory can be found in Crash Course, especially in how they try to connect materials to the world outside the classroom. In the simplest terms, Crash Course may seem like nothing more than a fancy web based textbook, but especially considering the problems with textbooks identified by Ravitch and Dewey, a revamped, well produced delivery system for educational content may be a welcome change from the conventional textbook.

One of the most innovative–though sometimes problematic–things about web content is that it is infinitely changeable, and correctable; edits and solutions can be updated with relative ease. Unlike issuing a new edition of a textbook, updating a YouTube video means that it will reach an entire audience instantaneously and at no cost to the consumer. Since Ani's article was posted in 2012 and Schaffhauser's article was published in 2013, Khan Academy has made many changes, with its newest update warranting media attention being SAT prep classes produced in conjunction with College Board. These new services rolled out in 2016 alongside a complete overhaul of the SAT test. College Board's website advertises the collaboration, declaring that "the College Board and Khan Academy are dedicated to leveling the playing field by providing world-class SAT practice, entirely for free," and welcoming students to "meet the new SAT: free world class practice, optional essay, no penalty for guessing, vocab you'll use long after test day."[21] Though interest in and discussion of Khan Acad-

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[19] Beauchamp, "Curriculum Theory," 27.

[20] Beauchamp, "Curriculum Theory," 27.

[21] "SAT Suite of Assessments," *CollegeBoard,* accessed November 25, 2016, https://collegereadiness.collegeboard.org/sat?navId=gh-sat.

emy reached its peak in 2012, Khan Academy has expanded from mathematics to science and engineering, computing, arts and humanities, economics and finance, the aforementioned test prep, as well as a section of the website dedicated to preparing students for College Admissions.[22]

Though Crash Course has received much less press, they too, have been making improvements since the channel's conception, with many of these improvements geared towards making their content more directly related to preparing for College Board's Advanced Placement exams. Most recently, in October of 2016, they released curricular materials to accompany their original World History series. On their website where these free materials are hosted, they promise "*current, accurate, and frequently updated* learning materials to assist in their World History classes" that are "great resources for review of content to check for understanding and application."[23] In the description of their currently airing Physics series, started in March of 2016, they say that the channel will "leads [viewers] through AP Physics 1 and 2."[24] However, while this constant updating makes it a valuable resource for educators and students, it makes it a difficult subject to study. In fact, during the period that this thesis was being written, between September of 2016 and March of 2017, Crash Course started three new series–Computer Science, Sociology and Mythology–as well as launching and then cancelling another of its series, Human Geography.

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[22] Appendix: See Fig.1 and Fig. 2.

[23] "Crash Course World History Curriculum," *Crash Course*, accessed March 20, 2017, http://thecrashcourse.com/curriculum.html.

[24] "Physics," YouTube Playlist, *CrashCourse*, https://www.youtube.com/playlist?list=PL8dPuuaLjXtN0ge7yDk_UA0ldZJdhwkoV.

Concerns for Education: *A Nation at Risk*

In order to better understand why people like Sal Khan and the Green brothers wanted to take education out of institutions and put it online, for free, for anyone, it is important to examine the education policy and debate that led to the educational climate that thus produced free online education. After seeing a brief boom in education funding and scientific advancement following the Cold War Space Race, the American people were shocked by the 1983 report released by President Ronald Reagan's National Commission on Excellence in Education, *A Nation at Risk* (ANAR), which was a review of the current state of the American education system. The language of the report was grim and foreboding, claiming that "Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world."[25] *A Nation at Risk* berated Americans and their government for "squander[ing] the gains in student achievement made in the wake of the Sputnik challenge," and described this descent into mediocrity as "an act of unthinking, unilateral educational disarmament."[26] ANAR pointed to a steep decline in SAT scores, a high rate of functionally illiterate adults, and a 72 percent increase in remedial mathematics courses at 4 year colleges between 1975 and 1980 as "indicators of risk."[27] While identifying these problems and proposing a series of solutions were the report's primary goals, the overarching theme of ANAR was that the burden of education reform fell on everyone's shoulders, not just educators and legislators.

Though many government reports are often released with little fanfare or reaction, *A Nation at Risk* became a topic of heated discussion, and many education policy historians like

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[25] United States National Commission on Excellence in Education, *A Nation at Risk: the Imperative for Educational Reform: A Report to the Nation and the Secretary of Education*, (Washington, D.C., 1983), 5.

[26] *A Nation at Risk*, 5.

[27] *A Nation at Risk*, 10-11.

Diane Ravitch considered it a landmark event in the history of American education. At the time of the report's release, however, many constituents were shocked that Reagan's administration even suggested such widespread reform, especially considering that it had nothing to do with Reagan's personally identified problems in education, such as prayer in schools and tuition tax credits.[28] Days after the report's release, the *New York Times* also reported widespread skepticism. Some, like former United States Commissioner for Education Harold Howe, dismissed the report as overly "sensational," continuing by saying that while he thought "American education ha[d] a cold" and "most people [thought] it ha[d] the flu, it certainly [didn't] have the pneumonia that the commission suggested."[29] Others criticized the report for ignoring any evidence that contradicted its argument, such as evidence that test scores in basic skills in reading and mathematics had actually been on the rise since the mid-1970s.[30] One surprising criticism of the report was not over its findings, but over its concern for them; a director of a New York school claimed in an opinion piece for the *New York Times* that the commission "overlooked the need for truckers and clerks" and that these reformers had "no visceral sense of ineradicable differences in temperament, intelligence, maturity and family background - differences that neither requirements, changed curriculum, nor inspired teaching can eradicate."[31] Sentiments like these from those so closely involved in education were likely among those responsible for the poor educational environment identified by ANAR. Rather than illustrate his more complex understanding of the various demographic differences within students, this educator's belief that inequality was not only funda-

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[28] Edward B. Fiske, "Problem for Education," *New York Times,* April 28, 1983.

[29] Fiske, "Problem for Education."

[30] Fiske, "Problem for Education."

[31] Peter Gibbon, "EDUCATION COMMISSION OVERLOOKS NEED FOR CLERKS, TRUCKERS," *New York Times,* Jan 22, 1984.

mentally built into the education system but necessary to create people like "truckers and clerks" instead demonstrated an elitist and oversimplified understanding of education.

There were many, however, who agreed with the report and used it as an excuse to put in their two cents about the problems of the time. For instance, one editorial in the *Los Angeles Times* from Reverend Raymond A. Schroth declared that not only was this "mediocrity" unsurprising but it fit the "current generational lifestyle."[32] He claimed that young people of his time were all "like the bright, handsome, personable kid on the basketball team who [was] having a great time at college–making friends, drinking beer, avoiding tough courses and collecting C-minuses, with no awareness that a C minus student [would] be a C-minus citizen."[33] Even among those who agreed with the report, there were reservations, with another article pointing out that despite its exhaustive detailing of the problems of schools, and even some solutions, the commission was noticeably silent on how any of these solutions would be funded.[34]

One of the largest groups affected by this report was, of course, teachers. In an article published over a year after the report's initial release, the *New York Times* reported that teachers were "angry and fearful" about what was being said and were arguing that the commission "overlook[ed] the point of view of teachers and faculty."[35] Other teachers agreed with aspects of the report and welcomed reform, but criticized President Ronald Reagan for taking advantage of the buzz surrounding the report to advocate for tuition tax credits, an idea that

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[32] Raymond A. Schroth, "Education: Mediocre by Choice," *Los Angeles Times (1923-Current File),* May 24, 1983.

[33] Schroth, "Education: Mediocre by Choice."

[34] George Skelton and David Savage, "U.S. Education Decline Likened to Act of War," *Los Angeles Times (1923-Current File),* Apr 27, 1983.

[35] Gene I. Maeroff, "Education; Schools Debate Upsets Teachers," *New York Times,* July, 10, 1984.

was never mentioned or supported by *A Nation at Risk*. Albert T. Shanker, who addressed the annual convention of New York State United Teachers days after *A Nation at Risk* made headlines, reported initial reactions from individual teachers as "cynical."[36] However, writing two years after ANAR's release, Shanker celebrated that the "initial cynicism gave way not to anger and despair but to great hope for genuine improvement in the climate, conditions and outcome of education," largely thanks to "the nation's two million teachers" and "their almost unreasonable faith . . . in the value of what they do and to their basic receptiveness to change."[37] In 1984, their support was quantified in the first national survey of teachers ever taken, with 97 percent supporting an "emphasis on basics such as reading writing and math," 91% supporting "tighter graduation requirements," and 74 percent supporting more home-work, all of which were reforms recommended by *A Nation at Risk*.[38] This support did have its limits, however, with "77 percent oppos[ing] a longer school day and 71 percent oppos[ing] a longer school year."[39] Shanker concluded his discussion of the proposed reforms by correctly predicting that American education was "in for a decade or more of renewal, change, and experiment."[40]

Within the actual report, the commission did three main things: detail the problems within the American education system, offer an explanation for how the situation came to be so dire, and propose several solutions for the identified problems. The commission spent much of the document trying to convince the reader that the responsibility and subsequent

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[36] Albert Shanker, "The Reform Reports: Reaction from the Front Lines," *Education and Urban Society* 17, no. 2 (February 1985): 215.

[37] Shanker, "The Reform Reports," 216.

[38] Shanker, "The Reform Reports," 218.

[39] Shanker, "The Reform Reports," 218.

[40] Shanker, "The Reform Reports," 222.

benefits of enacting these reforms fell to everyone in the United States, not just the Department of Education, to whom the report was primarily addressed. In fact, *A Nation at Risk*'s full title is *A Nation at Risk: the Imperative for Educational Reform: An Open Letter to the American People: A Report to the Nation and the Secretary of Education.* By including the American people as one of the intended audiences of this report, the National Commission on Excellence in Education also placed the responsibility of education reform into the hands of the American people. In their introduction, the authors even explicitly stated that they were "confident that the American people, properly informed, [would] do what [was] right for their children and for the generations to come."[41] The entire report seems to focus on convincing readers that education reform was an issue that affected everyone and that improving it would benefit every part of society. While this tactic definitely emphasized the importance of education as an issue, it also deflected blame for America's declining education system from the government to the nation as a whole. The commission partially disguised this shifting of blame with constant discussion of the widespread benefits of a robust education system. The commission promised that improving education for "old and young alike, affluent and poor, majority and minority" would be an "indispensable investment required for success in the 'information age"' and would help "keep and improve on the slim competitive edge [America] still retain[ed] in world markets."[42] Beyond these quantifiable, financial benefits, the commission also ensured readers that improving education would benefit the "the intellectual, moral, and spiritual strengths of [the American] people which knit together the very fabric of society."[43] In contrast with the benefits of improving education, the report explained that if

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[41] *A Nation at Risk,* 6.

[42] *A Nation at Risk,* 7.

[43] *A Nation at Risk,* 7.

the nation failed to come together to fix these problems, democracy itself would fall apart, as "part of what [was] at risk [was] the promise first made on this continent: All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost."[44] In other words, those who suffered from a subpar education were not only denied "the material rewards that accompan[ied] competent performance, but also from the chance to participate fully in [American] national life."[45]

Even in the section on solutions, the commission took time to speak directly to parents and students, explaining how they, too, were responsible for the issues in education. To the parents, they issued a rallying cry, reminding them that not only did they "have the right to demand for [their] children the best [American] schools and colleges [could] provide," but they also bore "a responsibility to participate actively in [their] child's education" and to "help [their] children understand that excellence in education cannot be achieved without intellectual and moral integrity coupled with hard work and commitment."[46] By describing parent involvement in education as both a right and a responsibility, they used emotional rhetoric to simultaneously empower and guilt parents into action. To the students, they warned that no matter how much educators and educational institutions improved, if students "g[a]ve only the minimum to learning, [they] [would] receive only the minimum in return."[47] The commission summarized the report by calling on all kinds of Americans, both involved in education and not: from parents, students, teachers, administrators, and school board members to

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[44] *A Nation at Risk*, 8.

[45] *A Nation at Risk*, 7.

[46] *A Nation at Risk*, 35.

[47] *A Nation at Risk*, 35.

union members, military leaders, governors, State legislators, the President, members of Congress to members of learned and scientific societies, the print and electronic media.[48] According to ANAR, nobody could afford to ignore the issue of education. Indeed, it was everyone's duty as American citizens to pursue education reform.

However, beyond simply notifying the nation of its many failings in education, the commission also offered several explanations for how things came to be so dire, many of which were to be found at the school level, rather than a governmental one. One of the main issues was the amount of education students were receiving; not only were there not enough hours of instruction, the hours they did have were used inefficiently, and the "amount of homework for high school seniors ha[d] decreased."[49] Other than the measurable lack of education students were receiving, the commission also found fault in the quality of said education. They believed that "secondary school curricula ha[d] been homogenized, diluted, and diffused to the point that they no longer ha[d] a central purpose."[50] They also found evidence of falsely inflated grades, with "grades hav[ing] risen" even "as average student achievement ha[d] declin[ed.]"[51]

Alongside its explanation for why the nation was at risk, ANAR also offered solutions to help the nation improve. One of the main tenets of their proposed plan of reform was a secondary school curriculum called the "Five New Basics." This detailed the five subjects all American students should study in high school: "four years of English; three years of mathematics; three years of science; three years of social studies and one-half year of computer sci-

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[48] *A Nation at Risk,* 14.

[49] *A Nation at Risk,* 19.

[50] *A Nation at Risk,* 18.

[51] *A Nation at Risk,* 20.

ence" as well as "two years of foreign language in high school" for the college bound.[52] The commission argued that implementing the Five New Basics alongside "work in the fine and performing arts and foreign languages, constitute[d] the mind and spirit of [American] culture."[53] They also recommended the use of standardized tests to be "administered at major transition points from one level of schooling to another," in order to "certify the student's credentials, identify the need for remedial intervention, and identify the opportunity for advanced or accelerated work."[54] Logistically, they envisioned the tests being "administered as part of a nationwide (but not Federal) system of State and local standardized tests" that included "other diagnostic procedures that assist teachers and students to evaluate student progress."[55] At the heart of these suggestions was their belief that "everyone [could] learn, that everyone [was] born with an urge to learn which [could] be nurtured . . . and that lifelong learning [would] equip people with the skills required for new careers and citizenship."[56]

This section on recommendations for how to fix the education system's problems echoed the earlier insistence that the responsibility of education fell to all American citizens. Even as the commission admitted that "state and local officials, including school board members, governors, and legislators, ha[d] the *primary* responsibility for financing and governing the schools" the commission also "call[ed] upon educators, parents, and public officials at all levels to assist in bringing about the educational reform proposed in this report" and upon

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[52] *A Nation at Risk,* 24.

[53] *A Nation at Risk,* 25.

[54] *A Nation at Risk,* 28.

[55] *A Nation at Risk,* 28.

[56] *A Nation at Risk,* 24.

"citizens to provide the financial support necessary to accomplish these purposes."[57] They even "call[ed] upon university scientists, scholars, and members of professional societies, in collaboration with master teachers, to help [upgrade the content of textbooks and educational materials], as they did in the post-Sputnik era."[58]

While, of course, the primary goal of these proposed reforms was to eradicate the problems they identified, another objective supported by the commission was an idea they called the "Learning Society." They explained that "at the heart of such a society [was] the commitment to a set of values and to a system of education that affords all members the opportunity to stretch their minds to full capacity from early childhood through adulthood, learning more as the world itself changes," with the understanding that "education [was] important not only because of what it contribute[d] to one's career goals but also because of the value it add[ed] to the general quality of one's life."[59] Here, the commission identified that education did not begin and end in "the traditional institutions of [America's] schools and colleges," but in fact "extend[ed] into homes and workplaces; into libraries, art galleries, museums, and science centers; indeed, into every place where the individual can develop and mature in work and life."[60]

ANAR's advocacy for a Learning Society was not the first of its kind. Renowned twentieth-century educational theorist John Dewey famously argued that a well-executed curriculum should not simply teach a child concepts in a vacuum, but use the child's existing understanding of the world with their lessons to produce an individual who continues to learn

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[57] *A Nation at Risk,* 32-33.

[58] *A Nation at Risk,* 28.

[59] *A Nation at Risk,* 13-14.

[60] *A Nation at Risk,* 14.

after completing their schooling. In his 1902 text, *The Child and the Curriculum*, he identified "three evils" that occurred when educational materials were "not translated into life-terms, but directly offered as a substitute for, or an external annex to, the child's present life."[61] These three evils were a "lack of organic connection with what the child has already seen and felt and loved [that] makes the material purely formal and symbolic," a lack of motivation, and the fact that "even the most scientific matter, arranged in the most logical fashion, loses this quality, when presented in external, ready-made fashion, by the time it gets to the child."[62] In other words, Dewey's concerns were not so much that the student would stop learning once they entered the world, but that if these methods were not implemented throughout the child's education, it would have a detrimental effect on all the learning they had done throughout their education. While ANAR stressed the importance of lifelong learning as a tool to improve society, Dewey advocated for lifelong learning as a goal that would benefit the student even while they were still in school.

When comparing free online education to the goals of *A Nation at Risk*, platforms like Khan Academy and Crash Course effectively exemplify education being every citizen's responsibility as well as perfectly catering to the constant learning and self-educating public indicative of a Learning Society. Though their efforts did not improve education in the way ANAR dictated, which called mostly for direct interactions between citizens and institutional education reform, Khan Academy and Crash Course were both started by the kinds of people to whom ANAR reached out: people involved with "industry," "members of learned and scientific societies," as well as "electronic media."[63] Furthermore, since these resources are

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[61] Dewey, *The Child and the Curriculum*, 24.

[62] Dewey, *The Child and the Curriculum*, 24-6.

[63] *A Nation at Risk*, 14.

hosted online, they are not restricted to those of school-going age, allowing the kind of "life-long learning" the commission dreamed of for its Learning Society. However, before examining more closely how these content creators responded indirectly to the concerns of *A Nation at Risk,* it is important to see how policy makers responded directly to ANAR's call to action.

Education Reformed? : "No Child Left Behind"

In the many reform attempts that followed *A Nation at Risk,* one of the best known and most contentious was the George W. Bush Administration's 2001 "No Child Left Behind" (NCLB) act. NCLB passed through the House and Senate with enormous bipartisan support and focused on "stronger accountability for results; greater flexibility for states, school districts and schools in the use of federal funds; more choices for parents of children from disadvantaged backgrounds; and an emphasis on teaching methods that have been demonstrated to work."[64] It was largely based on similar standardized testing and accountability-based reform that President Bush had seemingly successfully implemented during his time as governor in Texas.[65] Part of its accountability model involved what Diane Ravitch termed "measure and punish."[66] NCLB required all public schools that received federal money to test students in grades three through eight annually, to separate scores demographically to make sure each group's progress (or lack thereof) would not disappear into a comprehensive average, and to use these test scores to show "adequate yearly progress" towards complete proficiency by the 2013-14 school year. Schools that failed to make adequate progress

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[64] United States Department of Education, Office of the Under Secretary, *No Child Left Behind: A Desktop Reference*, (Washington, D.C., 2002), http://www.ed.gov/offices/OESE/pubs/reference.pdf, 9.

[65] *The Death and Life of the Great American School System,* 96.

[66] *The Death and Life of the Great American School System,* 93.

in every demographic subgroup were labeled a "school in need of improvement." These schools then faced punitive sanctions every subsequent year they failed to make adequate yearly progress.[67] Noticeably absent from NCLB was any sort of curricular reform; though the law required states to assess students' progress in reading and math, it left it up to the states to define proficiency for themselves.

A report put out by the Bush Administration's Department of Education directly assessed how the American education system had done since ANAR, acknowledging that though the United States was ostensibly still a nation at risk, it was now a nation "informed" and "accountable," which would help improve education moving forward.[68] This report, titled *A Nation Accountable: Twenty-Five Years After* A Nation at Risk, was released in 2008, seven years after the original implementation of NCLB. The Department of Education's report stressed that the environment that produced ANAR was an uninformed one, and "elected officials, administrators, teachers, parents and students have been hard at work since [then] . . . to make sure [America would not] be caught off guard again," largely through the development of "content standards and tests that allow [the Department of Education] to know how well [American] students [were] doing."[69] Also, responding directly to some of ANAR's suggestions, the report claimed that "notable strides were made" in regards to the Five New Basics, and "by 2005 almost 65 percent of high school graduates were taking the recommended course work–four times the rate that students took the recommended course work in 1983."[70]

As evidence and explanation for their claim that the United States was now a nation

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[67] *The Death and Life of the Great American School System,* 97.

[68] United States Department of Education, *A Nation Accountable: Twenty Five Years After* A Nation at Risk, (Washington, D.C., 2008), http://www.ed.gov/rschstat/research/pubs/accountable.

[69] *A Nation Accountable,* 3.

[70] *A Nation Accountable,* 3.

"informed," the report cited the standards that the Bush administration had set in place as part of NCLB. These standards, the writers of the report argued, were a marked improvement on earlier implementation of "content standards that were not very clear or specific or academically rigorous;" having learned from these mistakes, their current standards were much "clearer, grade-level specific, and more academically challenging."[71] They also described how NCLB required "states accepting the federal government's targeted investment to agree to measure and report on results in terms of standards and accountability" as a "giant step forward from 1983, when the public knew comparatively little about student performance."[72] Celebrating their progress, they seemed to believe they had "transformed [America] from a nation at risk of complacency to a nation that [was] accountable and at work on its education weaknesses."[73]

Though the tone of *A Nation Accountable* was generally self-congratulatory, the 2008 report did acknowledge that American "performance at the high school level [was] as alarming as it was at the time of A Nation at Risk, if not worse."[74] The authors explained that this was partly due to the fact that of the many challenges that America currently faced in regard to education, several "did not even exist in 1983."[75] These unforeseen challenges included an achievement gap between demographics, as evidenced by "dropout factories" which tended to have "a much higher percentages of low income and minority students;" an influx of English language learners; and "increasing threats to school safety."[76] Though not necessarily an

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[71] *A Nation Accountable,* 5.

[72] *A Nation Accountable,* 5.

[73] *A Nation Accountable,* 8.

[74] *A Nation Accountable,* 10.

[75] *A Nation Accountable,* 14.

[76] *A Nation Accountable,* 12, 14.

unforeseen challenge, the report also mentioned struggling to keep up with rapidly advancing technology. ANAR did, in fact, repeatedly stress that the Learning Society was critical to keep up with the pace of technology, but writing in 1983, the commission simply could not have imagined the scope of just how far things did eventually (and continue to) advance. The report also cited reluctance from those who refused to "accept and make the changes that are necessary" to implement the solutions that *had* been found.[77]

As this report was written during George W. Bush's administration, it is unsurprising that the Department of Education celebrated NCLB as a success, making the major strides towards education reform that ANAR imagined. However, even in this favorable report, other than the general implementation of the Five New Basics, which largely happened before George W. Bush's administration, there did not seem to be much in the way of actual progress towards ANAR's idea of a Learning Society. Further, the report seemed to equate simply knowing about the nation's problems with making progress towards solving them. This focus on accountability was what drove, and continues to drive, the standardized testing movement that dominates education reform today. To many critics of NCLB and subsequent legislation like it, this singular focus on standards and testing derailed American efforts towards constructive education reform. When comparing ANAR's framework for reform with NCLB's actualized policy, Diane Ravitch calls ANAR "positively idealistic, liberal, and prescient," while NCLB "was bereft of any educational ideas."[78] She goes on to call it a "technocratic approach to school reform that measured 'success' only in relation to standardized test scores in two skill-based subjects."[79] Ravitch argued that NCLB was doomed to fail be-

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[77] *A Nation Accountable,* 14.

[78] Ravitch, *Death and Life of the Great American School System,* 29

[79] Ravitch, *Death and Life of the Great American School System,* 29.

cause it was based on the false assumption that "higher test scores on standardized tests of basic skills [were] synonymous with good education."[80] Much like those who criticized *A Nation at Risk*, there were many who criticized NCLB for its lack of sufficient funding for the grand reforms it proposed, risking what one editorial described as "states defin[ing] mediocrity as excellence and declar[ing] the problem solved."[81] Another editorial called NCLB a "bait-and-switch" from the Bush administration, accusing it of hoping to "trumpet No Child Left Behind, then fail to pay for it."[82]

A study carried out by the Northwest Evaluation Association (NWEA) showed that these standards were not even a particularly effective incentive for student growth, finding that students who had already met the level of their state's established proficiency standards showed less academic growth than their peers who had fallen below their state's proficiency standards previously.[83] In other words, once students meet the state's standards, they tend to benefit less from their instruction than students who fall below said standards. Furthermore, in three out of the four cases the NWEA examined, there was no correlation between student growth and whether states set their academic proficiency standards high or low.[84] In fact, the report even explained that because of the way NCLB punished low performing schools, many schools had actually lowered their proficiency cut scores since the implementation of NCLB, including several states that had formerly persistently achieved some of the highest proficien-

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[80] Ravitch, *Death and Life of the Great American School System,* 111.

[81] "The Education Sellout." *New York Times,* Mar 15, 2003.

[82] "Bait-and-Switch on Public Education." *New York Times,* Oct 21, 2003

[83] Michael Dahlin, Yun Xiang, Sarah Durant, and John Cronin, *State Standards and Student Growth: Why State Standards Don't Matter as Much as we Thought*: Northwest Evaluation Association, February 1, 2010.

[84] Dahlin, *State Standards and Student Growth*, 5.

cy scores in the United States.[85] This study showed that by tying a seemingly arbitrary scoring system to funding, NCLB forced states to focus on achieving better test scores rather than actually teaching students.

Another particularly scathing review of NCLB from Crispin Sartwell in the *Los Angeles Times* called the phrase, "No Child Left Behind," trivial, false and meaningless, an "epiphanic synthesis of banality, mendacity and vacuity."[86] Sartwell was writing in response to the Bush Administration's questionable decision to commission an upbeat, gospel style song from PBS's "Between Two Lions" writers Christopher Cerf and Sarah Bruce Durkee, which celebrated President Bush's role in reforming education. The song featured the lyrics, "We're here to thank our president, /For signing this great bill, /That's right! Yeah, /Research shows we know the way, /It's time we showed the will!"[87] The US Department of Education was "considering piping the song into its lobby, having students perform it when Dr. Paige [then Secretary of Education] visit[ed] schools, or playing it for callers when the department put them on hold."[88] It seems that even NCLB lawmakers understood the power of a good jingle, even if they may have stumbled on the execution.[89]

Predecessors and Precedents: Where did these Resources Come From?

With institutional education so wrapped up in standards and testing, it is unsurprising

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[85] Dahlin, *State Standards and Student Growth*, 2.

[86] Crispin Sartwell, "Politically Speaking, It's Greasy Kid Stuff," *Los Angeles Times*, June 26, 2002, B13.

[87] Diana Jean Schemo, "The Reviews are Mixed for Slogan Turned Tune," *New York Times*, June 23, 2002.

[88] Schemo, "Reviews are Mixed."

[89] Despite my best efforts, I could not find audio of this No Child Left Behind anywhere, either on the Department of Education's website or YouTube. Perhaps the song never made it to its destiny as DOE hold music.

that concerned citizens who wanted to help improve education would forego trying to fix anything at the legislative level. By providing an alternative outlet for learning, free online resources allow students to take their educations into their own hands. However, Khan Academy and Crash Course were not born solely out of a frustration with the standardized testing movement. Even before the release of *A Nation at Risk*, there was a tradition of non-educators providing educational content for free. Many of these kinds of content from before the internet's heyday can be found in children's television. Indeed, with children spending more time online than watching television, YouTube can be considered a modern day television network.[90] There was a wide variety of children's programming with educational overtones, like Jim Henson's Sesame Street or Disney's Bill Nye the Science Guy, the former of which continues to air today. In fact, the Public Broadcasting Service (PBS), which aired both of these television series, began partnering with Crash Course in 2014, and continues to be one of Crash Course's main sources of funding as of 2017.[91]

Just as Crash Course was not the first attempt from entertainers to produce educational content, Sal Khan was not the first person with a technology background to try to use this to revolutionize education. These precursors to Khan and Crash Course have had varying degrees of success, like the non-profit One Laptop per Child (OLPC), whose mission was to bring a "$100 laptop" to every child began in 2005. Founder Nicholas Negroponte even clarified that this was "not a laptop project" but "an education project."[92] However, as of 2017, rather than the inexpensive laptop they promised, their main product was instead a still inex-

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[90] "Online overtakes TV as kids' top pastime," *Ofcom*, November 16, 2016, https://www.ofcom.org.uk/about-ofcom/latest/features-and-news/childrens-media-use.

[91] "PBS Digital Studios and Hank and John Green Announce New Partnership to Expand Popular 'CRASH COURSE' YouTube Series," November 5, 2014, http://www.pbs.org/about/blogs/news/pbs-digital-studios-and-hank-and-john-green-announce-new-partnership-to-expand-popular-crash-course-youtube-series.

[92] TED, "Nicholas Negroponte: The Vision Behind One Laptop per Child," filmed February 2006, YouTube video, 18:23, uploaded January 16, 2007, https://www.youtube.com/watch?v=W5ySOqtxhbw

pensive, but less impressive, Android tablet. Furthermore, their original dream–a durable $100 laptop–never came to be; though they did produce a relatively cheap, durable laptop, it was twice its initially advertised price, and the journey to its production was marred by in-fighting within the company as well as production and distribution delays, with officials associated with the project stepping down with little to no notice.[93]

Another eminent advocate for technology in education from the the past few decades has been Bill Gates and his nonprofit organization, the Bill & Melinda Gates Foundation, whose earliest involvement in education on their website dates back to 1998, with a $2 million gift to St. George's School.[94] In the next year, the Gates Foundation donated a total of $3.1 million to over 200 teachers in grants, which went towards purchasing computers for student and teacher use, as well as offering workshops and seminars with other grant recipients to develop ideas for how to best integrate technology in the classroom.[95] By 2000, the Gates Foundation had started four new grant programs in Washington state, committing a total of $350 million over three years, with plans to expand giving nationally.[96] They also used their money to support specific methods of education reform, like donating $4 million to the Sacramento Unified School District in 2002 and $7.6 million to Chicago Public Schools in 2003 to help create smaller high schools, with class sizes of no more than 100 students per

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[93] Matt Ransford, "The $188 and Counting Laptop," *Popular Science*, April 22, 2008, http://www.popsci.com/gear-gadgets/article/2008-04/188-and-counting-laptop.

[94] "St. George's School Receives $2 Million Dollar Gift," *Bill & Melinda Gates Foundation*, June 5, 1998, http://www.gatesfoundation.org/Media-Center/Press-Releases/1998/06/Saint-Georges-School.

[95] "Washington teachers awarded Gates Learning Foundation grants," *Bill & Melinda Gates Foundation,* May 19, 1999, http://www.gatesfoundation.org/Media-Center/Press-Releases/1999/05/Teacher-Leadership-Project.

[96] "Bill & Melinda Gates Foundation Commits $350 Million Nationally, Starting in Washington State, To Help Students Succeed in the Classroom," *Bill & Melinda Gates Foundation*, March 1, 2000, http://www.gatesfoundation.org/Media-Center/Press-Releases/2000/03/State-Challenge-Grant-for-Leadership-Development.

grade.[97] In 2009, the Gates Foundation also invested over $22 million in research and data systems to help schools, districts, and states more effectively both gather and utilize data.[98] Another cause that the Gates Foundation helped support was in fact, Khan Academy, issuing them their first $1,464,667 grant in October of 2010 to "provide general operating support, expand Khan Academy's leadership and staff capacity to map Khan Academy content to the Common Core high school standards, improve assessments, and enhance the user interface."[99] The Gates Foundation continued to support Khan Academy, with three subsequent grants in 2011, 2012, and 2016, the largest being the 2016 grant, which was $10.5 million "to provide digital instructional content and tools to help teachers accelerate student learning."[100] Without the financial support of the Gates Foundation and the public support of Bill Gates, Khan Academy may not have grown to what it is today, and is even listed as a founding supporter on the website's donor page.[101]

Khan Academy and Crash Course did not emerge unprecedented or unexpected, rather, the educational policy environment and those in technology and entertainment that came before them paved the way for what they would become. Khan Academy and Crash

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[97] "Sacramento City Unified School District To Receive $4 Million To Create Small High Schools from Bill & Melinda Gates Foundation," *Bill & Melinda Gates Foundation,* August 13, 2002, http://www.gatesfoundation.org/Media-Center/Press-Releases/2002/08/Sacramento-Creates-Eight-New-High-Schools; "The Chicago Public Schools To Create 12 New Small High Schools with Bill & Melinda Gates Foundation $7.6 Million Grant," *Bill & Melinda Gates Foundation,* April 21, 2003, http://www.gatesfoundation.org/Media-Center/Press-Releases/2003/04/Transforming-Chicago-High-Schools.

[98] "Foundation Invests in Research and Data Systems to Improve Student Achievement - Bill & Melinda Gates Foundation," *Bill & Melinda Gates Foundation,* January 22, 2009, http://www.gatesfoundation.org/Media-Center/Press-Releases/2009/01/Foundation-Invests-in-Research-and-Data-Systems-to-Improve-Student-Achievement.

[99] "Grant: Khan Academy Inc.," *Bill & Melinda Gates Foundation*, October 2010, http://www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database/Grants/2011/07/OPP1039840.

[100] "Grant: Khan Academy Inc.," *Bill & Melinda Gates Foundation*, October 2016, http://www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database/Grants/2016/10/OPP1156739.

[101] "Our Supporters," *Khan Academy*, Accessed March 3, 2017, https://www.khanacademy.org/about/our-supporters.

Course participated and continue to participate in a tradition, in both their roles as non-educators making their foray into education, as well as their new roles as educators participating in the history of education.

Teaching and Technology: The Origins of Khan Academy

Salman Khan was born in Metairie, Louisiana to Bangladeshi immigrant parents.[102] A smart, capable, student, he completed both his undergraduate degree in math, engineering, and computer science and his Masters in Computer Science at the Massachusetts Institute of Technology (MIT) by 1998. He then spent some time working in Silicon Valley before pursuing a MBA at Harvard Business School. After this, he began working as a hedge fund analyst in Boston.[103] While working at this hedge fund in 2004, Khan began tutoring his cousin, Nadia, who lived in Louisiana. In order to facilitate the long-distance tutoring, he uploaded video lessons to YouTube, which found a much wider audience beyond Khan's cousin. This was the catalyst for what came to be known as Khan Academy.[104] Though Khan began with math, Khan Academy has since expanded to include computer programming, science and engineering, economics, as well as arts and humanities. Most recently, in a 2016 partnership with CollegeBoard, Khan Academy began to offer standardized test prep courses, from the SAT to the MCAT. One of the most exciting things about Khan Academy is that all of these courses are completely free.

Though Khan Academy's resources are free to the public, they are by no means free

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[102] Salman Khan, *The One World Schoolhouse,* 15.

[103] "Sal Khan, SB, MEng '98," *MIT EECS*, accessed February 15, 2017, https://www.eecs.mit.edu/people/alumni/alumni-eecs-connector-2013/sal-khan-sb-meng-98.

[104] TED, "Let's Use Video to Reinvent Education | Salman Khan," Filmed March 2011, YouTube video, 20:27, uploaded March 9, 2011, https://www.youtube.com/watch?v=nTFEUsudhfs.

to create. For the 2015 fiscal year, Khan Academy reported $24,113,592 in expenses, broken down on their website as $20,995,946 towards Programs, $2,099,665 towards General & Administrative costs, and $1,027,770 towards Fundraising.[105] Around 87 percent of their 2015 funding came from grants and donations–$24,353,123 of a total reported $27,945,225 in revenue–with the other 13 percent of their revenue coming from "program service revenue," made up of content licensing, speaking, and maintenance fees.[106] Khan Academy currently has a number of notable donors, which they thank in tiers on their supporters page. Venture capitalists Ann and John Doerr, Netflix founder Reed Hastings, and Google are listed alongside the Gates Foundation as "Founding Partners," while the Walt Disney Company and College Board are thanked in the $2 million and above section.[107] Compared to other education oriented non-profit organizations like College Board, Khan Academy is funded much more by voluntary donations than by collecting fees from its users. In the case of College Board, grants and donations made up only one percent of their $315,160,302 reported 2014 revenue, while 83 percent of this came from program service revenue, consisting of AP and Instruction, Assessments, College Opportunities & Enrollment, and "Other Services."[108]

Khan has spoken at length, and often, about his goals for Khan Academy. On the landing page for the platform itself, Khan Academy promises that "You only have to know one thing: You can learn anything. For free. For everyone. Forever."[109] During a 2011 Reddit

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[105] U.S. Department of the Treasury, Internal Revenue Service, Form 990, (Washington, DC: 2015), 9, http://990s.foundationcenter.org/990_pdf_archive/261/261544963/261544963_201512_990.pdf; "Help Us Do More," *Khan Academy*, accessed, March 20, 2017, https://www.khanacademy.org/donate.

[106] U.S. Department of the Treasury, IRS, Form 990.

[107] "Our Supporters," *Khan Academy*, accessed March 20, 2017, https://www.khanacademy.org/about/our-supporters.

[108] U.S. Department of the Treasury, Internal Revenue Service, Form 990, (Washington, DC: 2014), 9, http://990s.foundationcenter.org/990_pdf_archive/131/131623965/131623965_201412_990.pdf.

[109] "Khan Academy," *Khan Academy*, accessed February 15, 2017, https://www.khanacademy.org.

"Ask Me Anything" (AMA), Khan admitted that the company was "still trying to fully figure out the implications of what [they were] doing," but ideally, Khan Academy would "progress to the point that [students] [could] get a deep understanding of most topics independently and 'school' [would] be a physical place and support network that help[ed] [them] explore and apply what [they] kn[e]w."[110] In one of his TED talks, he promoted the idea of using video technology to "flip the classroom," where teachers assign video lectures as homework, and use class time to work on problems, allowing students to get the one-on-one help they need. Khan also argued that not only could they use technology to flip the classroom, they would actually help "humaniz[e] the classroom . . . by a factor of five or 10." While in the traditional classroom model "most of the teacher's time [would be] spent doing lectures and grading" and "maybe five percent of their time [would be] sitting next to students and working with them," by flipping the classroom, "100 percent of their time" would be spent actually working with students.[111] Khan also wanted to use technology to "arm teachers with as much data as possible. . .so the teachers [could] diagnose what [was] wrong with the students so they [could] make their interaction as productive as possible."[112]

This use of data seems to align with No Child Left Behind's goals of accountability and staying informed. However, rather than use data as a punitive metric to keep governments informed, Khan's system of data works at the micro level, letting teachers "know exactly what the students have been up to, how long they've spent each day, what videos they've watched, when did they pause the videos, what did they stop watching, what exercises [were]

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[110] Salman Khan, "Reddit AMA," *Reddit*, accessed February 15, 2017, https://www.reddit.com/r/IAmA/comments/ntsco/i_am_salman_khan_founder_of_khan_academyama.

[111] TED, "Let's Use Video to Reinvent Education | Salman Khan," Filmed March 2011, YouTube video, 20:27, uploaded March 9, 2011, https://www.youtube.com/watch?v=nTFEUsudhfs.

[112] TED, "Let's Use Video to Reinvent Education."

they using."[113] When asked directly about what he would do if he could reform public education, Khan said that he "believe[d] that when a critical mass of parents and students see other students doing amazing things with their time, the change will happen from the ground up" rather than "with top-down government policies."[114] Unlike NCLB, Khan believed that the in order to truly help better educate children, reform had to come from the smallest level, and that accessibility mattered more than accountability. While inspiring, his belief that individuals would inspire each other to action, ultimately leading to a widespread educational revolution exemplified the idealism that was at the heart of Khan's work.

Though Khan never directly spoke about his work in relation to *A Nation at Risk*, his idealism and belief in individuals mirrored the call to all citizens found in the report. Similarly, the goals of Khan Academy echoed the spirit of ANAR while bypassing its particular methodology of legislative reform. In regards to ANAR's insistence that the responsibility of education is a universal one, not only did Khan tackle this himself, Khan Academy provides a tool to help anyone put their own, their children, or their students' education into their own hands. The website's sign up page provides three options: "Start learning now," "Parents start here," or "Teachers start here."[115] For parents, they promise that they can "help [their] child learn anything," and to teachers, that they can "reach every student at any level."[116]

A Nation at Risk warned that though good foundational learning in primary and secondary school was critical to a student's future success, without "life-long learning, one's

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[113] TED, "Let's Use Video to Reinvent Education."

[114] Salman Khan, "Reddit AMA," *Reddit*, https://www.reddit.com/r/IAmA/comments/ntsco/i_am_salman_khan_founder_of_khan_academyama.

[115] https://www.khanacademy.org/

[116] https://www.khanacademy.org/

skills [would] become rapidly dated."[117] Khan Academy, itself a product of rapidly advancing technology, is especially aware of the importance of helping people learn new technological skills. Especially regarding computer science, for many adults today, concepts that are used in computer programming are either brand new or did not exist when they were in school. Resources like Khan Academy and its free classes on coding and programming give students who, for whatever reason, may not have had access to a comprehensive science and technology education a chance to acquire these skills even after they have finished their formal schooling.

Mastery, Achievements, and Videos: The Mechanics of Khan Academy

When a student signs up to use Khan Academy, they can tackle any topic. In order to best understand how Khan Academy has helped respond to the goals found in *A Nation at Risk* as well as the educational environment set by No Child Left Behind, it is important to detail what it is like to do a Khan Academy course. Though Khan Academy is rather math and science heavy in its coverage of the Five New Basics, it goes beyond simply math, science, social studies, English, and computer science to include economics, music, and standardized test preparations. There is even a part of the website dedicated to advice on the college admissions process.[118] Having started out as math tutoring videos, Khan Academy has an extremely comprehensive math section, allowing teachers and learners to choose math by grade level or by subject, including the topic, "Math for fun and glory." After viewing all these options, a student can select whichever lesson they need, like Precalculus. These lessons are known as missions, and after selecting Precalculus, the website offers a "Mission warm-up," which is essentially a placement test. This placement test page, seen in Figure 1,

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[117] *A Nation at Risk*, 14.

[118] Appendix, Figure 3.

has a quadratic equation as the first question to solve. There are two tools in the right sidebar to help, including a video lesson on solving quadratic equations, as well as a button that requests a hint. Selecting the hint button tells the user that "The coefficient on the x term is -18, and the constant term is 81, so we need to find two numbers that add up to -18, and multiply to 81."[119] Once the user completes five questions, Khan Academy produces a kind of report card, indicating what skills the student knows and which need work, as well as awarding video game like achievement badges, seen in Figure 2.

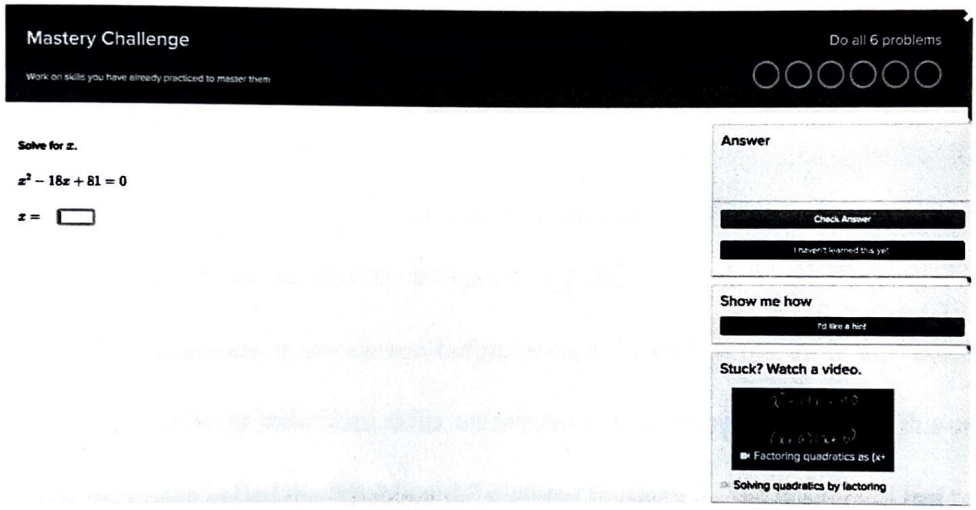

Fig. 1 - Khan Academy Mission Warm Up

[119] Pictured in Figure 2, "You've leveled up in 4 skills," *Khan Academy,* https://www.khanacademy.org/mission/precalculus/task/6287621671682048.

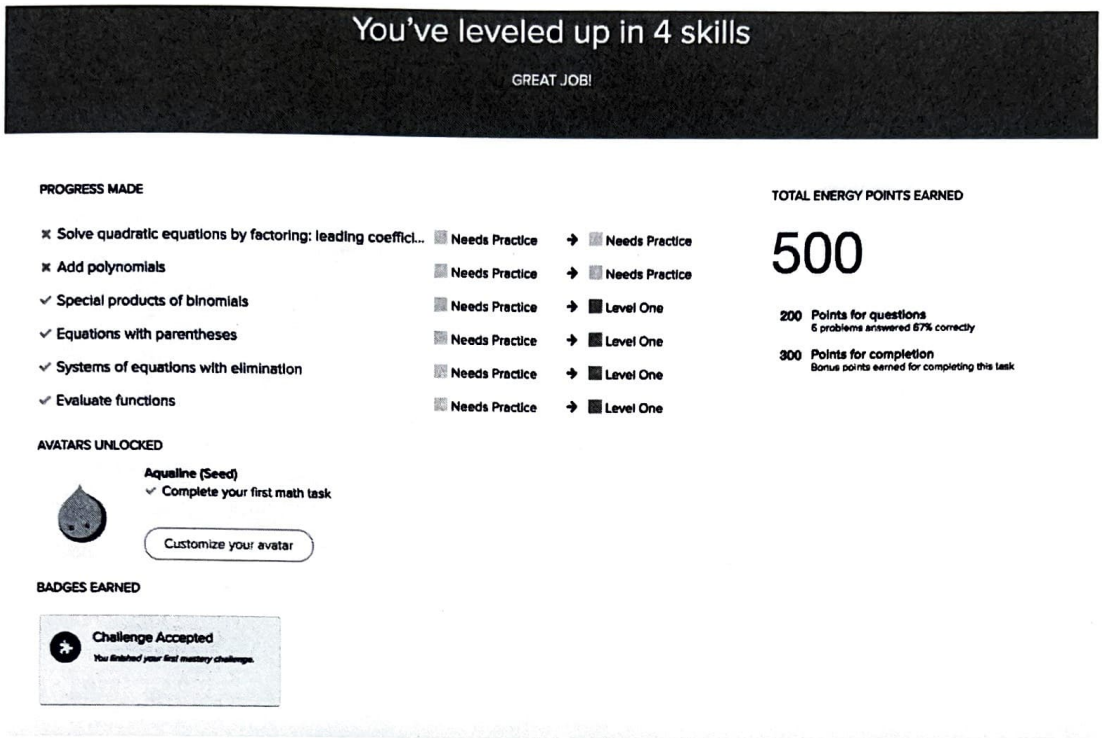

Fig. 2 - Khan Academy Skill Analysis

The website then takes the user directly into practicing skills needed, where students are required to get five questions in row correct before being allowed to move on in the skill. The website breaks down what individual skills are needed to master the main skill, in this case, precalculus, on a page called the "dashboard," pictured in figure 3. The dashboard has two main segments, a "progress at a glance" sidebar on the left, and a series of recommended skill tasks on the right. In this particular image, the "mastery challenge" has not yet been unlocked, but the mastery challenge gives students the opportunity to prove that they have retained the skills they have been learning. The website explains in the "learn more about the dashboard" page found at the bottom of the dashboard that the mechanics of the website implement this time delay because of evidence showing "that proving what you know over time is a really great way to ensure that you actually remember what you've learned."[120] Not only

[120] "Welcome to the learning dashboard," *Khan Academy,* https://www.khanacademy.org/mission/precalculus.

does Khan Academy arm teachers with data to help them offer targeted assistance where it is most needed, it also helps students keep track of their own progress.

Fig. 3 - Precalculus Mission Dashboard

The humanities half of Khan Academy is structured differently but follows a similar achievement and level-based structure. For instance, in the world history lesson, history is broken down into big chapters such as "Beginnings to 600 BCE" and "1750-1900 Enlightenment and Revolution."[121] Each chapter is then further broken down into sections, with even smaller sections and test checkpoints like those found in the math section, where students must get five questions in a row correct before progressing to the next lesson. For instance, in the "Beginnings to 600 BCE" section, the chapter is broken down into nine sections: The origin of humans and early human societies, the birth of agriculture and the Neolithic revolution, Ancient Mesopotamia, Ancient art and artifacts, Ancient India, Ancient Egypt, Ancient Americas, Shang China, and Humanity on earth.[122] Each section has several segments, in-

[121] "World History," *Khan Academy*, https://www.khanacademy.org/humanities/world-history.

[122] "Beginnings - 600 BCE," *Khan Academy*, https://www.khanacademy.org/humanities/world-history/history-beginnings.

cluding a few videos around twelve minutes each, several short articles overviewing related topics, and quiz checkpoints. Figure 4 shows the first video for the birth of agriculture and the Neolithic revolution section, with the progress bar on the left side showing what is ahead, using different symbols to indicate what type of activity each section will contain. The play button denotes a video, the sheet of paper signifies readings, and the star indicates a practice, or quiz section. As sections are passed, each icon changes color until the entire bar is filled, signaling that the student has successfully completed the lesson.

Fig. 4 - Khan Academy World History Lesson

Just like in the math section, students pursuing history lessons can earn badges for achievements, and these badges are often more general, such as those rewarding students for using Khan Academy several days in a row (Good Habits Badge) or for watching an hour of video on a single topic (Awesome Listener Badge). There are five tiers of badges–meteorite, moon, earth, sun, and black hole–as well as specialty challenge patches, which are for completing special topics like "Hour of Code." The tiers ascend in difficulty and dedication needed from completing ten practice tasks (Meteorite Badge: Fingers or Toes) to being a member

of Khan Academy for four years (Earth Badge: Bristlecone).[123] Part of the appeal of Khan Academy comes from the integration of video game mechanics into educational material. Studies have shown that "gamification" of non-game services can increase user interest and engagement, and by integrating it with educational topics, Khan has made learning feel like playing a video game.[124] Not only are the game mechanics fun, they turn the goal of learning into mastery rather than simply proceeding to the next topic when an "acceptable" score is reached. In Sal Khan's TED talk on this topic, he explained that though trying to teach each student at their own pace was once logistically impossible, thanks to modern technology, every potentially difficult to execute part of this educational model could now be remedied: "Students need an explanation at their own time and pace? There's on-demand video for that. They need practice? They need feedback? There's adaptive exercises readily available for students."[125]

In this TED talk, "Let's Teach for mastery – not test scores," Khan argues for mastery learning, using the metaphor of "home-building" to illustrate the benefits of this method. He says that in this metaphorical home project, they "have two weeks," so they "do what [they] can," and when the "inspector shows up, it's a 75 percent," which is a passing grade so they move on, building the "second floor, third floor, and all of a sudden. . . the whole structure collapses."[126] To continue the metaphor, Khan offers a few reactions that parallel those in education, that they "had a bad contractor, or maybe [they] needed better inspection or more

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[123] "Badge Types," *Khan Academy*, https://www.khanacademy.org/badges.

[124] Juho Hamari, "Do badges increase user activity? A field experiment on effects of gamification," *Computers in Human Behavior*, Corrected proof available online April 1, 2015, doi: 10.1016/j.chb.2015.03.036.

[125] TED, "Let's teach for mastery -- not test scores | Salman Khan," Filmed November 2015, YouTube video, 10:49, uploaded September 26, 2016, https://www.youtube.com/watch?v=-MTRxRO5SRA.

[126] TED, "Let's teach for mastery."

frequent inspection," but regardless of all these explanations, the real problem was the process. By choosing to artificially impose time constraints on their project, they ensured a variable outcome. Furthermore, even though they went to the trouble of inspecting and identifying the problems, they moved on and built the floors above anyway.[127] He then moves out of the metaphor to advocate for mastery learning, not only to help students learn better, but to boost their self-esteem, to teach them that if they score poorly on a test, it does not mean that they "have a C branded in their DNA somehow," but that it instead simply means that they should keep working at it.[128] When taking a closer look at the theory behind mastery learning, much of its proposed methodology can be found in how Khan has structured the lessons on Khan Academy.

The first major proponent of mastery learning was an twentieth-century education theorist named Benjamin Bloom, who believed that teachers could adapt the beneficial aspects of one-on-one instruction to improve student learning in a larger setting, and that even though students varied in learning speeds and abilities, through mastery learning, almost all students could accomplish high levels of achievement.[129] Most mastery learning models emphasized the importance of diagnostic pre-assessments, like the one described earlier in the Precalculus mission. These models also tended to stress that formative assessments should be "for" learning, not "of" learning. Rather than act as a "one-shot, do-or-die experience," they are instead a seamless part of the learning process. These sentiments towards testing are echoed by Khan in his book, *The One World Schoolhouse*, where he criticizes contemporary conventions of testing. He proposed that "at best, [tests] offer[ed] a snapshot of where the

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[127] TED, "Let's teach for mastery."

[128] TED, "Let's teach for mastery."

[129] Thomas R. Guskey, "Lessons of Mastery Learning," *Interventions that Work* 68, no. 2 (2010), n.p.

student stands at a given moment in time" and said "nothing about how long learning will be retained."[130] He criticized "conventional schools" for placing "great emphasis on test results as a measure of a student's innate ability or potential."[131] Though he promised that he was not "anti-testing," this fundamental disagreement with tests as an accurate measure of student progress directly counters the way No Child Left Behind celebrates its own standardized tests as an invaluable tool to maintain accountability and keep schools informed.[132]

Khan also criticized "the Prussian Model" that he claimed most standard K-12 education in the United States was based on. This model was founded in part by Prussian philosopher Johann Gottlieb Fichte and designed to "churn out loyal and tractable citizens who would learn the value of submitting to the authority of parents, teachers, church, and ultimately, king."[133] It was because of the Prussian Model that ideas were broken down into subjects that could be learned through rote memorization and overall learning time was broken into "class periods" designed to discourage independent thinking by constantly interrupt learning.[134] Once again, Khan qualified his criticisms, insisting that this was not intended as a "wholesale condemnation of [the United State's] current educational system," nor did he want to "shut down the schools and start over."[135] Instead he advocated for "a more questioning and skeptical stance toward educational customs and assumptions."[136] Looking at Khan's criticisms of testing, what he perceived as antiquated school models, and top-down govern-

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[130] Sal Khan, *The One World Schoolhouse,* 91.

[131] Khan, *One World Schoolhouse,* 93.

[132] Khan, *One World Schoolhouse,* 92.

[133] Khan, *One World Schoolhouse,* 76.

[134] Khan, *One World Schoolhouse,* 77.

[135] Khan, *One World Schoolhouse,* 81.

[136] Khan, *One World Schoolhouse,* 81.

mental policies side-by-side reads as a critique of the educational establishment, as well as towards reform that had been legislated in recent years, even though Khan has never explicitly spoken out against No Child Left Behind. Indeed, Khan uses very little of his public platform to hash out problems, as these few criticisms were rarely repeated and always accompanied by caveats. He instead dedicates his time and effort to discussing solutions, with the most obvious larger example being Khan Academy. More specifically, they provide extensive support and unique tools for teachers to help them integrate Khan Academy into their classrooms.

Once again, Khan Academy implements ideas of the mastery model, which also recommended utilizing these "formative assessments" to help teachers implement targeted "corrective instruction," which the model differentiates from "reteaching."[137] This corrective instruction can engage with students' different learning styles, or use peer tutoring–as long as the lessons are not being simply repeated. Proponents of this model conceded that these corrective teaching practices can add anywhere between ten and twenty percent more time to earlier lessons, but also argued that this time typically ended up being saved by reducing the time needed for remediation later on.[138] Khan Academy integrated this particular convention of mastery learning and integrated it into the website's user interface: by flipping the classroom, each student can move at a different pace without the teacher needing to teach certain units multiple times. Khan Academy becomes a tool for student and teacher alike to help make mastery learning the most effective and efficient for all involved.

On Khan Academy's teacher portal, a user can have multiple modes enabled, allowing teachers to use Khan Academy to learn in their own time as well. In fact, the Khan Academy

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[137] Guskey, "Lessons of Mastery Learning."

[138] Guskey, "Lessons of Mastery Learning."

"Teacher's How-To Guide" recommends teachers to try out a mission on their own before using it in their classrooms. In math courses, teachers can recommend skills to their students, which will notify students enrolled in the class in their own accounts. They can either recommend skills to the whole class or to specific students who need extra help, and these recommendations can be given a due date or an assigned number of questions. To see how students are doing, Khan Academy provides data to teachers through detailed "coach reports," which help teachers see how their class is doing overall, and if any targeted help is needed, as seen in figure 5. Teachers can also view activity reports that show exactly how much time students spend on Khan Academy either during or outside of school, as well as a real time report that shows a live average of total class "energy points." Khan Academy claims many teachers use this metric to encourage activity in the classroom or to fuel in-class games or competitions.[139]

On the other hand, the accountability systems found in No Child Left Behind, which used assessment data to demonstrate "adequate yearly progress," are defined in the law itself as needing to

> appl[y] to the same high standards of academic achievement to all public elementary school and secondary school students in the State; [be] statistically valid and reliable; result in continuous and substantial academic improvement for all students; measure the progress of public elementary schools, secondary schools and local educational agencies and the State based primarily on the academic assessments.[140]

Khan Academy instead uses data to inform educators immediately so they can target specific problems within their classroom, allowing them to fix any problems right away with solutions tailored to their specific classroom situation. Even though their goals are arguably simi-

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[139] Khan Academy, "A Teacher's How-To Guide," https://www.khanacademy.org/resources.

[140] *No Child Left Behind Act of 2001*, Public Law 107-110, U.S. Statutes at Large 115 (2001): 1446.

lar, with Khan's desire to educate everyone and No Child Left Behind's goal of "enabling all public elementary school and secondary school students to meet the State's student academic achievement standards" and "narrowing the achievement gaps in the State, local educational agencies, and schools," each group's executed solution is drastically different.[141]

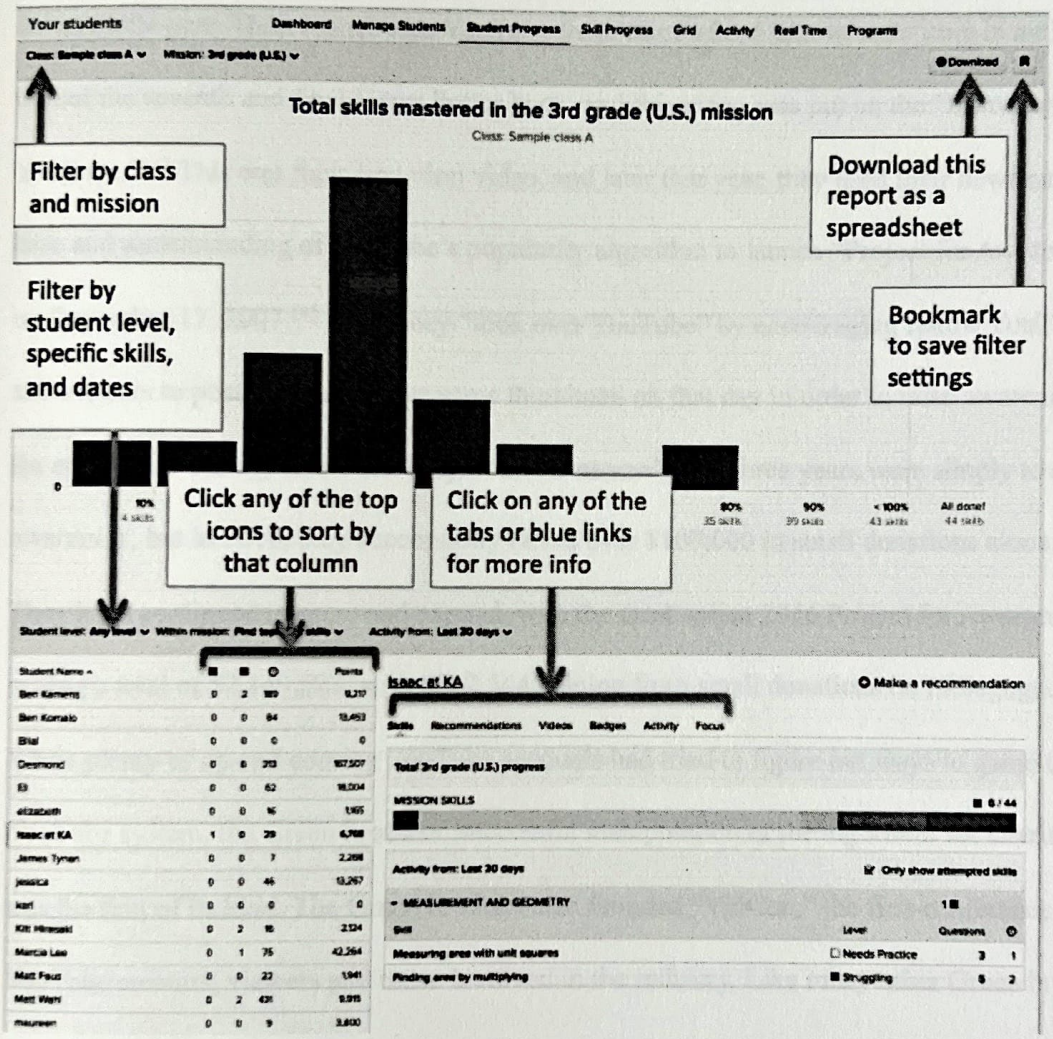

Fig. 5 - Labeled coach report from Khan Academy Teacher How To Guide

Crash Course: YouTube Stars turned Educators

While Khan Academy is one of the earliest and most prominent, many other free online educational resources have cropped up, including Crash Course, a series of educational

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[141] *No Child Left Behind*, 1446.

YouTube channels founded by John and Hank Green. Though Khan predated the Green Brothers in their online education endeavors, John and Hank's joint YouTube channel, "VlogBrothers," rose to popularity back in 2007. Their success came from their project "Brotherhood 2.0," which involved them communicating solely via "vlogs," or video blogs, for an entire year. Their launch into YouTube fame came after Hank wrote a song in anticipation of the seventh and final Harry Potter book, and this video was put on the "front page of YouTube."[142] This was their first viral video, and later that year, they used their newfound fan base and understanding of YouTube's popularity algorithm to launch "Project for Awesome" on December 17, 2007.[143] Here, they "took over YouTube" by encouraging fellow YouTubers and viewers to post videos with the same thumbnail on that day in order to raise awareness for each users' charity of choice. Project for Awesome's first three years were simply to raise awareness, but in 2010, they successfully raised over $100,000 in small donations alone.[144] They have continued to grow and expand, with the most recent 2016 Project for Awesome raising a total of $2,149,523, with $862,544 coming from small donations on Indiegogo.[145] While plenty of up and coming YouTube accounts had tried to figure out ways to game the YouTube system, the Green brothers' successful manipulation of the algorithm for charity was the first of its kind. The Green brothers also founded "VidCon," the first conference for YouTube creators, viewers and those involved in the industry. Like many other Green broth-

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[142] Vlogbrothers, "July 18: Accio Deathly Hallows (no spoilers)," YouTube video, 3:53, uploaded July 18, 2007, https://www.youtube.com/watch?v=CvvFiZyEyTA.

[143] "History of Monetization oat YouTube," *YouTube5Year*, https://sites.google.com/a/pressatgoogle.com/youtube5year/home/history-of-monetization-at-youtube. In 2007, rather than generating popular videos based on user preference or viewer statistics, YouTube had a curated front page.

[144] Vlogbrothers, "Thoughts on the Project for Awesome," YouTube video, 3:40, uploaded December 20, 2010, https://youtu.be/-6BgPJqAkP0?t=154.

[145] "Online Creators Decreasing World Suck," *Project for Awesome*, accessed February 15, 2017, http://www.projectforawesome.com/about.

ers endeavors, the first VidCon was a small event, held at a hotel in Southern California. It has continued expand every year, though, and for the first time in 2017, it will include international locations in Amsterdam and Melbourne.[146] Endeavors such as Project for Awesome and VidCon came to define John and Hank Green; even though there were always videos and channels that were far more popular than their own, they were always at the forefront of innovation in utilizing YouTube as a platform.

Funded by YouTube's 2011 Original Channel Initiative, the Green brothers released their first Crash Course video series in the beginning of 2012, teaching Biology and World History.[147] Unlike Khan, who stumbled into educational videos by chance, the Green brothers went into Crash Course knowing exactly what they wanted to do. From the beginning, Crash Course videos were filmed in a studio, with a script, directors, editors and a graphics team, thanks to their funding from YouTube. However, this funding eventually ran out, and in the Green brothers' tradition of innovation, they created Subbable, which they described as a "voluntary subscription service that allow[ed] [viewers] to pay monthly for stuff [they] like." This set-up offered tiered perks like Kickstarter, but instead of funding a single project, donations were to sustain artists on a more ongoing basis.[148] They explained that, at the time, an episode of Crash Course cost around $5,000 an episode to make, covering the cost of things like pay for teachers, writers, editors and animators as well as image rights, equipment, and studio space. Further, twelve-minute-long educational videos simply did not generate the view counts for these costs to be covered by ad revenue alone. They envisioned Subbable as

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[146] "Online Video is Impossible to Pin Down," *VidCon*, accessed February 15, 2107, http://vidcon.com/about/

[147] Paul Bond and George Szalai, "YouTube Announces TV Initiative With 100 Niche YouTube Channels," *The Hollywood Reporter*, accessed November 25, 2016, http://www.hollywoodreporter.com/news/youtube-tv-channels-kutcher-poehler-254370.

[148] "Where We Go From Here?" *Hank and John's Newsletter*, sent on July 24, 2013, http://us2.campaign-archive1.com/?u=0dcadd0ad86593dbaf6121730&id=f339fe02e2.

taking steps "toward an Internet that rewards engagement over distraction, one where success is not measured by how many people watch something but by how valuable the audience finds it."[149] In 2013, John and Hank explained that Crash Course was then fully funded through a combination of Subbable donations and advertising revenue from existing Crash Course videos.[150] Subbable has since been acquired by Patreon, a similar voluntary subscription service with tiered rewards, and Crash Course migrated their donors over to this new platform.[151] Though PBS Digital Studios began a partnership with the channel in 2014, the Green brothers continue to crowdsource much of their funding.[152] According to Crash Course's Patreon page, as of February 2017, they have 7,291 patrons, generating $29,167 a month.[153]

Crash Course has not received nearly the amount of press coverage–critical or complimentary–that Khan and Khan Academy have received and continue to receive. However, Crash Course bears examination because it is so inextricably connected to YouTube as a platform. While users can find Khan Academy videos on YouTube, to get the full experience, they have to create an account and log in to a separate website. As veterans of the platform, the Green brothers were able to create Crash Course in a way that interacts seamlessly with YouTube–an enormously popular and near unavoidable website that boasts over a billion

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[149] "Where We Go From Here?"

[150] Hank Green and John Green, "Reddit Ask Me Anything," accessed February 15, 2017, https://www.reddit.com/r/IAmA/comments/1ttwf9/i_am_hank_green_cohost_of_vlogbrothers_mental.

[151] Alex Pham, "Patreon Acquires Subbable, Aligning the YouTube Stars," March 16, 2015, http://www.forbes.com/sites/alexpham/2015/03/16/patreon-acquires-subbable-aligning-youtube-stars

[152] "PBS Digital Studios and Hank and John Green Announce New Partnership to Expand Popular 'CRASH COURSE' YouTube Series," November 5, 2014, http://www.pbs.org/about/blogs/news/pbs-digital-studios-and-hank-and-john-green-announce-new-partnership-to-expand-popular-crash-course-youtube-series.

[153] "Crash Course is creating Smarter People," *Patreon*, https://www.patreon.com/crashcourse.

users and reaches more 18-34 year-old and 18-39 users than any American cable network.[154] While this of course does not mean that every one of these users spends their time watching Crash Course's educational videos, it is much easier to stumble upon Crash Course than it is Khan Academy. When searching generic topics on YouTube such as "US history," "biology," and "literature," Crash Course comes up as the first or second result, even when logged out, so personal YouTube use or history would not affect search results.[155]

Furthermore, as explained before, the Green brothers themselves have considerable influence in their own right, across several social media platforms. Their own channel, Vlogbrothers, has nearly 3 million subscribers and over a billion and a half total views as of February 2017, and is the head of a forty-four channel network.[156] That network includes educational content such as Crash Course, as well as other interactive fictional content channels such as *The Lizzie Bennet Diaries*, an adaptation of *Pride and Prejudice* reformatted for YouTube that eventually became the first digital series to win an Emmy.[157] Hank and John have around 700 thousand and 5 million Twitter followers respectively. John's significantly larger number of followers is likely due to the fact that along with running the multi-channel YouTube network with his brother, he is a New York Times best-selling author of young adult fiction novels, with two of his works being made into films within the past three years.[158] Unlike Khan, who quit his career as a hedge fund analyst to devote his time and attention wholly to Khan Academy, the Green brothers have incorporated Crash Course into their brand, con-

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[154] "Statistics," *Youtube*, accessed February 15, 2017, https://www.youtube.com/yt/press/statistics.html.

[155] Appendix, Fig. 4-6.

[156] *Vlogbrothers*, accessed February 15, 2017, https://www.youtube.com/user/vlogbrothers.

[157] *Vlogbrothers*.

[158] John's books are *Looking for Alaska, An Abundance of Katherines, Paper Towns,* and *The Fault in Our Stars*, with *The Fault in Our Stars* and *Paper Towns* receiving film adaptations in 2014 and 2015, respectively.

tinuing to pursue and expand upon all other aspects of their lives as members of the media and entertainment industry.

Crash Course itself has undergone improvements and expansions since its original launch in 2010, most recently in the release of curricular materials to be used alongside Crash Course World History, the channel's first "season" of videos. Like Khan, the Green brothers have clearly articulated their goals for Crash Course throughout the channel's evolution. In their announcement video for the project on their main VlogBrothers channel, they explained that they had both always "dreamt of making an educational channel on YouTube . . . that would be both genuinely informational and also genuinely entertaining," and that through this series they would finally have the opportunity to do so.[159] In a 2014 interview, John insisted that Crash Course was not trying to "erase the classroom" and that the best educational materials were those that "enhance or jumpstart the classroom experience."[160] Later that year, during a Reddit "Ask Me Anything," John described Crash Course's long term goals as to make materials other than simply videos–"textbooks and textbook-like learning tools"– available to students and teachers.[161] He echoed this desire in an answer to a different question about whether they would be releasing another Crash Course series, to which he responded that he was instead focusing the majority of his energy trying to "build curricular materials around the videos that [Crash Course] can release for free: worksheets and collections of primary sources and lesson plans and essays that can complement."[162] In an interview a year later, he

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[159] vlogbrothers, "IS THIS HEAVEN?," YouTube video, 3:09, uploaded November 7, 2011, https://youtu.be/RCCC1avJ8bI.

[160] Heike Young, "Interview with Bestselling Author John Green: Crash Course in Community Building and Content Creation," *Marketing Cloud*, accessed November 25, 2016, https://www.marketingcloud.com/blog/interview-with-bestselling-author-john-green-crash-course-in-community-building-and-content-creation/.

[161] John Green, "Reddit Ask Me Anything," *Reddit*, https://www.reddit.com/r/IAmA/comments/3guvzy/iam_john_greenauthor_of_paper_towns_cocreator_of/

[162] John Green, "Reddit AMA."

insisted that students who were watching Crash Course videos instead of reading their textbooks should "read their boring textbooks" and that Crash Course videos were always intended to supplement regular instruction rather than replace it.[163] In 2017, their about page proclaimed that "high quality educational videos should be available to everyone for free" and that Crash Course transforms the traditional textbook model by presenting information in a fast-paced format, enhancing the learning experience."[164]

The Green brothers' primary roles as "YouTubers" also means that they treat Crash Course viewers like a community of contributors, with input and stake over what content they produce–much like they do with their main channel subscribers. The most fascinating example of this happened in October 2016, when they decided to take down the existing episodes of a newly released series, Crash Course Human Geography. They issued a statement on the Crash Course channel in a video titled "A Note on Crash Course Human Geography." In it, John Green explained that

> [i]n the last few months, we've been trying to grow Crash Course - both on the curricular side of things and in terms of the number of videos we make per week - without increases to our budget or staffing and that was a mistake. It led to a rushed production schedule, inadequately edited and vetted scripts and the Human Geography videos had factual mistakes as well as too strident a tone. . . Crash Course needs to have a point-of-view but it also needs to be intellectually rigorous and to acknowledge the diversity of opinion and research within a field and we didn't do that, so we've taken the videos down and we'll be back with the Geography series in the future, that better reflects the diversity of contemporary

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[163] Claire Kirch, "John Green to Crash Course Fans ' Read Your Boring Textbooks,'" *Publishers Weekly,* May 19, 2015, http://www.publishersweekly.com/pw/by-topic/childrens/childrens-authors/article/66676-john-green-to-crash-course-fans-read-your-boring-textbooks.html

[164]"About," *Crash Course*, accessed February 15, 2017, http://thecrashcourse.com/about.

approaches to the study of Geography.[165]

In an era of education where one of the biggest buzzwords is "accountability," Crash Course's decision to acknowledge its mistakes and shortcomings and retract an entire series is an important one, especially because the entire process of creating these videos, from research to release, is self-contained within Crash Course's own team. It seems that the accountability comes from a conversation with their viewership, as John goes on to thank "the many people who have shared reasoned, thoughtful and constructive criticisms of Crash Course videos."[166] While this incident shows the benefits of how easy it is to edit and update web content, it also illustrates how even though the internet seems ephemeral, nothing can ever truly be deleted from the internet; these deleted episodes of Crash Course Human Geography have since been re-uploaded by other users, and there is little the Green brothers can do to prevent this from happening.[167] In this way, web content like Crash Course is held to a standard of accountability that would not seem out of place in policies like No Child Left Behind.

Edutainment: Crash Course and its Content

As of February 2017, Crash Course has nineteen series that are either completed or in progress, with a new series, Crash Course Computer Science, scheduled to begin on February 22, 2017. Though most series like the inaugural Biology and World History playlists have around forty videos, there are some shorter more specialized series that cover narrower top-

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[165] CrashCourse, "A Note on CC Human Geography," YouTube video, 2:03, uploaded October 31, 2016, https://www.youtube.com/watch?v=yvFStAP7Uko.

[166] CrashCourse, "A Note on CC Human Geography."

[167] Thane Krios, "COURSE CRASH Geography Human 01 - Environmental Determinism," YouTube video, 9:59, uploaded November 1, 2016, https://www.youtube.com/watch?v=9mGvZXvRNLs&t=0s.

ics, such as Intellectual Property. The full list of topics covered includes Physics, Philosophy, Games, Literature Series 1-3, Economics, US Government and Politics, Astronomy, Anatomy & Physiology, Intellectual Property, World History Series 1 & 2, Big History, Psychology, Biology, Ecology, US History and Chemistry. As of February 2017, the channel had a little over 5.5 million subscribers and over 535 million total views.[168] The hosts of the video series have expanded beyond John and Hank Green alone, though they still retain creator credits throughout the project. For instance, beginning in March 2016, the channel's Physics series was being taught by Dr. Shini Somara, whose resumé includes her own show with BBC World news and a doctorate from Brunel University.[169] They even have a separate channel for grade-school science called "Crash Course Kids," which has the much more modest subscriber count of just over 123,000 as of February 2017.[170]

Though Crash Course's primary home is on YouTube, it does have its own website, which offers mostly navigational links to their primary content, merchandise, and their donation page, as well as providing credits and a contact form for press inquiries. The Crash course website also houses teacher resources, which until the end of 2016 was only downloadable versions of each video for teachers who wanted to show the videos in class without having to run ads before them or for teachers who could not show them from YouTube due to their school's firewall settings. As of 2017, Crash Course's website also hosts curricular materials for the Crash Course World History series. The curriculum page includes download links for both student and teacher editions of digital workbooks, that include assignments and activities as well as primary and secondary source documents to be used in conjunction with

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[168] *CrashCourse*, "Description," https://www.youtube.com/user/crashcourse/about.

[169] "See What I've Done," *Dr. Shini Somara*, accessed February 15, 2017, http://www.drshinisomara.com/credits.html

[170] *CrashCourse Kids*, "Description," https://www.youtube.com/user/crashcoursekids/about.

the existing videos.[171]

Though the show has comedic undertones, its primary focus is educational, and it does its best to maintain as much accuracy as possible. Whenever an error is made or if the way something is said could be misleading, they include corrections through annotations on the screen. Furthermore, if a person or an idea gets glossed over for the sake of time, they often include on-screen text boxes with more information for curious viewers to read if they pause the video. They will also link to past episodes and series if they mention something that has a relevant existing episode. This use of annotations and linking between videos can be found in all the series, and marks one of the benefits of YouTube as a platform to disseminate educational material. If an error was caught in a textbook after it had already been widely implemented in schools, the cost of reprinting and redistributing would be far too high to fix a simple mistake. Even the continued re-release of updated editions becomes costly for schools to keep up with, with some schools looking to replace textbooks with tablets and e-readers.[172] Instead, with a YouTube video, an annotation can be put in and instantaneously, everyone who watches the video will see the correction, at no cost to the viewers or the content creators.

Aspects of curriculum theory find their ways into the conventions used by Crash Course, especially in regards to making sure materials are not dry and disconnected from a student's real experiences. They use several delivery methods, often humorous to keep the content from being too "boring." Looking at one course in particular, Crash Course US History, the series aims to explore what John describes as "the tension between American mythol-

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[171] "Crash Course World History Curriculum," *Crash Course*, http://thecrashcourse.com/curriculum.html.

[172] The Associated Press, "Schools Shift from Textbooks to Tablets," *CBS News,* March 6, 2013, http://www.cbsnews.com/news/schools-shift-from-textbooks-to-tablets/.

ogy and American history," making sure to address the absence of–and include when possible–the voices of often underrepresented groups, such as women and ethnic minorities.[173] In this series, as well as the World History series, Crash Course uses recurring segments and visual effects to tie the series together and make its content more accessible to viewers. This is often combined with humor, as exemplified by the "Libertage" found in the US History series, so named as a portmanteau of liberty and montage, and used to present an exaggerated image of patriotism. It involves rapidly changing historical "American" images overlaid with a semi-transparent waving American flag, with the "AMERICA" written in bold, all capital letters across the center, pictured in figure 5. Underneath "AMERICA," they include a subtitle that changes episode to episode. The segment, though usually lasting no longer than five seconds, begins and ends with an explosion, and features a rapid electric-guitar version of the national anthem. It is always used in a humorous, ironic way, but also helps address things like historical bias. In "Taxes & Smuggling - Prelude to Revolution: Crash Course US History #6," the libertage follows John's explanation that colonists often avoided British taxes via smuggling, "which we did because this is America!", with the short subtitle reading, "No Taxation Without Representation." Later in the video, there is a second libertage, which John requests after referring to colonial reactions to the Townshend Acts with the pronoun "we." Though he says, "You don't like it when I say we? Well tough luck, I'm an American. Bring back the libertage!" the libertage as punctuation acknowledges John's potential bias and sympathy towards the American colonists as an American.[174]

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[173] CrashCourse, "When is Thanksgiving? Colonizing America: CrashCourse US History #2,' *YouTube*, posted 7 February 2013, https://youtu.be/o69TvQqyGdg , accessed 4 January 2016.

[174] CrashCourse, "Taxes & Smuggling - Prelude to Revolution: Crash Course US History #6," *YouTube*, posted 7 March 2013, https://www.youtube.com/watch?v=Eytc9ZaNWyc , accessed 27 November 2016.

Fig. 5 - A sample frame of a "libertage," from CrashCourse US History #6

One of the other ways Crash Course history videos use humor and repeating motifs involves John playing "Me from the Past," where he sits in a student desk, asking questions as his younger self. Usually included either in the introduction or very near the beginning of the video, this is often used as a way to voice misconceptions or commonly believed over-simplifications. For example, in the same episode, when John asserts that the American Revolution was not about taxes, "Me from the Past," asks "Was it about tea?" John replies that "also, it was not about tea. The Boston Tea party was about taxes, and our God-given right to smuggle. It's a little confusing, me from the past, but that's why Crash Course is here!," neatly reiterating main ideas while confirming Crash Course's goals.[175]

Another recurring segment is the "Mystery Document," which is a game section where John is given an excerpt from an unknown primary source document, and he guesses its author. If he guesses incorrectly he gets a small electric shock from a shock pen, reminding viewers that the show is in fact on YouTube, where the most popular videos often involve

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[175] CrashCourse, "US History CrashCourse #6."

the subject incurring some kind of physical pain. In this particular episode, the document read as follows:

> The Americans are properly Britons. They have the manners, habits, and ideas of Britons; and have been accustomed to a similar form of government. But Britons could never bear the extremes, either of monarchy or republicanism. Some of their kings have aimed at despotism; but always failed. Repeated efforts have been made towards democracy, and they equally failed... If we may judge of future events by past transactions, in similar circumstances, this would most probably be the case in America, were a republican form of government adopted in our present ferment.[176]

John talks through his guessing process, identifying that the speaker is "an educated person who thinks that Americans are Britons who will inevitably want to walk a middle path between republicanism and monarchy and therefore that the revolution is not a good idea" and "a colonist, because of the reference to "our present ferment," guessing that the author was Ben Franklin's son William. Unfortunately for John, the answer was Charles Ingles, a bishop, but even when John guesses wrong, his process teaches methods that students and historians can use when reading primary source documents, like paying attention to the language and diction used as well as who the writer is addressing.

While many of the science oriented series do not have repeating segments the way the history ones do, they do use visual aids to help make concepts more clear, such as making sure mathematical formulas and problems are demonstrated visually rather than just spoken about, as well as providing models of things, like molecular bonds in the Crash Course Chemistry series. These visualizations are especially helpful in videos such as Crash Course physics, where seeing equations play out in real situations can help bring clarity to the viewer. The Crash Course science series also provide interactive tables of contents at the end of each video, simultaneously providing a final review of what was covered in the video and giving viewers a tool to help navigate the video to exactly the topic they want to rewatch if they need to review.

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[176] CrashCourse, "US History CrashCourse #6."

Much like Khan Academy, Crash Course covers *A Nation at Risk*'s Five New Basics and more. Crash Course even frames several of their video series around College Board Advanced Placement (AP) curricula, such as their ongoing Physics series and especially their World History series. Though this is not how they initially planned for the show to function, users began to push the series towards use for AP preparation on their own. Looking again at the Crash Course US History video discussed above, YouTube analytics provide interesting statistical proof that students were using the videos to prepare for AP tests. Looking at how the video has done since publication on March 3, 2013 and as of February 2017, YouTube analytics show that this particular video has a total of 1,785,939 views, historically spiking around April and May, right before when American high school students take the College Board Advanced Placement US History test, seen in figure 6.

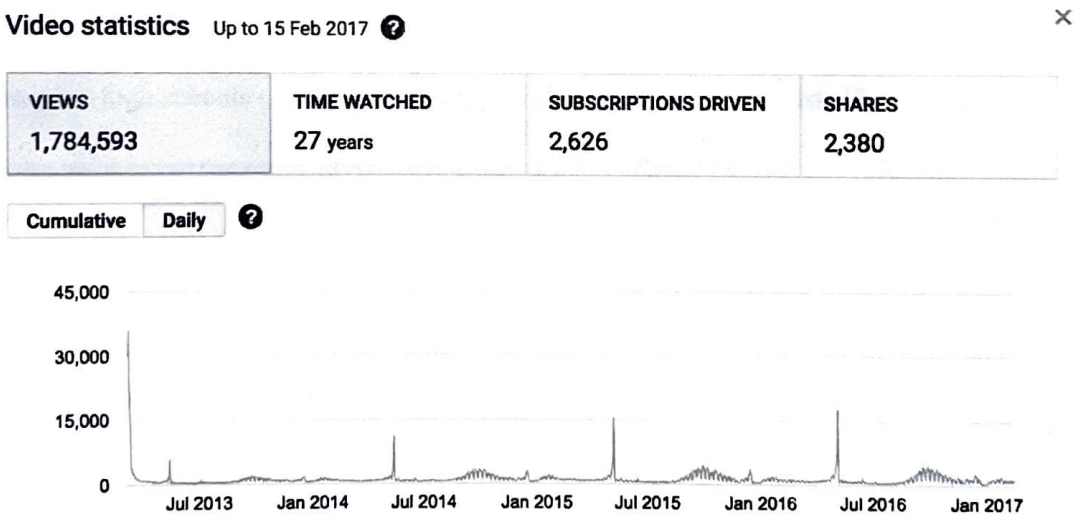

Figure 6 - Video Statistics for Crash Course US History #6

Even though the video has over a million and a half views, viewers do not always sit all the way through, with view duration averaging at eight minutes and fifteen seconds, about 67% of the twelve minutes and eighteen second long video. The video has also been shared 2,380 times and driven 2,626 subscribers, meaning that 2,626 people subscribed from this video's

page on YouTube. The video also has 3,547 comments, and though not all relevant to the video, they offer confirmation that many of the viewers are high school students preparing to take AP US History test, like one comment with 51 community likes asking "how do I watch 48 12-minute videos before tomorrow morning?" and another with 226 likes that read "Must.... keep.... cramming..... for..... AP..... exam," both from May of 2016.[177]

Now, Crash Course is consciously working towards making their channel a tool for AP test preparation. With things like the release of curricular materials, and an explicit statement in the description of their physics series that it would guide students through AP Physics 1 and 2, the Green brothers have taken user feedback to guide the progression of their channel. In fact, John explained to a follower on Twitter who asked if they could complete Crash Course's World History curriculum, and then take the AP World History test without having ever taken a formal high school class, that not only yes, a student could prepare for an AP test on their own but high schools could also forgo AP World History material costs.[178] For both students who want to pursue more advanced coursework not offered by their schools and schools who want to provide more advanced coursework for their students amidst budget constraints, free instructional and curricular materials can help achieve these once difficult to reach and expensive dreams.

Accessibility and Affordability: Helping End Gatekeeping in Education

In a 2010 speech to the American Enterprise Institute, then Secretary of Education Arne Duncan called for a new kind of reform to replace the old idea of "reform by addition,"

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[177] kateazile, re: Crash Course US History #6; Pokeplayer, re: Crash Course US History #6, May 2016, retrieved from https://www.youtube.com/watch?v=Eytc9kZaNWyc on March 20, 2017.

[178] John Green, Twitter post, September 1, 2016, 5:47 p.m., https://twitter.com/johngreen/status/771446410185170944.

using technology to illustrate the two kinds of reform. He told his audience that technology could greatly benefit education, but "not just as an add-on or for a high-tech reproduction of current practice." Instead, used most effectively in education, technology was less about "replacing educational roles as it [was] about giving each person the tools they need to be more successful."[179] Khan Academy and Crash Course have done exactly this. Rather than try to replace the teacher, they offer two kinds of resources for two kinds of users: educators and learners. First, for all kinds of educators–parents and teachers–they provide free material to integrate into their instruction in any way they want. In the case of Khan Academy, the site provides individualized attention for students at different levels, without sacrificing already limited instruction time, as well providing resources for learners both in and out of school that either supplement their classes or provide them with entirely new ones.

Having examined both Khan Academy and Crash Course and their relationship with the educational policies that preceded them, there is another facet of free online education that goes beyond anything predicted or attempted by *A Nation at Risk* or No Child Left Behind. Through ways that come inherently from being free and online, as well as those that were intentionally implemented, Khan and the Green brothers work hard to ensure that their content is as accessible as possible. Accessibility can mean two things; first, "capable of being used and seen," as well as "capable of being understood or appreciated."[180] In regards to the first definition for educational materials, this means that these materials should be easily found, and once found, be used without mounting undue financial burden on the user. For the latter definition, this should mean that the content itself can be easily comprehended by the

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[179] Arne Duncan., "The New Normal: Doing More with Less," (speech, Washington, DC, November 17, 2010), *U.S. Department of Education*, https://www.ed.gov/news/speeches/new-normal-doing-more-less-secretary-arne-duncans-remarks-american-enterprise-institute.

[180] "Accessible," *Merriam-Webster.com*, accessed February 15, 2017, https://www.merriam-webster.com/dictionary/accessible.

user, and ideally, enjoyable. In the face of education theories about curriculum and learning style, accessibility seems almost trivial, but both of these facets of accessibility are extremely important to education innovation, especially regarding the implementation of new of technologies. Both are achieved successfully by Khan Academy and Crash Course by using technology to help make their content as accessible as possible, though often in different ways.

Both content creators host their videos in some way on YouTube. For Crash Course, YouTube is their primary location, with a website for additional materials that help the learning experience but are not necessarily essential to get the full Crash Course experience. These additional materials are largely for educators and those looking for additional information about Crash Course as a production company. For Khan Academy, while their own website runs the bulk of their practice questions and achievements system, their videos are still hosted on YouTube, because YouTube is the internet's most popular website on which to host video content and thus allows creators to reach the largest audiences. According to YouTube's press page, nearly a third of all internet users use YouTube, and they watch hundreds of millions of hours of video and generate billions of views daily.[181] Furthermore, YouTube's interface can be used in seventy-six different languages, which covers 95% of the world's Internet population.[182] By using YouTube, Khan and the Green brothers make it easy for their viewers to find and keep track of their content. Viewers can view videos without having to make an account, but can save and follow them once they sign up for a free account. Even on Khan Academy's website users can view and use assignments and quizzes along with videos without making an account, but once they do, their progress can be tracked and they can begin to earn badges.

Produced by American content creators, all of Khan Academy and Crash Course's

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[181] "Press Room," *YouTube*, https://www.youtube.com/yt/press/en-GB/.

[182] "Press Room," *YouTube*.

videos are in English. However, utilizing the community aspect of YouTube, both Khan and Crash Course have translated captions for many of their videos. Any user who uploads a YouTube video can allow "community contributions" for captioning.[183] However, the fact that these captions are community submitted means that the number of languages represented in each video can be incredibly inconsistent, with one video having only captions in English to a video having captions in twenty-eight different languages. These discrepancies in diversity of captions can usually be found in videos released very recently versus those that have been out for several years; it follows that more viewers would have had time to caption older videos. Every video does, however, have captions in English for the hearing impaired or anyone else who needs videos to be captioned. Any YouTube video with captions also has an interactive transcript function that makes the video fully searchable by providing a full text of the video with links to video time stamps so viewers can go directly to the exact second something was said.

As a point of comparison for how important it is that these resources are free, there are countless ways for students to prepare for the SAT or AP exams, if they are willing to pay. While the only thing a student needs to contribute towards completing a Khan Academy SAT preparatory course is his or her time, if they want to buy College Board's *Official SAT Study Guide,* it sells for $24.99, or they can try Princeton Review, whose 2017 edition of *Cracking the SAT with Practice Tests* goes for the slightly lower price of $21.99.[184] Similarly, all of Crash Course's AP World History resources can be downloaded for free, while College Board sells a packet of ten released AP World History exams for $42, and Princeton Review sells

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[183] Appendix.

[184] "Welcome to the College Board Store," *College Board*, accessed March 20, 2017, https://store.collegeboard.org/; "21 books in College - SAT," *The Princeton Review*, accessed March 20, 2017, https://www.randomhouse.com/princetonreview/college/sat/.

their *Cracking the AP World History Exam* for $19.99.[185] While none of these prices are too exorbitant for an average book, for a modern high school student to be competitive in the college admissions process, they must take not only the SAT–perhaps several times–but also multiple AP exams. Adding up the exam fees and purchasing these study guides for every exam can be too much for many students and their families. By offering free supplemental resources, Crash Course and Khan Academy help break down financial barriers that may have been keeping some students from being able to put together competitive college applications.

In regards to the second definition of accessibility, each content producer puts their unique spin on the content to help make it more engaging to an audience. Crash Course drastically differs from Khan Academy in terms of production value. For Crash Course, each video is produced much like an episode of a television series, with a writer, director, editors, a set, as well as an animation team and soundtrack. As stated earlier, the Green brothers estimated that an episode of Crash Course costs about $5,000 to make in 2013, though these costs may have increased in the past three years. For Khan Academy on the other hand, most of their impressive budget discussed in an earlier section goes towards developing their website. Furthermore Khan himself has stated that he "definitely never want[ed] teams writing or scripting videos" as it "would ruin in the connection with the student."[186] Though he has since brought in other teachers to teach topics that he himself does not feel qualified to teach, like art history, those videos are still done in the style of his first videos–a voice over, lecture style. He explained that the amount of time it takes to make the videos that he does himself,

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[185] "Welcome to the College Board Store," *College Board*; "52 books in College - AP," *The Princeton Review*, accessed March 20, 2017, https://www.randomhouse.com/princetonreview/college/ap/.

[186] Salman Khan, "Reddit AMA," *Reddit*, https://www.reddit.com/r/IAmA/comments/ntsco/i_am_salman_khan_founder_of_khan_academyama.

varies depending on his own knowledge of the topic from not needing any prep to make a video on algebra to spending two weeks studying organic chemistry before making the first video.[187]

Conclusion

Even though both Sal Khan and the Green brothers have spoken at length about not wanting to displace teachers from the classroom, if eventually adopted as a nationwide model, their work has the potential to completely change teachers' roles in the classroom. However, Khan Academy's partnership with College Board and most recently, the Law School Admission Council, to provide free materials for students preparing for exams that will help them advance into and beyond post-secondary education, as well as Crash Course's move towards focusing on Advanced Placement materials, seems to solidify their roles as supplemental rather than core education.[188] Moving forward, as Khan Academy and Crash Course garner more respect, legitimacy, and funding, the question becomes not whether they are important to the history of education but instead what their rise in popularity means for the future of education.

Ultimately, beyond the way they embody much of the spirit and intentions of *A Nation at Risk*, Khan Academy and Crash Course's most important impact comes from the way they equalize the playing field for students. Khan Academy and Crash Course help dismantle the role of tests like the SAT and AP exams as financial gatekeepers into higher education by

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[187] Sal Khan "Reddit AMA"

[188] "Khan Academy Announces Free LSAT Prep for All," *LSAC*, February 28, 2017, http://www.lsac.org/aboutlsac/pressreleases/khan-academy-lsat-prep.

making their content as accessible in as many ways as possible. Without accessibility, no matter how helpful the activities, how easy to use or polished their website is, or high the production value of their videos, free online resources do very little to help anyone at all. By making sure these materials are not only high quality, but also easily located and user friendly, Khan Academy and Crash Course make it possible for anyone to take education into their own hands; teachers can supplement their classroom with data analysis, students can supplement their learning with any combination of videos and activities, and the casual viewer can make education a fun pastime. *A Nation at Risk* imagined a Learning Society where educational opportunities would extend "far beyond the traditional institutions of our schools and colleges," and Khan Academy and Crash Course made this a reality, making their extensive educational resources accessible on every computer, smartphone and tablet with internet access.[189]

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[189] *A Nation at Risk,* 14.

Appendix

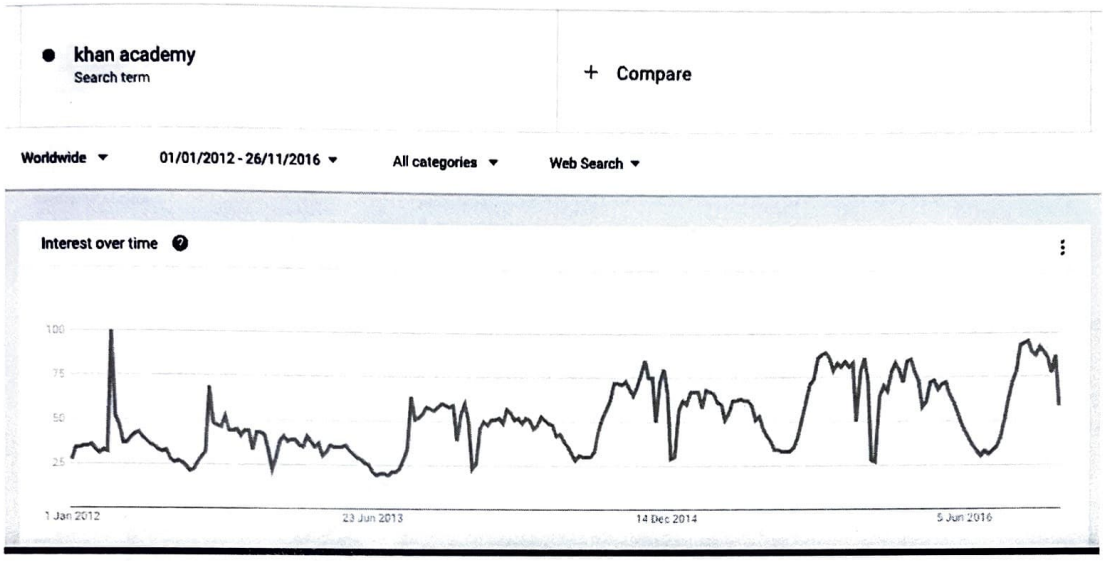


Fig. 1 - Google Trends analysis of search term "Khan Academy" from 2012 to 2016

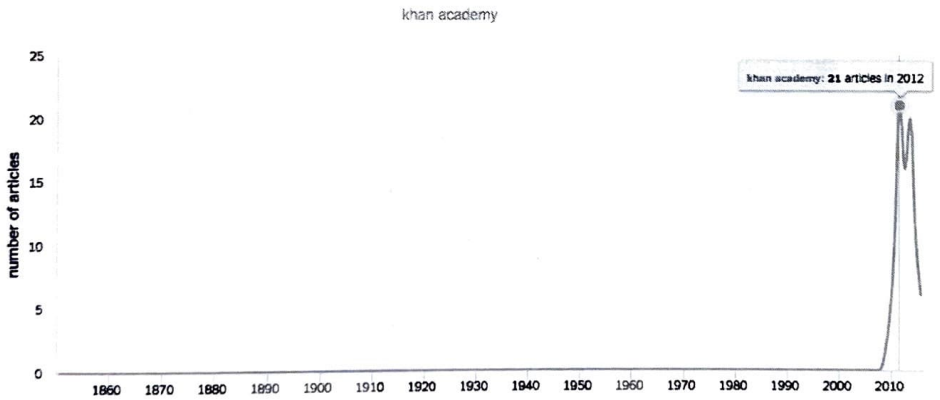


Fig. 2 - New York Times Chronicle Analysis of number of articles containing the term "Khan Academy," 1851 to 2016 (range not adjustable)

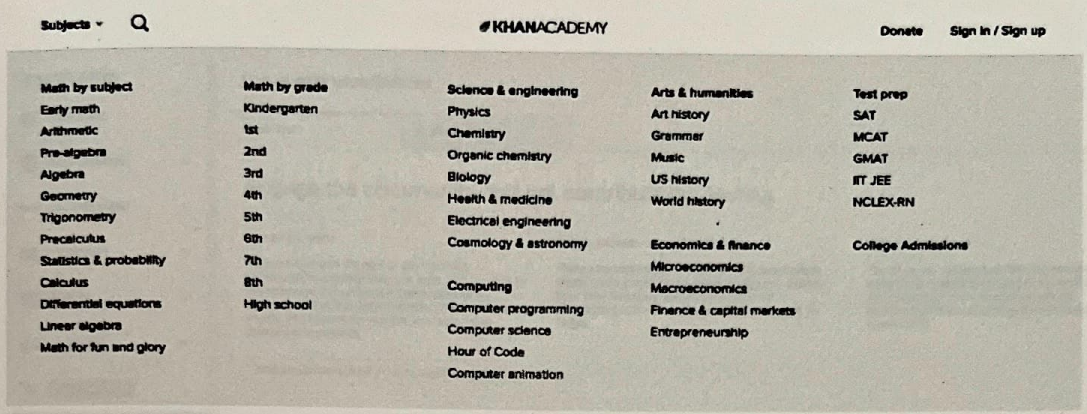
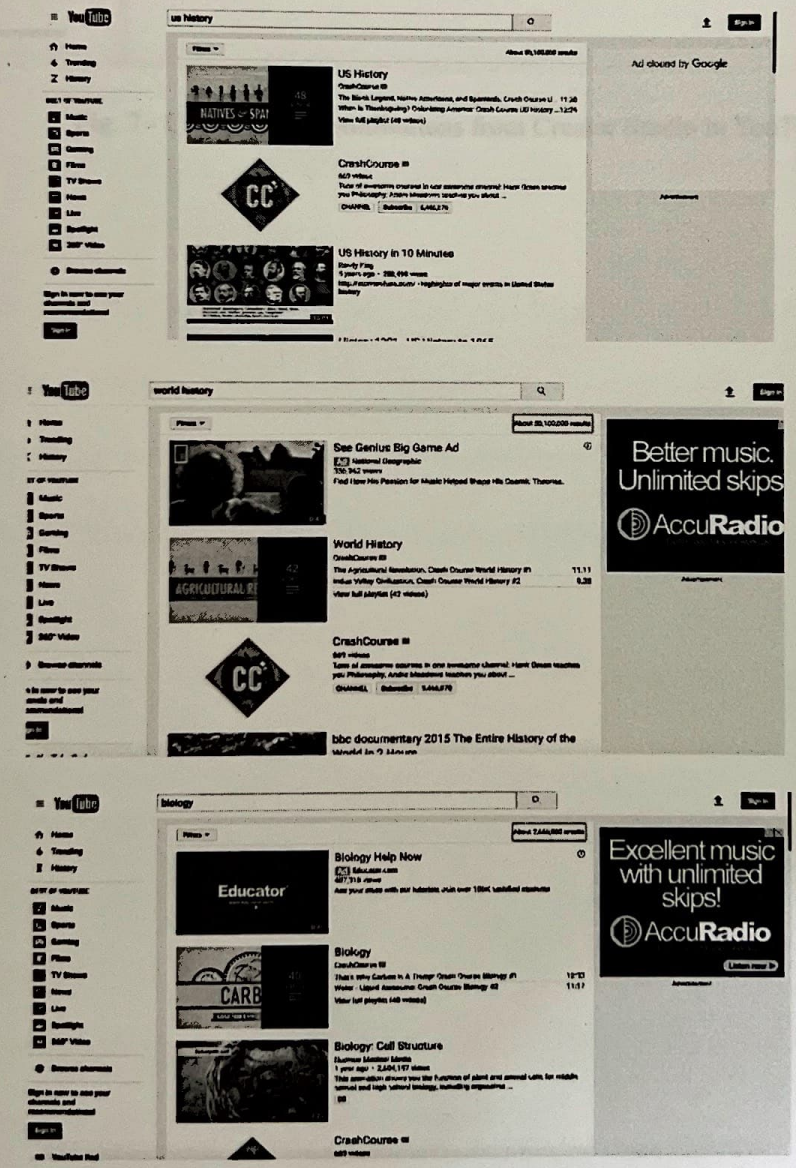


Fig. 3 Screenshot of Available Topics to Learn Through Khan Academy as of January 2017



Figs. 4-6: YouTube Search Results

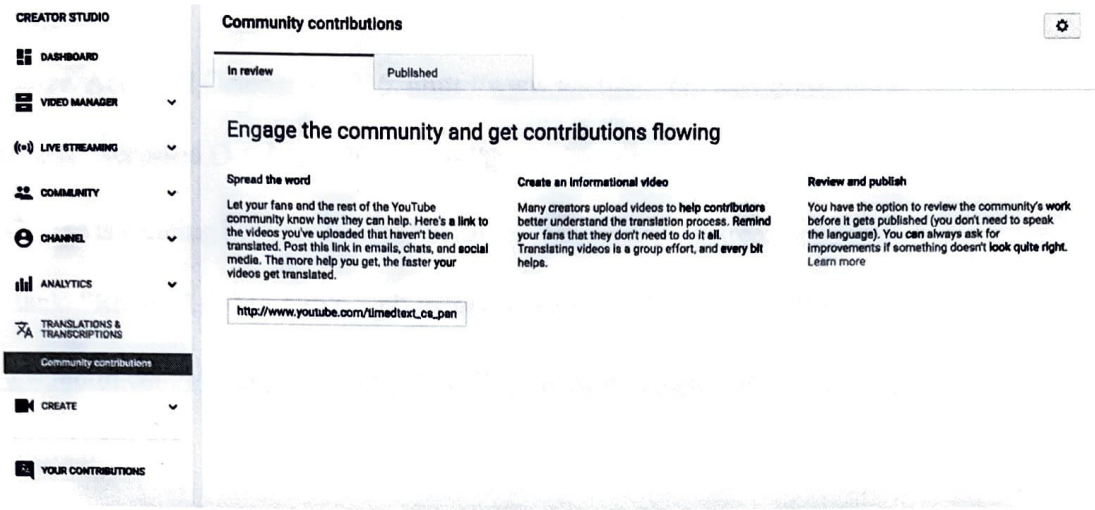


Fig. 7 - Community Contributions from Creator Studio in YouTube

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