

# A Review of the Alternative Education Literature

## 1. Introduction

This paper outlines findings from a literature review concerned with understanding optimal decisionmaking, particularly at the microeconomic level, in the market for education. The analysis was conducted in a book-first fashion, and the following eight books, ordered by chronology of publication, were identified as relevant:

1. 2008, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*, Clayton M. Christensen, Curtis W. Johnson, and Michael B. Horn
2. 2011, *The Innovative University: Changing the DNA of Higher Education from the Inside Out*, Clayton M. Christensen and Henry J. Eyring
3. 2013, *College (Un) Bound*, Jeffrey Selinger
4. 2014, *Blended*, Heather Staker and Michael B. Horn
5. March 2015, *College Disrupted: The Great Unbundling of Higher Education*, Ryan Craig
6. April 2015, *Creative Schools: The Grassroots Revolution That's Transforming Education*, Ken Robinson
7. Jan 2018, *The Case Against Education*, Bryan Caplan
8. Sept 2018, *A New U: Faster + Cheaper Alternatives to College*, Ryan Craig

Several other works are referred to incidentally. Note that the present analysis does not intend to be a comprehensive review of journal work. This paper adds to existing knowledge in that several of these books have never been reviewed within a journal of economics, and no paper exists which compares, contrasts, or concurrently cites even half of these books in the context of a single paper.

The first section provides background and motivation for the current analysis, then gives the organization of the paper. The second section discusses variance in the use of key terms across the literature, then settles the meaning of certain key terms for the purpose of this paper. Each section inclusively between 3 and 10 is dedicated to reviewing one of the eight key books mentioned above, in the same chronological order identified above. A rough tendency is for later sections to compare and contrast the current book of analysis with earlier sections. Section 11 reports general findings across all sections, and this section includes subsections for Atemporal Findings and Trends Over Time.

## 2. Terms

If there was one thing that scholars of education ought to be able to, it would seem to be construction of a standard definition of education and related terms. In contrast to this intuition, Ken Robinson concludes in *Creative Schools*, discussed further in section 8, that education is an essentially contested concept. Rather than depending on conflicting third party definitions, I outline working definitions in this section for the purposes of this paper. Key terms settled here include education, learning, credentials, and the concept of a pathway.

Education is any process which causes learning. To receive an education is to have learned. The difference is so nuanced as not to exist. Traditional learning is, as used in this paper, synonymous with traditional education. Learning is any activity undertaken by an individual which results in accrual of new knowledge or skill.

The conversational notion of a traditional process is one which has been usually undertaken over a substantial period of time. For the purpose of this paper, traditional learning is bound to the context of the United States. This includes K-12 education. A four-year degree is also considered a modern component of traditional education, although a stricter analysis would rule a four-year degree out of the category of traditional because only about one third of Americans obtain an undergraduate degree[42].

Non-traditional and alternative are used as interchangeable prefixes. Pedagogy and organization are included in the concept of education, so a traditional education is conceived of as a teacher delivering an offline lecture to multiple students.

While I think my use of these terms is mainly consistent with the literature, if there is a distinction to be found between the present paper and the broader literature, it is that the present paper takes an intentionally broad conceptualization of education. Online learning, self-directed learning, homeschooling, modern graduate education, and ancient Socratic dialogue all fall within my conceptualization of learning. I would like to think that this concept is particularly devoid of hidden meaning, perhaps unlike other papers. I do not assume the presence of a school, an accrediting body, or even a teacher distinct from the student. Autodidacticism and introspection, to the degree they generate new knowledge or skill, count as learning.

Credentials and pathways, or paths, are the final important terms. While I consider education to be synonymous with learning, credentials and pathways are distinct. Each of these three concepts can be discussed in a traditional or non-traditional form, yielding a total of six interesting categories. A pathway is a set of learning events, and a credential is a presentable artifact intended to convey skill in some area. The traditional path is for a student to progress one grade level per year and graduate at the end of senior year, then go to college. To take a gap year, for example, would be considered non-traditional in this view. The traditional pathway is well-defined, and all other pathways are considered alternative pathways.

As a result, individuals may move back and forth between traditional and non-traditional learning under a non-traditional pathway, but not under a traditional pathway. The traditional pathway always results in a traditional credential, but alternative pathways may result in traditional credentials, non-traditional credentials, or no credentials at all. Under this conception, dropping out of high school and graduating early would both be non-traditional. An exception is made for college, where obtaining a four year degree in four years is in fact abnormal.

Traditionalism technically occurs along a spectrum where the most normal thing is the most traditional and the least normal thing is the least traditional. In this sense, for example, public high school is more traditional than private high school, which in turn is more traditional than homeschooling. Practically, however, private accredited programs are extremely similar and both

considered relatively traditional. Under this rule,

### **3. On Disrupting Class**

TODO: - Summarize notes - Compare/contrast with prior sections

### **4. On The Innovative University**

TODO: - Summarize notes - Compare/contrast with prior sections

### **5. On College (Un) Bound**

In the introductory section, before chapter 1, Selingo agrees with Caplan and disagrees with one reading of Christiansen in that he sees government forces providing universities with a barrier against market forces. Selingo and Caplan argue that universities will not disappear any time soon.

Jeff agrees that the bundled service model of the traditional 4-year undergraduate degree is collapsing, but rather than foreseeing a market takeover by nimbler competitors, Jeff is optimistic that universities will be able to adapt. This theme of universities successfully adapting to become like their competitors, rather than being ousted by competitors, is a major theme of the book.

Jeff's thesis seems to contextualize a series of related wagers put forth by Caplan as wrong-headed. Caplan argues "New Tech Won't Gut Higher Education," [4] Bryan has indicated sustained confidence by offering a series of similar wagers over time. As recently as September 2018, Bryan has wagered that the fraction of American 18-24 year-olds enrolled in traditional four-year colleges will not significantly decrease [5]. This wager, however, hardly shows that new technology hasn't been deeply disruptive. Four-year colleges have maintained enrollment in large part by adapting. Utilizing new technologies, partnering with and giving credit for learning from non-traditional providers, engaging online or hybrid courses, and supporting timeframes varying widely from the fictional four-year standard.

In chapter 1, Jeff notices that many universities are creating degrees which sound vocational, like graphic design or athletic training. He reads this as a sign of disruption. In chapter 2, Jeff notes that some degrees cost the university money. These include majors like Chemistry which are generally well reputed. This seems to be an unaccounted complication to the calculation of social benefit by major found in Caplan and others.

Chapters 2, 4, and 5 detail some ways in which power is shifting from the teachers to the students in the university. One way is simple expenditure. Non-learning service spending has increased much faster than faculty spending in recent years. Selingo indicates this is a positive change which goes hand-in-hand with disruptive pedagogies like the flipped classroom.

Chapter 5 notes that many students graduate with excess credits. Associate degree graduates graduate with 19 extra credits on average, and 16 is the average at the bachelor's level. Excess credits are attributable in part to major-switching and transferring. Such excess credit serves to

inflate actual student costs over, student expectations, estimates published by universities, and even academic calculations of degree cost and return. In chapter 6, Jeff states that 40% of college freshman require remedial course work. This inflates cost in a comparable way.

In chapter 5, Jeff suggests that many college freshman decide on a major based on the recommendations of a relative. In an obvious way this is problematic, but it is also encouraging because it provides evidence that student major selection is somewhat open to external influence, and this allows us to relax the assumption that strategies utilized to improve student education must hold the major constant.

College (Un) Bound is rich in qualitative observation and plausible reasoning, but occasionally wanting in data and also occasionally stretching what counts as plausible reasoning past the breaking point. One instance is observed in chapter 6, where Jeff states that if match.com can make two people fall in love, then surely society can design a better college experience using technology.

In chapter 6, Jeff draws a parallel between online disruption to print media and online disruption to higher education. This comparison presents an opportunity to describe some types of thought on the issue of innovation in education, and provides some evidence in favor of one type. One thought is pure disruption, a la Christiansen, which would indicate that new firms would initially carve out niches and ultimately kick incumbents out of the market. An antagonistic idea would be relatively pure conservatism. This idea would indicate that the existing institutions are still a good market fit and the alleged disruptors are no such thing. Change is not actually likely to occur.

A middle-ground between the two would be market adaptation. In this view, some niche firms enter in with some genuinely innovative technologies and existing institutions are genuinely threatened, but threatened institutions adapt to integrate new technology and as a result such firms are not ousted from the market. The market adaptation story is Jeff's view, and his parallel to the disruption of print media is apropos. In media, legacy providers still hold a major share of the market, but their activities have changed in response to integrating new technologies.

Also in chapter 6, Jeff states that a problem with MOOCs is their failure to deliver academic credit. Jeff claims this won't be a problem for long, as MOOC and other alternative learning providers will continue to partner with universities.

According to chapter 7, 23% of students from families with over \$100,000 of annual income attended to community college which is up from 12% five years ago. First, this may indicate that American society is at a point where income effects dominate social stigma associated with non-traditional education. Second, the degree of that stigma is expected to weaken as this pattern continues. Another topic in chapter 8 is the comparison between a competency based degree plan and a degree plan based on the credit hour. A competency based degree plan is an innovative approach which allows students to complete a degree more cheaply and quickly.

Southern New Hampshire University and Western Governors University are mentioned as leaders in competency based education. Paul LeBlanc identifies himself as a disrupter. He considers the online learning revolution old news and competency based education is the more recent innovation.

LeBlanc believes that competency based education will come from existing institutions, and will exist alongside four-year programs.

In chapter 9, Jeff states that an important measure of active learning is called time on task. Time on task is just what it seems to be, which is the amount of time spent on some task. It is a form of active learning or learning-by-doing. Active learning has been shown more effective than traditional learning methods including lecture. These considerations imply there is a false distinction between education and work. The correct distinction is between education and schooling. Schooling can also be seen as a form of labor with non-positive wages.

In chapter 10, Selingo discusses a company called OnShore which has partnered with universities to obtain college credit for training some employees receive while working with OnShore. Jeff states this program is similar to an apprenticeship. In the second half of chapter 10, Jeff criticizes some modes of economic analysis of the value of an education. I think he does so unsuccessfully. Many of his comments in this section are questionable in importance or dealt with by Caplan.

In section 14, after the conclusion, Selingo discusses several universities with interesting features in their education programs. For example, Wake Tech Community College in North Carolina admits a certain number of 8th graders from the surrounding area into a program which takes four to five years to complete. This program results in both a high school diploma and two years of college credit, which may include a community college degree or certificate in a health science field. Selingo states this is part of a broader movement called the early college movement.

WTCC is one example of many which show that optimal alternative education planning begins well before high school graduation, and in many scenarios even before high school admission. Many high schools have interesting programs which yield college credit, college admission benefits, college cost reductions, or vocational training during high school.

Another interesting program discussed in section 14 involves Westminster College. This program requires the creation of a digital portfolio for all students. One approach to job placement recommended by proponents of alternative education is to build a digital portfolio to demonstrate skill. This technique may also be utilized by individuals who are self-taught or completely skip formal education. This adds evidence to the claim that cutting-edge universities are integrating alternative techniques. It also highlights an interesting question about whether portfolios function as credentials, learning tools, production outputs, or perhaps all of the above. Students may be able to save time and money by asking a university to evaluate a portfolio created while in high school or earlier for college credit.

A recent report indicates that ePortfolios are becoming increasingly supported by institutions of higher education, but their full value remains yet unobserved by employers because there is currently an integration bottleneck with the application tracking systems used by employers [13].

## **6. On Blended**

TODO: - Summarize notes - Compare/contrast with prior sections

## 7. On College Disrupted

TODO: - Summarize notes - Compare/contrast with prior sections

## 8. On Creative Schools

While acknowledging that education is an essentially contested concept, Ken concisely defines learning in the introduction as the process of acquiring knowledge and skills. Ken defines education, particularly formal education, as an organized program of learning. Clearly, organization involves planning, and this precludes learning by surprise from education. I think this is a good thing, because learning by surprise seems like the sort of thing which cannot be invested in or optimized.

Around the middle of chapter 4, Ken indicates that he sees IQ as a narrow measure of intelligence intelligence. He indicates that he is a fan of the theory of multiple intelligence. Later in chapter 4 he speaks highly of self-directed learning and play for children in elementary school and ostensibly otherwise. He name dropped Peter Gray affably.

Clearly Ken and Caplan differ in their position on IQ. Their definitions on education also differ. By including self-directed learning within the concept of education, Ken adopts a broad concept of education. When Caplan argues against education, on the other hand, he clearly does not oppose vocational training in many cases, and he doesn't even oppose education for all student profiles. Caplan seems to be arguing against the four year degree, with some caveats, and also against certain public policies, not analyzing education broadly. Ken's concept of education includes alternative modes of education, and by grouping these two together it may become more plausible to argue that they can substitute for one another substantially, though imperfectly.

Around the middle of chapter 5, Ken discusses mastery learning. Sal Khan, founder of Khan Academy, has called mastery learning the common sense approach to education, and a way to enhance the K-12 status quo in the US[9]. Khan refers to a long literature, dating at least back to Benjamin Bloom in 1984[10] demonstrating significantly better student outcomes under mastery learning. This brings up an interesting question about whether topics learned to mastery obtain slower fadeout. Khan indicates mastery learning as a form of personalized learning, because the pace of learning is individualized.

In chapter 5, Ken argues that the flipped classroom technique, non-substantively different from peer instruction, causes superior outcomes compared to lecture. Ken refers to Mezur[15] for empirical backing. For Ken and Mezur, pedagogies are often causally responsible, not merely associated, with outcomes. In chapter 6, Ken opposes engagement to boredom. In this view passion becomes synonymous with or operationalized by engagement. Ken associates personalized learning with higher passion, engagement, and grit.

In chapter 6, Ken voices support for vocational education directly, and also for alternative pedagogical approaches which are job-like. Project based learning involves learning by creating a deliverable with a team. This is very similar to many positions of employment. Big picture learning is a pedagogical approach which emphasizes the importance of an internship. Ken also discusses

design thinking in this chapter. The details of design thinking are largely extraneous, but it is a good example of a systematic analytical approach, and one which is often used in business. I wonder whether learning by reasoning is more robust against fadeout compared to fadeout of memorized knowledge which is not embedded within a larger system of reasoning. If learning by reasoning is more robust, then learning in the context of a systematic analytical approach like design thinking or economic analysis might resist fadeout.

In chapter 7, Ken reminds us that GPA is a better predictor of college completion than SAT scores, and he discusses the learning record, which is an alternative assessment scheme similar to a portfolio plus principled portfolio grading. Ken speaks highly of homeschooling towards the end of chapter 9. The afterword, occurring after chapter 10, name drops interesting thinkers in education including, Montessori and Steiner, who've lead to schools fashioned after their ideas. He says these traditions tend to emphasize personalized learning.

## **9. On The Case Against Education**

Caplan sets up the purpose of his book clearly in the first chapter, though perhaps not in the title. Caplan's position is that most actual job skills are acquired informally through on-the-job training, not education[11]. Of course, this distinction only matters if we presuppose that on-the-job training isn't a kind of education. Most scholars of education and economists of education, I would even assert Caplan himself, believe that on-the-job-training is a kind of education. It simply isn't the kind that Caplan opposes. In demonstration of his position, Caplan's chief tools are the signaling model of education and the return to education. Most chapters deal with some particular component in a grand assembly of the return to education.

Caplan seems to be a proponent of education to the point of basic literacy and numeracy, and a proponent of learning-by-doing thereafter. It is the formalized education after the point of basic education which he appears to oppose, regardless of whether that formalized education appears in a traditional or non-traditional form. If my reading of Caplan holds, then Caplan would be amenable to certain forms of alternative education but antagonistic towards others. Specifically, if a portfolio is generated by assembling actual work products, this would ostensibly signal real learning, rather than hollow learning, in Caplan's view.

Caplan does at times call for fiscal policy change including reductions in public expenditure on education, but this is hardly his chief goal. Caplan is clear in the book, and he has also been clear in interviews exterior to the book[39], that his criticism holds for private institutions as much as it does for public institutions. Some foreshadowing in chapter 1 underscores what he later argues throughout the book. Higher education is a bad idea for most students, but not for all students. Current policies are bad for society as a whole. Certain forms of education like vocational education, and positions of mixed employment and education, like internship and apprenticeship, are strongly preferred to the typical advice a high school student would receive if he or she were to graduate today.

While Caplan sets a general picture in chapter 1, he sets a detailed picture of the ubiquity of useless

education in chapter 2. Examples of low usefulness education include social studies and arts. Caplan admits some topics taught, like algebra, are high in usefulness, and never claims that education is pure signaling. In analyzing what degree of education is useful, Caplan shows that most high school education is useless. Caplan also shows that most undergraduate degrees conferred are low in usefulness. Medium usefulness degrees like business are the second most common group, and the high usefulness degrees are also lowest by conferral.

Caplan also goes over fadeout and basic learning measurement in chapter 2. One interesting measurement technique Caplan uses is to grant all knowledge held by adults as attributable to the education system, then proceed to show that this upper bound is in fact quite low. Caplan refers to the National Assessment of Adult Literacy to further evidence the low total knowledge held by adults. "Only modest majorities are Intermediate or Proficient" on non-quantitative evaluation, Caplan notes, while under half are intermediate or proficient on quantitative assessment.

In chapter 3 Caplan echoes the countless studies which show that education has significant private gains. Importantly, Caplan accounts for ability bias, human capital, and signaling at the same time. Caplan considers whether credentialism is a product of the state, and he determines that it is not. He notes, for example, that government employees face compressed, not inflated, wages by education. I would contend that Caplan doesn't seriously deal with the problem of government degree accreditation. College degrees were far less common until the GI Bill and government-backed loans cheapened the cost of college attendance. I find it likely that credentialism would exist today even without such policies, but I think accredited degrees would be a relatively less common currency of credentialism in that counterfactual history. The reason for my claim is that there is evidence that non-accredited learning is substituting for accredited learning even in our current system. To say, then, that policy creates credentialism may not be exactly right, but to say that policy shapes credentialism seems right, and that is important enough because the form of credentialism we now have is plausibly much more financially and temporally expensive than the form of credentialism we otherwise might have. Indeed, Friedman's Law is not that government invents behavior or industry, it's that government does things in an expensive way[40].

In chapter 4, Caplan discusses sheepskin effects and secondary sheepskin effects. A sheepskin effect is the payoff difference between the payoff gain from an ordinary year of education and the payoff gain from a graduating year. In graduating years, graduates obtain a disproportionate growth in expected payoff, which indicates there is something found in graduation that is not found in usual, annual education. Caplan argues the thing that is found is fulfillment of social expectation and demonstration of certain capabilities like the ability to follow instruction, behave politely, sustain focus on boring tasks for nontrivial periods of time, and so on. An example of a secondary sheepskin effect is that graduates from college are more likely to marry graduates from college. So the college graduate obtains own sheepskin payoff and some share of their spouses sheepskin bonus in addition. Caplan also discusses some interesting work on employer learning, showing that employers learn a significant amount about an employee during their first decade in the work force, but they never seem to totally understand their employees. Caplan concludes a reasonable estimate for the share of signaling is 80%.



In chapter 5, Caplan shows that the selfish or private return to education obtains regardless of whether education's value is determined under human capital or signaling. Caplan readily acknowledges that his calculations hold for specific types of constructed individual profiles, and the applicability to the reader may vary. I echo this and point out some of the things which may significantly alter Caplan's calculations for individual cases:

- 1 - Working full time while going to school
- 2 - Graduating early
- 3 - Attending a low-tuition school
- 4 - Obtaining a school with a high completion rate

Caplan creates a solid baseline by focusing intently on the traditional path, but let's take a look at how severely his numbers can be shaken with a slight alternative transformation. Suppose I pay average tuition, I'm an average student, and so on. The only difference is that I put good effort into obtaining credit by examination in order to minimize the number of courses I need to take. Nathan Young took it upon himself to experiment with accelerated learning in an unprecedented way, attempting to test out of a bachelor's degree in one year using CLEP tests[41]. Nathan failed in this goal, and his lessons learned are worth reviewing, but he succeeded in knocking out a substantial number of credits. Nathan obtained 84 credits in less than one calendar year. Because an undergraduate degree calls for 120 credits, Nathan roughly reduced his college degree cost by 67%. While observation is susceptible to all kinds of error, reviewing Nathan's videos online don't lead me to believe that he is a prodigy. Nathan appears to be a rather ordinary white male in his late 20s.

In chapter 6, Caplan pulls together components of the social return to education. Interestingly, crime effects make up a substantial portion of the gains. Bryan reports return across 4 types of varying student quality, then disaggregates by gender, but college is not a good investment for any type of student at the social level, and public funding of high school is only a somewhat good idea for poor men, where criminality reductions do make impactful gains. In chapter 7, Caplan states the obvious policy implication, which is that we need less education. In chapter 8, Caplan calls for a heavier emphasis on vocational education. Chapter 9 discusses whether education is intrinsically good, or perhaps qualifies as a merit good. This discussion is interesting, though quantitatively unimportant for the purposes of the present paper.

Jumping ahead to chapter 10 for a moment, Caplan gives some reasons to be skeptical about alternative education. Perhaps his most straightforward argument is that traditional education signals conformity in part, and so an alternative education is tautologically unable to provide such conformity signaling. I would make a few points to counter this:

- 1 - Consider that Walmart is often in some sense preferable to Whole Foods. While I'm happy to grant that traditional education signals conformity in part, the share is unclear. Alternative education is generally faster and cheaper. If the signal value is slightly lower, but the signal obtainment is much cheaper, choosing the lower quality signal may be a net win for many consumers.

This is not speculative. Craig notes that the rate at which children of higher-income families attend community college is up from 12% five years ago. Community college has a stigma as well, but it still makes sense in some cases.

2 - As discussed in the section 10, On A New U, bootcamps provide nearly one third of the number of computer science graduates that universities collectively provide. It is implausible to argue that such large numbers of non-traditional learners entering the workplace will not move the needle on what counts are normal. Employers are extremely satisfied with bootcamp graduates, and most claim that bootcamp graduates are just as qualified as university graduates.

3 - In Bryan's fictional discussion with Gillian, a Craig-like character in my view, Gillian makes the mistake of thinking in the human capital mode. Bryan's character rightly points out that education pays primarily by certifying skill. Gillian's character never bothers to make the point that online skill measurement firms exist as well, and they are becoming the go-to resource for employers, over and above university degrees. See the section on atemporal findings for more information on this subject. Whereas employers began by looking to alternative credentials as a tie-breaker between candidates with similar experience and degree qualification, some employers will now consider candidate in possession of the alternative credential regardless of degree possession.

Tangentially, chapter 10 is conversational in tone and formatted a bit like a screenplay, making it a fun read.

## **10. On A New U**

Craig's book takes a non-academic style with frequent anecdote and about one joke per chapter. I find this style distracting and verbose, but perhaps the fact that this book is written in a style uncommon among top books on the subject will serve to reach a different or broader audience. There isn't much useful factual information until around the third chapter, but just when an academic may be inclined to put the book away, Craig unleashes a torrent of useful factual information, and he continues this pattern of discontinuous segments of high-density information throughout the book.

In chapter 3, Craig notes that 85% of jobs posted online, and 80% of employers, use an application tracking system (ATS). These software systems include functionality which ranks and filters candidates, primarily using keyword matching. Craig refers to Burning Glass research and to others to argue that These matching algorithms are known to have systematic accuracy problems. One key point is that ranking candidates is much easier to do using niche or technical skills and terms, rather than broad skills like communication or critical thinking. As a result, technical keywords have exploded within job descriptions used by employers. Their use has highlighted, and perhaps exacerbated, a keyword-level skills gap. The skills gap is particularly severe at the entry level, indicating that traditional education providers are not equipping students with the specific skills employers are searching for.

Craig points out that technical terms often consist of software names or standard business process names. A competency in these categories is a good example of a middle-skill. Between high-skill

labor and low-skill labor is the category of middle-skill labor, which is identified as a job that requires more than a high school diploma and less than a four-year degree [19]. The National Skills Coalition states that middle-skills "make up the largest part of the labor market in the United States and in each of the 50 states." [20]

Examples of software usage skill includes proficiency with Microsoft Office products or Salesforce. Examples of standard business processes include Agile and Design Thinking. Software usage and business processes knowledge are amenable to online learning and measurement, although they are harder to demonstrate by portfolio in comparison to programming skill. Because middle-skills are heterogenous by industry, while relatively fewer programming languages are usable across industry, it is intuitive that any particular one of the most used programming languages would face higher demand than any particular one of the most common software usage skills. These reasons give some intuition to the reality that programming jobs are particularly open to alternative education.

Later in chapter 3, Craig discusses the relatively slower pace of adaptation observed in four year colleges relative to new education providers. It's worth noting that even pro-traditional scholars like Ken Robinson admit the slower pace of adaption exhibited by four year universities. The usage of the pro-traditional label for the purposes of this paper is clarified in the section on atemporal findings. Craig states that one mechanism for this slow adaptation is the incentive structure faced by university professors. University professors are significantly motivated by their own research interests, rather than labor market requirements. Craig notes the uptrend in double majoring and attributes this behavior to a hedge on the part of students to hedge against unemployment due to misaligned curriculum.

Craig seems to echo Caplan in his discussion on credential inflation and experience inflation. Craig points to Burning Glass research data which shows interesting cases where an entry level position might require 1-3 years of experience, or a position which previously required an undergraduate degree or no degree at all might today require a Master's degree. Like Caplan, Craig concludes these increased candidate requirements are not attributable to an increase in difficulty of the underlying job. On the contrary, many jobs are considered less technical, laborious, or stressful today than prior.

Craig's analysis includes an interesting exposition of Bidwell's Matrix, referring to a working paper by Matthew Bidwell at the University of Pennsylvania. Bidwell's quadrant is a two-by-two matrix where the columns are the level of education required for a job and the rows are the levels of experience required. After reviewing a data set of about three million job descriptions, one of Bidwell's key findings is that employers are not posting jobs in the bottom-left quadrant of this matrix. The empty quadrant, as it's labeled, involves high education and low experience jobs. This is exactly where many highly educated students enter the job market.

Bidwell himself notes that his results "suggest that the accumulation of experience accentuates rather than ameliorates differences in education, contributing to the barriers facing less educated workers." [24] It appears that temporally balanced consumption of education and experience obtains when a worker chooses a significant portion of each in every period, rather than frontloading

preference for either. This analytical result runs counter to existing public policy, because student loans today may only be deferred by half-time or higher course load, which effectively incentivizes the frontloading of education. It might be the case that allowing student loan payment deferral on the basis of part-time enrollment is a politically feasible change with potentially large impact on the ability of workers to smoothly obtain education and experience in a more balanced bundle.

Ernst & Young is a multinational staffing firm headquartered in London, England. They conduct a battery of assessments in order to evaluate candidates for placement fit across potentially matching roles. Employers which employ candidates referred by Ernst & Young are willing to accept candidates which possess less formal education, provided the candidates perform sufficiently well on assessment. Craig notes this move has resulted in an increase to diversity of employees at firms which partner with Ernst & Young. Craig likens the situation to a change implemented internally within Nestle. When Nestle replaced degree requirements with an assessment battery approach, the firm discovered that more than 20% of new hires would have been immediately screened out under their prior hiring model.

Craig points to a 2013 survey in which 71% of employers said they would consider hiring a candidate without a degree over another candidate with a degree. Craig mentions a separate survey of 400 employers by Hart Research, 80% of employers indicated that it would be very or fairly useful to see an electronic portfolio of work, consistent with what is read in Salerno's College (Un)Bound and elsewhere.

Craig defines the concept of the last mile in chapter 4. The idea originated in telecom during the 1990s. The idea then was that the last mile of telecom is the portion which actually connects to a consumer's physical building. The last mile is the most difficult and expensive to build, but it is equally the most valuable. Indeed, the whole system fails if the last mile is improperly handled. In the context of an education-to-employment pipeline, last mile learning providers attempt to take college graduates and turn them into an employed person. University career services are intended to do the same thing, but they are substantially less effective.

One common last mile learning implementation is the bootcamp. Craig states that "most student-pay bootcamps show placement rates north of 80%." Those placements are measured to have occurred within 6 months. While bootcamps, and last mile providers in general, are most common for software development roles and development-adjacent roles like designer, business analyst, software tester, scrum master, and so on, they do exist for entirely non-development roles. Sales is one non-development role which has a substantial number of reputed last mile providers.

When considering the return from any of these providers, it is critical to adjust for risk. Some providers offer employment guarantees, financing, high salary upon graduation, and high graduation rates, while other providers offer fewer or none of those features. Tuition and time costs are also critical factors to consider. Learning course costs range from less than \$100 into the 5-digit range. Some learning providers charge nearly as much as a traditional university would. That becomes intuitive when it is observed that some alternative learning providers partner with traditional universities to offer products which are ultimately indistinguishable from the traditional

product in the eyes of an employer. Coursera, for example, offers a Master in Computer Science through a partnership with the University of Illinois[25]. The time to complete an alternative program of learning can range from days to years. Craig notes that the subset of alternative learning programs called bootcamps range in completion time from four weeks to two years, with 14 weeks as an average.

Few economists or education scholars believe that alternative learning providers directly substitute for traditional providers in a winner-take-all fashion, but Craig points to a survey by the National Association of College and University Business Officers wherein 57% of colleges and universities attribute "the likes of software coding bootcamps" for enrollment declines, at least for particular subjects. Craig states that there are "now" 95 non-accredited so-called coding schools, although they only began popping up in 2012. He attributes this figure to Course Report, but my own search on the Course Report website indicates that as of December 2018 there are 332 bootcamps supporting a full-stack development position[26], a particularly intense kind of high-skill software developer. A full-stack developer is expected to have all skills held by a front end developer and all skills expected by a back end developer.

One explanation for the variance between Craig's count of 95 schools and my count of 332 is that the "now" Craig refers to was during 2017, while researching for the book, rather than during the publishing year. Craig notes that in 2017 these US-based bootcamps educated about 1/3 as many software developers as all US-based universities combined. A second, harder to believe, explanation is that the number of code schools on Course Report increased from 95 to 332 during 2018. The final plausible variance explanation I can come up with is that Craig somehow filtered the list further without making it clear in the book. To illustrate, as of December 2018, Course Report documents 552 bootcamps[27]. This includes bootcamps for sales, design, and other non-developer bootcamps. When filtered to include bootcamps which at least offer full-stack development, a count of 332 is observed. When filtering down to include bootcamps which only offer development and nothing else, it may be the case that a count around 95 is observed. This filtering cannot be done using Course Report's searching feature, however, so Craig must have filtered that data by hand.

In any case, employers are extremely happy with the graduates of these bootcamps. 99.8% of bootcamp graduate employers surveyed indicate that they plan to hire more. 72% say bootcamp graduates are equally qualified compared to university graduates, and 12% say bootcamp graduates are better prepared than university graduates. Outside of information technology, bootcamps are rarer, but PrepMD is a 6 month training and placement program which might be considered a bootcamp. PrepMD has a 94% placement rate for medical device specialist positions. Besomebody is another firm which markets so-called Paths. Besomebody Paths are hands-on, 100% in-person courses resulting in guaranteed employment.

Courses are designed by employers in partnership with Besomebody, and targeted at specific positions. Kroger, for example, has a Nutrition Technician Path which has been rated 4.9/5 by previous participants. Tuition for this path in 2018 is about \$3000, and financing options exist. The course is 4 weeks long and results in guaranteed employment with a starting salary no less than \$32,000 on passage. Besomebody Paths include medical, hospitality, sales, and automotive industry

training at the moment. The salary garnered on completing any of these programs appears to be less than median wages, but these positions do not appear to be terminal. Besomebody Paths are an interesting and recent development, having been initially launched in 2017.

In chapter 6, Craig gives a bit of history indicating that today's bootcamps originated as advanced professional training for individuals who had already obtained degrees, but that over time some programs began to enroll individuals who had never obtained a degree. Craig refers to an article by Liz Eggleston at College Report[28] which showed that 24% of bootcamp participants in 2016 had not obtained a four year degree. While Craig doesn't mention it, Eggleston notes in her report that 43% of bootcamp participants are female, in stark contrast to the 15.7% of undergraduate computer science students who are female. This reiterates the diversity increases which may come with increased use of alternative learning systems.

Craig specifically targets the question "At what point does a last-mile program become a viable alternative to college?" Following lean business principles, Craig conceives of college as a product and attempts to identify the minimal feature set. The process of product design yields a design of a simplified product which is called a minimum viable product (MVP). Craig claims the College MVP (CMVP) has only one feature that the last mile program does not have. The CMVP is meant to equip the student with some level of cognitive and non-cognitive skill training, in addition to the technical training and job placement services it holds in common with a last mile program.

In his discussion about the CMVP, Craig refers to the Clayton Christiansen Institute in order to argue that the CMVP meets the definition of a disruptive innovation. Craig argues convincingly that the CMVP is technically disruptive, but he stops short of elucidating why it matters that the CMVP is disruptive. This has the effect of suggesting to a reader that they should read Christiansen for more detail, without holding Craig to any concrete or particular predictions.

In chapter 7, Craig highlights apprenticeships and other practices which mix education and employment. Accounting, finance, human resources, business analysis, project management, insurance, pharmacy, and lab science are among the industries covered by alternative learning paths described in this chapter. Some of the firms involved include Aon, Avenica, CVS, Hartford, Wells Fargo, WhiteHat, and Zurich. Craig emphasizes a resurgence of apprenticeships moving with digital skill. He refers to these as new collar, distinct from legacy blue collar, apprenticeships. In contrast to Hanushek, Craig is extremely optimistic about apprenticeship in the digital age. See the atemporal findings section for more on Hanushek's pessimism. Notably, Hanushek mainly contrasts the United States with Germany, while Craig compares the United States to the United Kingdom, and the apprenticeship service provider (ASP) system of the UK is significantly different from the German system.

In chapter 8, Craig gives a brief history of online learning, MOOCs, and providers like Udacity and Coursera. Craig's treatment of this subject is wanting, although he rightly points out that MOOCs went through periods of immense excitement and disastrous failure, from which online learning providers are only recently recovering. In 2017, Craig observes, Udacity's nanodegree had a placement rate of about 10%. This is substantially lower than ordinary university placement rates,

which are themselves lower than placement rates from bootcamps and many other alternative learning approaches.

While Udacity failed in one endeavor during 2017, they succeeded in another. The online provider launched their first in-person course offering, called Udacity Connect. So far, Udacity Connect appears to be much more effective, with a graduation rate about 500% higher than that of students doing online-only Nanodegree programs[29]. Overall, Craig's treatment of the evolution of MOOCs, Udacity, and Udacity's founder, Dr. Sebastian Thrun, is not very in-depth. See my Trends Over Time section where I give more detail to the history of Udacity.

Craig also covers Yellowbrick and microcredentials in chapter 8. Yellowbrick is a resource which awards certificates in Fashion, Beauty, and Sports so-called industry essentials, but these certificate courses largely consist of career discovery instruction, and career preparedness including the development of an e-portfolio along recommended lines. Certificates can be seen as a kind of microcredential, but microcredentials are a broad group. The difference between a credential and a microcredential is that a microcredential is meant to signal a single specific competency. Certificates may signal one or more skills, so they may or may not count. Degrees are far too broad to be a microcredential.

Coursera Specializations, Udacity Nanodegrees, and other signature credentials from leading online learning providers are often thought of as microcredentials, but in some cases even they may be too broad. Craig mentions badges which are a good example of a very narrowly-scoped credential. Khan Academy, for example, has one badge which is awarded for listening to 30 minutes of video on a single topic[37]. One to many badges, then, might be acquired for completing a single course, whereas one to many courses might be required to obtain a Coursera Specialization or a Udacity Nanodegree. Microcredentials are interesting because an individual may assemble them into a digital portfolio demonstrates knowledge in a way that is highly specific to the portfolio owner. In contrast to the heterogeneity within the category of persons holding a business degree, a highly specified portfolio allows for low-noise signalling to an informed portfolio observer, better requirement fit, and less irrelevant learning. Microcredentials, like ordinary credentials, can be included in a factor analysis of employee performance, labor outcomes, and so on, to identify whether they provide evidence of value added.

One of the few interesting components of chapter 9 is a list of "Go to College Indicators" assembled by Craig. I think a review of this checklist is a value to any individual pondering whether or not to go to college, and it is a relief to see the list is in harmony with much of Caplan's discussion in *The Case Against Education*. Craig doesn't have quite the level of rigour as Caplan in that Craig does not actually calculate return on investment for various choices, but instead advises a reader to do that which is affordable, leaving the conception of affordability to the reader.

In chapter 10, Craig again agrees with Caplan in noting that fadeout from education is significant. Craig emphasizes the Ebbinghaus forgetting curve as an estimate of fadeout. This fadeout heuristic is a non-comprehensive simplification compared to the discussion found in Caplan, but the single-sourced nature of the heuristic facilitates discussion and memory. The simple formula for the curve

also facilitates calculation[38].

The final section of the book, in the appendix, is a directory of alternatives to college, including which jobs each program prepares a participant for. This is a phenomenal resource. For the relevant consumer, the appendix alone makes purchase of the book more than worthwhile.

## 11. General Findings

General findings are worth breaking into two groups. The first group is atemporal findings. The second group includes trends over time.

### Atemporal Findings

Intellectually, there is a clean distinction between a disruption camp and a non-disruption camp. In the real world, the leaders in either camp exist much more in the middle of the two than toward the extremes. The leading thinkers and practitioners in favor of the university system acknowledge that universities should continue to innovate, and adopting non-traditional features is practically, and in some sense tautologically, the means to that end. The leading thinkers and practitioners opposed to the legacy system acknowledge that the legacy system is firmly entrenched and will continue to be so for many years, and so the optimal course of action for individuals and for society is for new providers to integrate, cooperate, and coordinate with those legacy systems, instead of attempting to steal consumers in a winner-take-all fashion.

The result is that leading thinkers and practitioners on both sides largely support both alternative education and traditional education. Moreover, leaders on both sides generally agree on which pedagogies, technologies, and so on, provide optimal results in most cases. A cursory glance at the non-book literature demonstrates the difficulty involved in locating a formal paper with citations in excess of the single digits which promotes the traditional lecture mode of class instruction. I could only find one from by Kalogeras in 1976 [15]. While the magazines occasionally headline an article which pretends to defend lecture, seldom make an evidence-based case and often essentially concede the point. Consider *In Defense of the Lecture*, a 2014 article from the Chronicle of Higher Education. This article points out specific virtues of lecture, even while conceding "...lecturing as a means of transferring basic factual information is a poor way to teach. I agree..."

The differences in opinion seem rather limited, and they almost universally apply to macroeconomic issues. The closest thing to disagreement on microeconomic choices seems to be twofold:

- 1 - Some scholars are aware of interesting programs or technologies which other scholars are not aware of.
- 2 - Scholars heterogeneously trust the payoff claims of particular programs of alternative learning.
- 3 - Some scholars oppose particular alternative education techniques.

Expanding on the third point above, Eric Hanushek recently stated "We should not delude ourselves into thinking that Trump's apprenticeship expansion will substitute for our failing K-12 schooling



system...Vocationally-trained workers with relatively narrow skills face a harsher labor market with time as the nature of production changes." [22] Along the same lines, a Brookings study to which Hanushek contributed found that excess utilization of an apprenticeship model at the social level could generate a skill gap [23]. Despite Hanushek's particular position on the Trump plan, and perhaps his general opposition to excess utilization of apprenticeship, it is clear that he does not oppose alternative education writ large, and that he does not deny the utility of vocational training for particular individuals.

It is worth mentioning that both of these main microeconomic concerns are being addressed over time by projects like Credential Engine, which seeks to comprehensively catalog non-accredited credentials and standardize their outcome measurement and reporting [16]. An alternative strategy is provided by firms like Degreed, which markets a generalized service to measure any skill [17]. This approach simplifies the measurement trust problem from a need to trust heterogeneous providers to the need to trust a single provider of learning measurement, Degreed.

Many less comprehensive skill measurement providers exist. Pluralsight, for example, is a relatively well known and reputed firm in the IT market. Pluralsight provides a standard measurement service for a specific range of skills [18]. This measurement process obtains independent from where the learning or skill development occurred. In this sense, employers can choose to trust a skill measurement provider instead of directly trusting a learning provider. This simplifies the analysis problem for employers, and it also creates an additional incentive for learning providers to provide good content. If many students pass through an alternative learning process, then perform poorly during standard evaluation, the poor performance becomes attributable in part or whole to that alternative learning process.

The main sources of debate seem to be on macroeconomic concerns. These concerns are completely out of my interest, but they are worth noting:

- 1 - What is the best course of action for the mean or median student?
- 2 - What should be done with public funds for education?
- 3 - Should the existing educational requirements for certain professional licenses be reevaluated, or should certain licenses be created or destroyed?

It seems to me that if there is to be any meaning to the labelling of a scholar as in favor of traditional education, it merely means that, with respect to the macroeconomic points mentioned above, the scholar believes at least one of, and possibly all of, the following:

- 1 - The mean or median student should obtain a four year degree.
- 2 - The growth in public education spending should remain constant, or perhaps grow.
- 3 - At least some professions benefit from licensing, and at least some licenses benefit from requiring accredited education.

Caplan would represent, then, a non-traditional position. Hanushek would represent a moderate position between these extremes, arguing that policymakers should not grow spending, or perhaps cut it non-drastically, but mainly focus on spending in a more intelligent way[21].

Under this macroeconomic categorization, even the proponent of traditional education need not say a particular student should necessarily obtain a four year degree, although it would seem to be a null hypothesis. It is this null hypothesizing mechanism which finally allows us to obtain some meaningful distinction at the microeconomic level, whereas breaking scholars into camps according to their attitude on disruption seems like a red herring.

## **Trends Over Time**

In Robinson and Salerno we see traditional providers including four year universities adapting and innovating by adopting best-of-breed technologies, pedagogies, and program structures piloted by alternative providers. In Craig see that this flow is bidirectional, rather than unidirectional. Craig notes that Udacity's latest innovation is the in-person course. Besomebody Paths are fully offline. The typical course seems to be achieving equilibrium among a range of subtly different, but substantively similar, hybrid modes. Far from being an artifact of overfitting this literature, the elucidated pattern is consistent with multiple stories that none of these authors mention.

Christiansen et al published *Disrupting Class: How Disruptive Innovation Will Change...* in 2008. Christiansen and Eyring published *The Innovative University: Changing...* in 2011. Notice the predictive tone of the former in contrast with the active tone of the latter. The same year, 2011, Sebastian Thrun manifested the Christiansen of 2008 and ignored the Christiansen of 2011 by relinquishing his tenure at Stanford to found Udacity. Udacity's first courses began taking students in early 2012[35]. Only in 2013 did Udacity begin contributing to changing the university by offering some courses for college credit. In 2014, Udacity entered into its first full-fledged partnership with a university. The same year, Udacity released its first signature alternative credential, the Nanodegree. Excitement filled the air. About that time, as Craig informs us, the evidence on weak outcomes for Udacity's courses and other MOOCs began to cause significant doubt. In 2017, Udacity Connect was launched. This product is a hybrid learning solution which occurs partly in a classroom setting and partly online. Now that the results have started coming in, as earlier mentioned, this approach has shown about a 500% increase in graduation rate.

In 2016, Khan Academy applied for the \$100 million dollar grant by 100&Change in order to create a globally recognized secondary education diploma. 1904 organizations applied for the grant[30]. 1870 proposals are documented in a solution explorer made public by 100&Change[31]. 375 proposals are in the education category. When decisions were rendered in 2017, Khan Academy's proposal earned an honorable mention as one of the top ten in the education category, but it did not place among the 8 semi-finalists across categories and did not earn a financial award[32].

Like Udacity, Khan Academy is an online learning provider which went through a period of immense excitement followed by failure, and also like Udacity, Khan Academy achieved a remarkable success on a different project during the same calendar year as their disenchanting loss. In 2017, Khan Academy released the results of a study they conducted with the College Board. It showed that

studying for the SAT using Khan Academy is associated with 115-point average score increase[33]. Khan Academy also became the official practice partner for AP exams in 2017[34].

Not only do Udacity and Khan Academy share a Jungian hero typology, they have both evolved from traditional learning competitors to traditional learning allies. Like Coursera, edX, and others, the best-of-breed alternative learning providers of today are not substituting for traditional education providers, they are integrating with them. Likewise, the best-of-breed traditional providers are not rejecting new learning approaches, they are partnering with them, awarding credit to students for alternative learning, and even supplying online education providers with content.

While literature can be found further back that applies in ways increasingly less direct, I consider Christiansen's 2008 piece to be a watermark in the literature. With Udacity's course offerings in early 2012, I observe a bright line in the actualization of modern alternative education provision. With Udacity, Coursera, Khan Academy, and other major online learning providers having been through significant revision in just a few years, I consider 2018 to be a new age of alternative education. Significant changes occurred during 2017, so 2018 will have been the first year in which these changes were available throughout the period.

The general trend is toward integration of traditional and alternative providers, but alternative learning systems are heterogeneous and these heterogeneous solutions are not equal in optimality for consumption by any particular individual, nor at the social level. Portfolios, and digital portfolios in particular, are in demand by employers. Digital portfolios have recently become trendy among universities, while they have been in fashion with alternative providers for some time. Standardized portfolio artifact generation and evaluation is becoming more standardized over time, assisted by certain dedicated evaluation providers.

Apprenticeship programs are making a comeback as a matter of fact, although it is controversial to claim that this is an obvious social good. These programs never truly left Germany, but they have revived from slumber in the UK. Under Trump, the US saw a major step forward for a particular implementation of apprenticeship[36], but it has been a controversial policy implementation, as discussed in the atemporal findings section. Like apprenticeship, many scholars find themselves supporting evidence-based learning, even while criticizing particular implementations of learning assessment. It is particularly fashionable to criticize standardized examination.

Standardized exams typically have certain question formats, including multiple choice or essay response questions which may be graded according to a rubric. Examples of standardized exams include the SAT, the ACT, the international PISA, and many state-level exams including the Texas STAAR. Standardized exams are generally cost-effective means of generating meaningful signals, but these signals are often systematically imperfect, and those imperfections are the source of much discussion. While portfolios may be more costly to generate and evaluate, they seem to be substantially less controversial in both the literature and when surveying professionals. Portfolios may include a broad range of expression, and the complexity of normalizing these expressions may be one reason for a silence in the academic literature. The best explanation for high professional opinion, on the other hand, may be plain efficacy of skill demonstration by the candidate to a

knowledgeable portfolio reviewer.

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