

BETWEEN GAMES FOR KIDS AND GAMES FOR LEARNING

A NEW DEFINITION OF EDUCATIONAL VIDEO GAMES

CONTENTS

I. INTRODUCTION & THESIS	p.1
II. METHODOLOGY	p.2
III. THE BIRTH OF EDUCATIONAL VIDEO GAMES: A NEW MODEL FOR EVG WAVES	p.2
III.a. 1970s & 1980s – EVGs in the Classroom	p.3
III.b. 1990s – EVGs in the Home	p.4
III.c. 2000s – EVGs in Motion: A Return to Classroom Demand	p.5
III.d. 2010s – Consolidated Ownership of the EVG Market, Monetization of Kids Social Networks	p.6
III.e. MARKETPLACE ACCESS	p.7
III.f. MODELING A NEW APPROACH FOR EVG STUDY	p.8
IV. A NETWORKED MODEL FOR ATTENTION	p.8
IV.a. INCREASED SCREEN TIME LEADS ADVERTISERS TO TARGET KIDS IN NEW WAYS	p.8
IV.b. THE RISE OF CHILDREN’S SOCIAL (GAMING) NETWORKS	p.8
IV.c. A BRIEF HISTORY OF KIDS AS LABORERS	p.9
IV.d. KIDS AS ATTENTION LABORERS	p.10
V. CHALLENGES TO THE NATIONAL EVG MARKET	p.11
V.a. MARKET SATURATION & MARKET MIXING	p.11
V.b. MAJOR DESIGN PROBLEMS	p.12
V.c. LOCALIZATION OF DESIGN RESOURCES	p.12
V.d. BRAIN TRAINERS	p.12
VI. THE EVG MARKET TODAY	p.12
VII. LIMITATIONS & COUNTERARGUMENTS	p.13
VIII. CONCLUSION	p.13

I. INTRODUCTION & THESIS

This essay makes a case for the topical separation of educational video games (EVGs) from all e-learning and kids games marketplaces, arguing that since these products are created by, retailed for, and used by different population groups—and because their regular conflation makes understanding the unique market position of EVGs nearly impossible for reasons described below—EVGs should be considered to constitute an individual market. This essay seeks further to define the EVG as a pedagogical genre of digital games intended for use by minors and primarily purchased by parents and educators of children in K-12 classrooms. Not included in the EVG market, I argue, are (1) occupational training or “serious” games; (2) simulation games, except for those that teach classroom skills and curriculums to minors; (3) online classes or certification programs; (4) brain trainer apps and subscriptions; (5) learning apps that do not constitute game frameworks, such as PBS Kids; (6) any kids games that are not directed toward classroom subjects; (7) or any play activities outside the scope of digital games architectures. Due to the conflation of the EVG within adjacent markets, and the subsequent difficulty ascertaining the genre’s exact market value today, this essay focuses almost exclusively on the U.S. market for EVGs.

In this essay, I also suggest that EVGs have been included within the above adjacent markets expressly because of their necessarily low market value:¹ (1) EVGs are products of collaborations

between educators and designers, and are therefore overall interested in affordability for children and families; (2) EVGs acquire only minimal personal information from users, with an express concern for the online privacy of kids; and (3) EVGs, with few exceptions, do not use advertisements or product placements, making them difficult to monetize except through intellectual property licensing. While many e-learning products are developed through collaboration with educators,ⁱⁱ EVGs as defined here are the only such commodities used exclusively by minors.

To further outline the importance of redefining EVGs, we must understand that EVGs—unlike e-learning products—hold a special relationship with the U.S. public school system and all its accompanying laws, as this essay aims to prove. EVGs started in the classroom, after all, and through the early 1990s—and to an extent up until the app store revolution of the early 2000s—the classroom is largely where they stayed. While “gamification” has exploded in a range of markets, research into the effects of gamification on motivation and attention are mixed; research on EVGs that produce skills-based curriculums, however, are in consensus,ⁱⁱⁱ showing that skills-based learning games could result in actual positive outcomes for students.^{iv} While this essay is not primarily interested in the efficacy of EVGs, to understand their distinction from adjacent markets, it is important for us to understand how current pedagogical research makes EVGs distinct.

Unlike retail games, almost every successful educational video game, from *Math blaster* to *Reader’s Rabbit*, has been designed by educators who worked in collaboration with game designers,^v and while many U.S. educators are still hesitant to use video games in learning contexts,^{vi} the rise of impressively comprehensive, available, and empirical research in support of EVGs has led many U.S. schools to adopt them as essential classroom resources, with special emphasis placed on STEM subjects (Science, Technology, Engineering, Mathematics).^{vii}

II. METHODOLOGY

To better understand the shifting role of EVGs in classrooms, households, and financial markets today, this essay examines the history of the EVG market in the U.S., seeking to understand how this market has shifted in response to large-scale changes in several cultural and economic systems. These systems include the retail games industry, the U.S. public school system, and the widespread cultural adoption of both networked devices and social media networks among children and young adults. This piece draws from a range of historical and academic sources to better understand purchase behavior among parents, educators, and school administrators, who are the primary buyers of educational games. This essay also observes, necessarily, play and purchase behavior among U.S. children ages 5 through 17, who constitute the primary user demographic for the EVG market. At several points, I apply the term *child labor* as defined by the International Labor Association: “work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development.”^{viii}

III. THE BIRTH OF EDUCATIONAL VIDEO GAMES: A NEW MODEL FOR EVG WAVES

To best describe the evolution of EVGs in the U.S., and to make distinct our understanding of EVGs from adjacent markets, below I provide a multi-stage evolution that has led to the birth of the EVGs as

defined in this essay. In later revisions, my model of EVGs has been influenced by NASA’s 2002 report on educational video game waves, which was commissioned by NASA’s Office of Education to examine the market, history, and pedagogical implications of educational video games.^{ix} This report, while claiming that an exact definition for EVGs was at the time unnecessary, succeeded in providing incredibly useful in its suggestion of four distinct waves in educational game development: (1) Simple Games [1977], (2) Educators Get Involved [1978], (3) The Rise of Educational Software Companies [1985], and (4) Virtual Worlds [1999]. With a renewed definition of EVGs, and since the abovementioned study lacks nearly two decades of information on EVG development—a period marked by rapid expansion of EVG resources, strategies, properties, and economic contexts—in this section, I suggest a new model as follows, using market access, product monetization, and use value as central bases for wave development.

III.a. 1970s & 1980s – EVGs in the Classroom

Several prominent educational games studies have placed the start date of the home educational games market at the 1979 release of Mattel’s Intellivision console,^x while a public learning games market had begun in a smaller capacity two years earlier with the Atari 2600. As several researchers have pointed out in previous market studies, the first publicly sold educational video games in the U.S., designed by Atari’s in-house programmers, were far more interested in showing off the *potential* educational uses of electronic games than they were interested in creating useful educational products.^{xi} The first such game, 1977’s *Basic Math*, was at its best an elementary calculator embedded in an Atari 2600 cartridge. This evolved into Atari’s 1978 *The Brain Game*, which—while extremely limited by today’s standards—offered 19 separate mini-games with everything from division to short-term memory skills. This trend of “one-size-fits-all” educational games would continue for several decades, with few exceptions, until the 2002 enactment of No Child Left Behind, as described later in this section.

While video games have been used in U.S. classrooms since 1970 to teach basic programming skills (Papert and Fuerzeig’s *Logo* was the first such game), a national learning games market didn’t functionally exist until the 1974 national release of *The Oregon Trail*, an adventure game for the Apple II that sought to teach students about the Westward Expansion while introducing them to computer systems for the first time.^{xii} Of particular interest is that *The Oregon Trail* was designed by three student teachers, not by professional game designers, and that the game was released by MECC, an educational games company founded and owned by the Minnesota State Legislature to expand upon the recent advances of Minnesota schools in developing and releasing educational games within the state.^{1, xiii}

Interest in educational games had been on the rise following the 1974 release of *The Oregon Trail*, leading to the 1980 incorporation of several major players in the educational games market, including Brøderbund Software and The Learning Company. That year, MECC also expanded its licensing powers

¹ In 2016, *The Oregon Trail* was inducted into the World Video Game Hall of Fame, becoming the only educational game ever inducted. Through January of 2017, *The Oregon Trail* had sold 65 million copies worldwide.

to include the entire Iowa State public school system.^{xiv} By 1981, 85% of U.S. public school systems used microprocessor computers in the classroom, and almost all of them had a copy of *Oregon Trail*.^{xv}

The educational games market boomed in 1982 with the release of both the Commodore 64 and the CD-ROM, which expanded and solidified the market for educational games in the home.^{xvi} Just one year later, the longtime practices of the nation's largest retail games company, Atari—coupled with the evolution of the home computing market^{xvii}—led to a massive crash that threatened to wipe out the retail games industry for good.

It was at this time that the educational games market first proved itself distinct from the retail games market: educational games may have risen to prominence alongside the success of retail games, but when retail games largely lost their audience in 1983, the educational games industry exploded. While the rest of the games industry was nearly wiped out completely in the U.S., MECC had become so profitable that they were forced to incorporate as a for-profit entity. That same year, 250,000 classroom licenses of *The Oregon Trail* were sold worldwide, with 5,000 new classroom licenses in Minnesota alone. Between 1983 and 1985, the retail games industry had decreased in size by nearly 97% (from \$3.2 billion to \$100 million).^{xviii} At the same time, MECC and other educational game companies were experiencing a massive corporate expansion, seemingly taking over where the retail games industry left off. By 1985, MECC had expanded to offer more than 300 educational game products, earning nearly \$30 million in annual sales.^{xix} In 1987, The Learning Company acquired MECC, and in 1998, acquired Brøderbund Software, making it the definitive owner of the country's most successful educational video game properties.^{xx}

Later that year, Mattel tried to muscle onto the scene of educational video games by purchasing The Learning Company for \$4.2 billion, forming Mattel Interactive.^{xxi} Mattel had been in handheld games since its 1976 release of *Missile Attack*. And, inspired by the success of Atari's 2600, had entered the home games console market with its 1979 release of Intellivision. By 1982, Mattel had control of 20% of the U.S. electronic games market.^{xxii}

III.b. 1990s – EVGs in the Home

In 1991, the Internet changed how educational games could be used, purchased, and shared, and for the next couple decades, entire subgenres of educational games cropped up from every conceivable direction.^{xxiii} While there is much more to the story of Mattel's Intellivision, for our purposes, it is important centrally to note here that by 1991, the Intellivision had been discontinued, and since that time—except for its branded games for other systems—Mattel was largely out of the electronic games business. With its 1998 acquisition of The Learning Company, however, the company looked to be coming back with a new approach entirely.

It became quickly apparent that Mattel was ill prepared to operate a learning games company.^{xxiv} By the end of 1999, Mattel Interactive had lost nearly \$300 million in value, and by 2000, the company was losing almost \$1 million a day.^{xxv} The Learning Company, which at the time of its 1998 acquisition was the country's most successful educational games maker, was in 2000 sold off to LA-based Gores Technology at an estimated \$3.6 billion loss for Mattel. Mattel didn't give up educational *toys* however,

and today continues to find success through its subsidiary, Fisher Price, which it had acquired in 1993 for \$1 billion.^{xxvi}

In 1998, LucasFilms began making educational video games using its Star Wars franchise, inspiring a host of other entertainment companies to begin forays into educational video games. Into the early 2000s, it became increasingly clear that EVGs could access a new market with smartphones, tablets, and mobile app stores. Apparently unperturbed by Mattel’s incredible public failure in the educational games market, other toy company giants like Hasbro and Lego began to make their way to the mobile games scene, leaving behind any pretext of educational components and making wildly successful games that relied on long-held intellectual properties.^{xxvii}

III.c. 2000s – EVGs in Motion: A Return to Classroom Demand

The Elementary and Secondary Education Act (ESEA) of 1965, as part of Lyndon B. Johnson’s Great Society Program, massively increased classroom resources nationwide, but also increased government oversight.^{xxviii} Over another dozen or so iterations, the law would further expand the governments’ role in the classroom, and in 1975, along with an increase in nationwide testing of students for learning disabilities, U.S. public schools introduced the Individualized Education Plan (IEP), a document that was and continues to be used by teachers to develop strategies for teaching such students in the classroom.^{xxix} In 2002, the EVG market was established once again as separate from adjacent markets, driven alongside the next wave of regulatory changes in the ESEA—namely, No Child Left Behind, which made school funding contingent upon their adherence to skills-based benchmarks that were set at the federal level.^{xxx}

Toby Levinson, former Manager of The Learning Company’s Educational Design Department, told EdSurge in 2016 that when the 2002 boom happened, the EVG market had almost completely died out, resulting from the idea that “anyone involved [in the market] couldn’t handle money because of how badly the [Mattel acquisition] went.”^{xxxi} While there are many theories as to why the acquisition ended in disaster—Dartmouth’s Tuck School of Business has a comprehensive case study that describes it as one of the worst acquisitions in business history—Levinson attributes the fiasco to budget imbalances and a fiercely saturated market, which by 2002’s boom had calmed measurably.

Driven by immense and seemingly overnight demand in classrooms across the U.S., the educational games market shifted from making “one-size-fits-all” learning games—evidenced by the massive popularity of games like *Where in the World is Carmen Sandiego* and *Zoombinis*—to the development of games that were designed with the sole purpose of helping U.S. public schools meet their requisite federal benchmarks.^{xxxii} With classroom sizes increasing, teachers simply don’t have the ability to ensure every students’ adherence to federal benchmarks.^{xxxiii} Classroom learning games, in short, were introduced to help schools that were already short on teacher resources meet increasing demands of Common Core, the theory that if we promote high testing scores, children will be learning more.

While parents had been purchasing educational video games for their kids since the Atari 2600, the market had really been sustained by U.S. public schools through 2002. While 2002 saw an obvious increase in classroom use of educational games, it also made parents aware of their own increasing

responsibility over their kids' educations outside of the classroom. Perhaps to avoid competition with retail games, it's around this time that educational video game makers started to release their own dedicated gaming consoles, such as LeapFrog's LeapPad, which enabled parents to control their kids' home gaming use and limit it to those games that were purported to help their kids meet school requirements.

After the 2007 release of the iPhone and the subsequent rise of touch-screen tablets, the educational games market transitioned largely toward portable devices. To further separate themselves from retail games, it was around this time that educational game makers like LeapFrog began making their own handheld consoles that exclusively played educational games developed by the console owners, allowing parents to more closely monitor their kids' media use.

III.d. 2010s – Consolidated Ownership of the EVG Market, Monetization of Kids Social Networks

By 2014, the educational games market had largely been acquired by educational and trade book publishers like Scholastic and Houghton Mifflin Harcourt, which subsequently expanded the market share of The Learning Company. Around this time, startups hoping to tap into the expanding market for e-learning and EVG resources began entering the scene.^{xxxiv} By 2016, it became clear that the educational games market wasn't going anywhere. Like most educational game companies, LeapFrog has changed hands several times since its founding, and in 2016 was acquired by the Hong Kong based VTech for \$72 million.^{xxxv} Today, ownership of the U.S. educational games market is largely divided between Chinese tech companies and U.S. book publishers, with physical game makers like Mattel focusing instead on the development of retail games that expand upon their existing bodies of intellectual property, such as Barbie, Hotwheels, and Masters of the Universe.

III.e. MARKETPLACE ACCESS

Today, while dedicated handheld learning devices are increasing in popularity, the market for EVGs is perhaps largest online and in a host of app store marketplaces that can be accessed at any time, from any location, and by anyone with access to the connected device in question. The limitations placed on users by marketplace owners are, however, increasing, as marketplaces drive profits at the cost of ease of access. By 2016, the Apple App Store had 80,000 apps, games and otherwise, in its "Educational" category.^{xxxvi} But in 2017, unsurprisingly, Apple removed the "Education" sub-genre for educational games, leaving educational games mixed in with retail games.^{xxxvii} Steam used to have an Educational games category, too, but in 2015 removed it as an official game genre. Of the nearly 21,718 games on steam today, only 178 of them have even an "educational" tag, and among the 10 best sellers with this tag, all 10 are simulation games, none of which are purposed for student achievement or classroom use. The Google App Store is little different, placing educational video games into retail genre groups, such as puzzle, adventure, or RPG.^{xxxviii} By "hiding" EVGs within costlier adjacent commodities, digital marketplace owners ensure their low visibility, increasing the likelihood that a parent or educator will settle for a more expensive alternative first. In avoiding the pronouncement of the EVG market itself, as the Apple

App Store and the Google Play Store have done in several stages and on several occasions,^{xxxix} app stores protect their shares of the profits from these products. Of the three most popular educational game publishers on the Google App store (22LearnLLC, RosiMosi LLC, and AppQuiz), the former two are designed to clearly meet classroom demands, serving parents and teachers;^{xi} the latter, on the other hand, offers apps with massive “click” value—bright colors, bustling movement, and pop-up advertisements disguised as game elements—but clearly no pedagogical value.

III.f. MODELING A NEW APPROACH FOR EVG MARKET STUDY

The above history of the EVG market teaches us that EVGs, while swept up in several movements related to retail games, are not in fact part of the retail games market. This history also shows us that EVGs developed centrally from within the U.S. public school system and continue to be purposed by both educators and parents toward academic subject testing and progress, as we have seen in the EVG market’s immediate responses to continued federal regulations of the American classroom.

IV. A NETWORKED MODEL FOR ATTENTION

This section examines current network trends in EVGs and adjacent markets, focusing on kids social media networks, the evolution of child protection laws, and the widespread approaches that advertisers and corporations at large have taken to manage children’s attention on the Internet.^{xli} While these stages in EVG market development have occurred largely alongside and in conversation with those stages listed in Section III of this essay, the distinctive strategies of online social networks for kids warrants an independent approach and analysis, and has therefore been included below.

IV.a. INCREASED SCREEN TIME LEADS ADVERTISERS TO TARGET KIDS IN NEW WAYS

By the age of 8, 42% of U.S. kids already have their own personal Wi-Fi enabled tablets,^{xlii} and by the age of 12, 45% have their own cell phones.^{xliii} On average, young kids (0-8 years old) watch 58 minutes of streaming video per day, spending an average of 2 hours and 19 minutes with screen media more broadly. Streaming videos have become perhaps America’s favorite pass time, with more families subscribing to streaming video services such as Netflix and Hulu than paying for cable TV. Notably, among children age 2 and younger, screen time is decreasing, from 58 minutes per day in 2013 to 42 minutes per day in 2017. But for the rest of young children, screen time is increasing sharply.^{xliv} While in 2011 only 4% of young children’s screen time use was spent on mobile devices, in 2017, that number rose to 35%—from 5 minutes per day to 48 minutes per day. Today, mobile is universal in the U.S., and among households with young children, the number with mobile devices in the home exploded from 52% in 2011 to 98% in 2017.^{xlv}

While technically illegal,^{xlvi} advertisers regularly target children as young as four years old, spending over \$12 billion each year in the U.S. alone targeting youth markets, with a single child watching as many as 40,000 commercials and push advertisements every year across a network of connected devices.^{xlvii} Advertisers have known for decades that many of parents’ purchase decisions are

influenced greatly by their kids, and today, kids have independent spending power that far surpasses past generations. Advertisers are also becoming far more subversive with their online materials targeting kids, evidenced by text subscription practices for intellectual properties like *Gossip Girls* and product placement on popular kids gaming sites like *HappyMeal*, which is unsurprisingly owned by McDonalds.^{xlviii} McDonalds is perhaps the best example of how fast food companies have targeted kids using games both physical and virtual, and has been advertising with video games since the 1980s when the company introduced a line of commercials for scratch-ticket giveaways of Atari consoles: “Taste the thrill of Atari at McDonalds.”^{xlix} Today, examples like this are found on many inexpensive “impulse buy” products, like Nissin’s Cup Noodles, which currently advertises in-game Final Fantasy XV content for buyers who enter personal information online using a link on its product packaging.¹ Unsurprisingly, many of the advertisements that target kids today are increasingly utilizing, and taking the forms of, video games, which are among kids’ first stops when they gain access to connected devices.^{li}

Video games have monetized themselves, through kids’ attention, by many different means over the decades—just take the example of Buckner & Garcia’s “Pac-Man Fever,”^{lii} a hit single that was among the first videos presented on the new MTV in the 1980s. Today, this range of monetization schemes is perhaps greater than it has been at any other time.

IV.b. THE RISE OF CHILDREN’S SOCIAL (GAMING) NETWORKS

The 1990s were a fascinating time for American kids. Y2K, which didn’t end up being nearly as much of a deal as any of us were secretly hoping it would be, was almost upon us.^{liii} But perhaps the greatest shift in our lives occurred when we gained the ability to communicate virtually with other kids, or even adults, beyond parental purview.

Parenting has never been easy, and while the Internet and connected devices have made a lot of jobs easier, parenting is decidedly not among them.^{liv} Among today’s U.S. teens and tweens, 79% of own their own smart phones, 29% own their own portable gaming systems, 43% have personal TVs in their bedrooms, and 30% have personal laptops.^{lv} Among this age group, 80% participate in social media networks—which can typically be accessed via any of the above systems—with 56% of minors between 2 and 17 participating in social media networks.

Since the Children’s Online Privacy Protection Act of 1998, dedicated social networks for kids—which have always doubled as game networks, although never true EVG networks—have become an increasingly important resource for parents who are concerned about their children’s online activity.^{lvi} Used by kids but marketed to parents, and commonly offering classroom resources for educators, these platforms are excellent at holding kids’ attention, and are a first stop for advertisers looking to target kids markets. The most popular kids social network today is perhaps *Club Penguin*, a Disney-owned platform with the motto: “Fun for kids, peace of mind for parents.” Also of note is that, for a monthly subscription fee, *Club Penguin* provides parents with additional child monitoring features, and kids with a host of extra games and online social activities that mimic those on more adult-focused networks like Twitter and Instagram.

Released in 1992, the very first kids' social media platform was *Whyville*, which continues to expand its intellectual property today to include book and web video series. By 2010, *Whyville* had 2.1 million members, with 5 million by 2018.^{lvii} The average age of players has remained relatively stable over the game's history, at about 12.5 years old, ½ year younger than the legal age limit for online social networks. Also of note is the almost completely lacking barrier to accessing these social networks: In *Whyville*, kids make their player avatars before they even get a login; you literally make your avatar *on the homepage*. Also of note is that *Neopets*, *Club Penguin*, and *Whyville* are all monetized through intellectual property rights: their characters are used to advertise products on Disney Channel and other kids video networks, and these companies all sell plushies, books, and other products based on their intellectual properties. 2008's *Little Big Planet* was another touchstone in the development of children's social networks; *Little Big Planet* was one of the first networks to include direct messaging components, and served as one of the first user-generated games networks for kids.

While age restrictions have, for the most part, always existed on social media platforms, that children as young as six are habitually using social networks today is a widely acknowledged fact.^{lviii} In late 2017, although the age restriction for users was, and still is, 13, Facebook campaigned to add a new messenger platform catering precisely to this group. Messenger Kids, as they call it, promised to give parents oversight of their kids' inevitable "unauthorized" social media use, their kids' activity and "push down the age" at which social media use is considered appropriate. What's most surprising about all this is how *unsurprising* it is.

As Claudio Bueno points out, the nature of labor today has shifted drastically towards attention and information labor, centrally due to a lesser need for industrial processes and an economic cycle that has sought to apply value to virtual products and services.^{lix} Our information and our attention are among our greatest labor assets, and for advertisers, we are certainly within a new Golden Age. It is almost impossible to prevent minors from freely giving their attention to national corporate interests. While the most pervasive of these markets is perhaps the youth social media networks, which usually double as game networks, the second most affective of these markets is almost certainly the kids mobile games market, which just three years ago accounted for nearly 10% of the entire mobile games revenue.^{lx}

IV.c. A BRIEF HISTORY OF KIDS AS LABORERS

Children have labored throughout the history of our species, supplementing family and community labor where needed.^{lxi} And while it may seem cruel to modern generations, kids have traditionally been an excellent source of labor across a host of cultures, including our own.^{lxii} Their skill sets are extremely limited, so their labor has historically come cheap. And they have almost endless supplies of energy, so they can work longer hours without tiring. Realistically, there's only one problem with kids, and that's that they're *kids*. Give them complex mechanical tasks and they're likely to injure themselves. Give them long-term, multi-step tasks and they're likely to get distracted the minute you stand to leave. So, sure, kids make excellent laborers, but only if the labor that needs doing is both vastly simple and incredibly engaging (as with attention and information labor, which I examine below).

In the U.S., from the 1700s through the early 1800s, hand labor in industry was to a large degree wiped out, driven by developments in power-driven machines.^{lxiii} These machines no longer required adult muscle to operate fully, so for the most part, children began to operate them under periodic adult supervision. While children had already been working 12- to 18-hour days since the 1760s, where they would work in mines and factories, by 1810, about 2 million minors in the U.S. were working 50- to 70-hour weeks.^{lxiv}

According to U.S. Navy Archives, in the 18th and 19th centuries, young boys could work as loblolly boys, the lowest-ranking position on a ship, where they would be fed and housed in exchange for doing everything from cooking and cleaning to assisting medical practitioners in surgical procedures.^{lxv} In the 19th and early 20th centuries, kids might work as newsies, buying and selling newspapers for profit in urban locations, or take jobs as pinsetters in bowling alleys, where they would quite literally *set pins* for hours on end. None of these jobs is *safe* in any sense of the word. Newsies often lived on the streets, and pinsetters could have fingers and toes crushed by onrushing bowling balls.^{lxvi} Perhaps this is what makes child *attention* labor practices today so widely accepted.

IV. d. KIDS AS ATTENTION LABORERS

While Britain and several European nations passed a series of child labor laws from 1802 to 1878, it wouldn't be until 1899 that U.S. states would enact similar protections, and not until 1938 that Congress would pass the Fair Labor Standards Act. But with child activity increasingly resulting in corporate profits, it may be time finally to ask how the attention and information economies have shifted our understanding of what constitutes child labor.

As defined by the International Labor Association, we consider child labor, today, to be that which deprives children of learning or schooling opportunities altogether. Attention labor complicates this definition, since we don't fully understand how attention outside of the classroom affects focus inside of the classroom, or even how media use and attention labor at home affect homework quality, engagement, or completion. That said, U.S. parents are largely in agreement that technology “positively supports their children with schoolwork and education,” with 88% of U.S. parents reporting that technology helps their children to learn new skills and 89 percent reporting that network engagement actively prepares children for 21st century jobs.^{lxvii}

A kid isn't being physically endangered when they're playing on an iPad. And chances are they aren't in school at the time, so the iPad isn't exactly distracting from their education. But advertisers are well aware that kids increasing buying power makes them a marketable demographic in their own right, and advertisers are *well* aware of children's influences on their parents' buying practices.

While we don't expect kids to hold jobs, we do expect kids to *play*, and in so doing, they are regularly performing large amounts of attention labor. We also expect them to participate in supplemental after-school activities that we hope make them smarter, stronger, and better equipped to succeed in the modern workplace. We aren't always certain what exactly it *is* about these programs that prepare our kids for success down the line, but the promise of prosperity is one that we can't easily

overlook. In effect, parents and educators are not just willing participants of the new child labor, but essential agents in its success.

V. CHALLENGES TO THE NATIONAL EVG MARKET

V.a. MARKET SATURATION & MARKET MIXING

Since the introduction of app store marketplaces, kids have increasingly encountered educational video games in their daily lives.^{lxviii} With parental controls use increasing, EVGs and e-learning tools are quickly becoming some of the *only* networked games that kids can access from home. A central challenge for educational game makers, then, has become separating their game products from all the other “educational games” that are cropping up, by making them games that kids *want* to play, but are also games that practically support classroom learning. These games *also* have to be attractive to parents, and insofar as an EVG is attractive to parents, *ratings* and *discoverability* are perhaps the most important considerations. True EVGs, however, are rarely at the top of app store Top 10 lists. Further complicating this scheme is that what makes a game attractive to a child may not be the same thing that makes it attractive to a parent. Thus, we have seen a large variety of e-learning resources, EVGs or otherwise, in app store marketplaces, some obviously marketed for parents, others for children, and others that either combine the two or aren’t quite certain where they align.^{lxix}

Here, we are reminded that what makes educational video games useful to parents, teachers, and schools is exactly what makes them terrible retail products: educational video games, time and again, are proven to only work when they teach targeted, specific skill sets that kids actually need in classrooms.^{lxx} If parents want to help their kids learn about a single subject, his or her first stop might be a subject tutor. Otherwise, for those parents who are *generally* concerned about their kids future success—which pretty much covers every parent in the U.S.—there are brain trainers and “educational apps,” which app stores push to the forefront because they, unlike actual skills-based EVGs, use advertisements for monetization. These apps are also, unlike skills-based games, essentially *infinite*, since they don’t teach *information* that can be “completed”—so in theory, they can be monetized indefinitely.

V.b. MAJOR DESIGN PROBLEMS

EVGs face two major design challenges that retail games, and most e-learning resources, don’t face. The first is the question of how to make a *learning experience* that is also *fun*. The whole point of making a game to *teach* something is that the game framework itself makes the *learning* part more palatable, after all. And as any public school teacher will tell you, motivating students is one of the most difficult parts of teaching, because at the end of the day, external motivation never does the trick. The second design challenge is one that is seemingly more elusive, and dependent on the individual game product being discussed, and that’s the problem of progress tracking. The earliest educational video games didn’t “track” player progress in any particular way. They worked by requiring that the player learn certain rules of the game world and be able to, over time, apply those rules. These rules happened to be facts and

figures of value for daily life, like reading, writing, and arithmetic. As EVGs evolve, progress tracking strategies are advancing quickly, responding to evolutions in user-centered design principles.^{lxxi}

V.c. LOCALIZATION OF DESIGN RESOURCES

As Tan points out in her 2010 analysis of collaborative game design practices in the U.S., educators and game designers are increasingly working together to provide students with targeted, higher-level learning experiences that are fitted to specific schools, classrooms, and even students. While the EVG market has relied on collaborations like these for decades, now, individual game designers and companies in local settings are beginning to rise in popularity as alternatives to an e-learning market that has largely taken a one-size-fits-all approach to its EVG design practices.^{lxxii} Of particular relevance to me is that these changes have occurred alongside a growing practice of individualized learning plans, which seek to account for the needs and learning styles of each student.

V.d. BRAIN TRAINERS

Back in 2009, when brain trainers were relatively new in the public eye, several large-scale studies published in *Scientific American* and similar journals reported that the genre of games would make you smarter regardless of age.^{lxxiii} Dementia patients, concerned parents, and everyday adults came out in droves to welcome the new technology into their and their children's homes. The only problem was, and still is, that to this day we have no peer-reviewed study confirming that brain trainers will actually, as their name suggests, make any recognizable difference in how your *brain* works. In fact, every peer reviewed study of the past three years agrees that they have *no* measurable impact on intelligence whatsoever, in any area.^{lxxiv}

Those companies perhaps best known for their brain trainers, like Lumosity, have time and again been sued for their claims that their games would increase intelligence and neurological capacity, and in 2016, Lumosity paid out a \$2 million to the Federal Trade Commission on charges of deceptive advertising.^{lxxv}

This is a huge problem for the EVG market. For one, it puts into question, at least in public perception, a host of otherwise incredibly comprehensive research on the efficacy of skills-based educational video games. The other problem, which isn't so much about the practical failure of brain trainers as it is with their continued financial prominence in the e-learning market—is that these games tap into the market for *actual* educational video games and give nothing back. While brain trainers are used primarily by adults, and largely by senior citizens, they are increasingly being used by kids. This presents several problems to the educational video games market, not least of which is that kids aren't gaining any classroom skills, and they aren't getting smarter.

VI. THE EVG MARKET TODAY

Today, the EVG market is estimated to be worth approximately \$2.3 billion,^{lxxvi} accounting for just 1.2% of the global e-learning market, standing at approximately \$182 billion.^{lxxvii} For the most part, the single largest changes in the EVG market have been its relation to e-learning competition and its shift toward

product diversification; as an additional monetization stream, EVG companies partner with large companies to utilize known intellectual properties, and these companies also supplement their virtual offerings to include textbooks and other such products that don't take the form of games.^{lxxviii}

VII. LIMITATIONS & COUNTERARGUMENTS

One of the greatest limitations in this essay, while necessary in clarifying the context of EVGs in the U.S., is that it deals exclusively with U.S. EVG market and does not include data on the world's fastest-growing educational games market, China. Neither does this essay address educational games from Japan or France, which were, along with the U.S., among the first innovators in a global EVG market.

A second limitation, and a potential argument for *keeping* EVGs as part of the e-learning and kids games markets, is that EVG's inclusion here indoctrinates kids in subjectivity practices that are essential to their involvement in e-learning markets at-large; EVGs are targeted for the development of *academic* skills, which years later become *occupational* skills, so EVGs are the first stage in a progression of e-learning product consumption.

A third and essential limitation of this research is that we have very little information about EVG market values because EVGs are found anywhere and everywhere that other games are sold, and anywhere and everywhere, with few exceptions, that e-learning resources for kids are sold. This makes their *separation* a vital component to understanding how they operate.

VIII. CONCLUSION

The role of EVGs at home and in the classroom are shifting. To understand how to optimize the use value of EVGs, and how they can be used productively as both retail commodities and pedagogical resources, more research must be performed on the EVG market as distinct from adjacent forms. This essay presents an argument for a renewed definition of EVGs that makes clear their origins, their qualities, and their futures in U.S. and global markets. While EVGs have been in U.S. classrooms since the 1970s, they have only recently entered the home, making this an ideal market for future study. In addition, while not the central focus of this essay, I suggest that e-learning companies, youth social networks, and kids games markets must take considerably more responsibility in the stewardship of children as adults-in-training, not just as consumers-in-training. Children's attentions are sensitive and their ability to absorb information goes well beyond our own. At this stage in their lives, as APA research cited earlier in this essay presents conclusively, children should be spending more time experiencing, learning, and playing, and less time purchasing. Networked models for kids' attentions are ubiquitous and should take into account kids' needs at home and in the classroom, evidenced by research here showing that advertisers have a long ways to go before they are in actual compliance with U.S. child protection and information privacy laws. Games are excellent ways for kids to engage with new materials and are prime resources for free play activity. In the history of child labor practices in the U.S., free play is relatively new, but increasingly important to parents and schools. EVG creators, distributors, publishers, marketers, and retailers should consider the state of child attention labor today at every stage of EVG development and sale, which will make their products more competitive to parents and children

alike. Educator-designer collaborations have been successful throughout the history of EVGs, and should continue to evolve to support parents, families, and educators. With school systems increasing their use of EVGs as both classroom and supplemental resources, it is important to further study what makes EVGs distinct in form and function from adjacent markets, which is a primary interest of this essay. While there are many EVG products in app stores and virtual marketplaces everywhere, developers may do well to consider how a saturation model effects views of EVG efficacy in learning, as well as how EVGs are viewed when placed alongside adjacent market products within these marketplaces. In conclusion, the EVG market is an ever-evolving and complex ecosystem that requires further study by market researchers, educators, parents, and governments alike. As virtual learning services and systems evolve, EVGs are likely to become a market of increased interest for parents, educators, and corporations.

Bibliography:

-
- ⁱ Crawley, Dan. "Making Educational Games is Tough, Especially if you Want to Make Money." Venturebeat. 24 June 2015. Web. Accessed on 4 April 2018.
- ⁱⁱ Weintrop, David and Uri Wilensky. "Playing by Programming: Making Gameplay a Programming Activity," *Educational Technology*, Vol. 56, No. 3 (May-June 2016), pp. 36-41.
- ⁱⁱⁱ Gee, J. P. (2011) Reflections on empirical evidence on games and learning. In S. Tobias & J. D. Fletcher (Eds.), *Computer Games and Learning* (pp. 223–232). Charlotte, NC: Information Age Publishing, Inc.
- ^{iv} Dicheva, D., Dichev C., Agre G., & Angelova G. (2015). "Gamification in Education: A Systematic Mapping Study." *Educational Technology & Society*, 18 (3), 75–88.
- ^v Laughlin, Daniel. "A Guide to Computer Games in Education for NASA," NASA's Office of the Chief Education Officer, Technology and Products Office. Made publicly available: 2005.
<https://education.jsc.nasa.gov/pdfs/nasa-games-guide-laughlin-2005.pdf>. Web. Accessed on 14 April 2018.
- ^{vi} J.M. Spektor, et al. *Handbook of Research on Educational Communications and Technology*. Springer Science + Business Media, New York: 2014. pp. 485-497.
- ^{vii} Games, A., & Squire, K. D. (2011). Searching for the Fun in Learning: A Historical Perspective on the Evolution of Educational Video Games. In S. Tobias & J. D. Fletcher (Eds.), *Computer Games and Instruction* (pp. 17–46). Charlotte, NC.
- ^{viii} "Child Labor." Reviewed by Milton Fried. The New Book of Knowledge. Grolier Online, 2014. Web. 26 June 2014. Accessed on 20 April 2018.
- ^{ix} Laughlin, Daniel. "A Guide to Computer Games in Education for NASA," NASA's Office of the Chief Education Officer, Technology and Products Office. Made publicly available: 2005.
<https://education.jsc.nasa.gov/pdfs/nasa-games-guide-laughlin-2005.pdf>. Web. Accessed on 14 April 2018.
- ^x Zhen, Jeremy. "The History of Educational Video Gaming." Immersed Games. 1 January 2014. Web. Accessed on 2 April 2018.
- ^{xi} Laughlin, Daniel. "A Guide to Computer Games in Education for NASA," NASA's Office of the Chief Education Officer, Technology and Products Office. Made publicly available: 2005.
<https://education.jsc.nasa.gov/pdfs/nasa-games-guide-laughlin-2005.pdf>. Web. Accessed on 14 April 2018.
- ^{xii} Wang, Kevin. "The Forgotten History of The Oregon Trail, As Told By Its Creators." Motherboard. Published 15 Feb. 2017. Web. Accessed on 24 April 2018.

-
- ^{xiii} Rignall, Jaz. "A Pioneering Game's Journey: The History of Oregon Trail." US Gamer. 19 April 2017. Web. Accessed on 22 April 2018.
- ^{xiv} Office of Technology Assessment (1982). Informational technology and its impact on American education. United States Government Printing Office. pp. 214–218
- ^{xv} IBID.
- ^{xvi} Zhen, Jeremy. "The History of Educational Video Gaming." Immersed Games. 1 January 2014. Web. Accessed on 2 April 2018.
- ^{xvii} Donovan, Tristan. (2010). *Replay: The History of Video Games*. Audiobook: Chapter 10, 4:24:30. Yellow Ant Publishing. Accessed on 24 April 2018.
- ^{xviii} Stephens, Michael. "A Brief History of Video Game Consoles." Venturebeat: 12 December 2013. Web. Accessed on 28 April 2018.
- ^{xix} Mace, Scott (2 December 1985). "Christmas Contenders". *InfoWorld*. Volume 8, Issue 45. Web. Accessed on 26 April 2018.
- ^{xx} Laughlin, Daniel. "A Guide to Computer Games in Education for NASA," NASA's Office of the Chief Education Officer, Technology and Products Office. Made publicly available: 2005.
- ^{xxi} Montgomery, Blake. "Is the Educational Games Industry Falling Into the Same Trap It Did 20 Years Ago?" EdSurge. 7 February 2017. Web. Accessed on 29 April 2018.
- ^{xxii} Christian Science Monitor Archives. (1982). Sklarewitz, Norman, "Computerized games hit profits jackpot for Mattel company." Web. Accessed on 28 April 2018.
- ^{xxiii} Zhen, Jeremy. "The History of Educational Video Gaming." Immersed Games. 1 January 2014. Web. Accessed on 2 April 2018.
- ^{xxiv} Cave, Andrew (30 September 2000). "Mattel sale ends \$3.6bn fiasco". *The Daily Telegraph*. London. Web. Accessed on 28 April 2018.
- ^{xxv} IBID.
- ^{xxvi} NY Times Archives. (1993). Sims, Salvin. "Fisher-Price to Be Bought by Mattel." Web. Accessed on 5 April 2018.
- ^{xxvii} Cave, Andrew (30 September 2000). "Mattel sale ends \$3.6bn fiasco". *The Daily Telegraph*. London. Web. Accessed on 28 April 2018.
- ^{xxviii} Klein, Alyson. "No Child Left Behind: An Overview." Education Week. 10 April 2015. Web. Accessed on 12 April 2018.
- ^{xxix} Rice, Jeff. "An IEP for Every Student? Using Technology to Provide Truly Differentiated Instruction." District Administration. 13 December 2012. Web. Accessed on 2 April 2018.
- ^{xxx} Henry Kaiser Family Foundation. "Annual Report: Children and Video Games." Fall 2002. Web. Accessed on 14 April 2018.
- ^{xxxi} Montgomery, Blake. "Is the Educational Games Industry Falling Into the Same Trap It Did 20 Years Ago?" Edsurge. 7 February 2016. Web. Accessed on 30 March 2018.
- ^{xxxii} Henry Kaiser Family Foundation. "Annual Report: Children and Video Games." Fall 2002. Web. Accessed on 14 April 2018.
- ^{xxxiii} National Education Association: Alcocer, Paulina. "History of Standardized Testing in the United States." 11 December 2009. Web. Accessed on 13 April 2018.
- ^{xxxiv} Empson, Rip. "STI Buys Chalkable For \$10M To Bring Its Educational App Store And Learning Platform To K-12 Schools." TechCrunch. 7 December 2013. Web. Accessed on 17 April 2018.

-
- ^{xxxv} PR Newswire: Whitepaper: "VTech Completes Acquisition of LeapFrog." 4 April 2016. Web. Accessed on 25 April 2018.
- ^{xxxvi} Montgomery, Blake. "Is the Educational Games Industry Falling Into the Same Trap It Did 20 Years Ago?" Edsurge. 7 February 2016. Web. Accessed on 30 March 2018.
- ^{xxxvii} Fingas, Roger. "Apple pulls Catalogs category from App Store, Dice & Educational subcategories under Games." Apple Insider. 4 October 2017. Web. Accessed on 7 April 2018.
- ^{xxxviii} Google Play Store. "Educational: Top Selling & Free." Accessed on 29 April 2018.
- ^{xxxix} PR Newswire: Whitepaper. "Global Serious Games Market Expected to Reach \$9,167 Million By 2023 - Allied Market Research" 6 December 2017. Web. Accessed on 28 April 2018.
- ^{xl} Google Play Store. RosiMosi LLC. Accessed on 29 April 2018.
- ^{xli} Federal Trade Commission: Report. (2017). "Children's Online Privacy Protection Rule (COPPA)" Web. Accessed on 1 May 2018.
- ^{xlii} Robb, Michael B. (Editor). "Media Use in Children Age Zero Through Eight." Common Sense Media. (2017) p.5.
- ^{xliiii} Howard, Jacqueline. "When Kids Get Their First Cell Phones Around the World." 11 December 2017. Web. Accessed on 1 May 2018.
- ^{xliv} Common Sense Media. (2017) "Media Use in Children Age Zero Through Eight." p.5.
- ^{xlv} Common Sense Media. (2017) "Plugged-In Parents of Tweens and Teens." pp.17-44.
- ^{xlvi} Turow, J. (2001). Privacy policies on children's websites: Do they play by the rules? Philadelphia, PA: Annenberg Public Policy Centre of the University of Pennsylvania.
- ^{xlvii} Wilcox, Brian., et al. "Report of the APA Task Force on Advertising and Children." American Psychological Association Reports. 20 February 2004. Web. Accessed on 10 April 2018.
- ^{xlviii} Robb, Michael B. (Editor). "Media Use in Children Age Zero Through Eight." Common Sense Media. (2017) p.15.
- ^{xlix} YouTube. Nukem: "1980s McDonalds Atari Scratch & Win Ticket Commercial." 20 January 2012. Web. Accessed on 5 April 2018.
- ^l Buckley, Sean. "'Final Fantasy XV' tricked me into buying Cup Noodles." Engadget. 18 January 2017. Web. Accessed on 20 April 2018.
- ^{li} Grimes, S. & Fields, D. (2012) Kids Online: A New Research Agenda for Understanding Social networking Forums. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- ^{lii} Brown, Marcel. (2016). "Pac-Man Fever Begins." Blog: This Day in Tech History. Web. Accessed on 20 April 2018.
- ^{liii} National Geographic. West, Kara (Editor.) "Y2K Bug: Better Safe than Sorry." 11 January 2011. Web. Accessed on 12 April 2018.
- ^{liv} Federal Trade Commission: Report. "FTC Seeks Comment on Proposed Modifications to Video Game Industry Self-Regulatory Program Approved under the COPPA Safe Harbor Program." 2 April 2018. Web. Accessed on 1 May 2018.
- ^{lv} Common Sense Media. (2017) "Plugged-In Parents of Tweens and Teens." p.17-44.
- ^{lvi} Federal Trade Commission: Report. "FTC Seeks Comment on Proposed Modifications to Video Game Industry Self-Regulatory Program Approved under the COPPA Safe Harbor Program." 2 April 2018. Web. Accessed on 1 May 2018.

-
- ^{lvii} Kafia, Yasmin B. (2010). "World of Whyville: An Introduction to Tween Virtual Life." *Games and Culture*: 5(1), pp. 3-22.
- ^{lviii} Computer History Museum. (2018). "Timeline of Computer History." Web. Accessed on 14 April 2018.
- ^{lix} Bueno, Claudio Celis. "The Attention Economy: Labour, Time and Power in Cognitive Capitalism." Rowman & Littlefield International, 2016. ProQuest Ebook Central.
- ^{lx} Judge, Alysia. "Kids' mobile games worth nearly 8% of global market." *Pocket Gamer*. 20 August 2015. Web. Accessed on 25 April 2018.
- ^{lxi} Schuman, Michael. (Jan, 2007). "History of Child Labor in the United States." Bureau of Labor Statistics. Web. Accessed on 26 April 2018.
- ^{lxii} IBID.
- ^{lxiii} Child Labor." Reviewed by Milton Fried. *The New Book of Knowledge*. Grolier Online, 2014. Web. 26 June 2014. Accessed on 20 April 2018.
- ^{lxiv} Montagna, Joseph A. "The Industrial Revolution." Yale-New Haven Teachers Institute. Unit 81, 2006. Web. Accessed on 15 April 2018.
- ^{lxv} U.S. Navy Archives. (2005). Hacala, Mark T. "The U. S. Navy Hospital Corps: A Century of Tradition, Valor, and Sacrifice." Web. Accessed on 16 April 2018.
- ^{lxvi} Schuman, Michael. (Jan, 2007). "History of Child Labor in the United States." Bureau of Labor Statistics. Web. Accessed on 26 April 2018.
- ^{lxvii} Grimes, S. & Fields, D. (2012) "Kids Online: A New Research Agenda for Understanding Social networking Forums." New York: The Joan Ganz Cooney Center at Sesame Workshop.
- ^{lxviii} IBID.
- ^{lxix} Common Sense Media Report. (2015). *Best Apps for Kids Age 5-8*. Web. Accessed on 1 May 2018.
- ^{lxx} Gee, J. P. (2011) Reflections on empirical evidence on games and learning. In S. Tobias & J. D. Fletcher (Eds.), *Computer Games and Learning* (pp. 223–232). *Charlotte, NC: Information Age Publishing, Inc.*
- ^{lxxi} Weintrop, David and Uri Wilensky. "Playing by Programming: Making Gameplay a Programming Activity," *Educational Technology*, Vol. 56, No. 3 (May-June 2016), pp. 36-41.
- ^{lxxii} Tan, Wee Hoe. "Game-based learning in formal educational contexts: how subject matter experts and game experts could collaborate to design and develop games." (2010).
- ^{lxxiii} Mossman, Kaspar. (April, 2009). "Brain Trainers: A Workout for the Mind." *Scientific American*. Web. Accessed on 23 April 2018.
- ^{lxxiv} Neuroskeptic. "Brain Training Doesn't Work?" *Discover Magazine*. 13 July 2017. Web. Accessed on 27 April 2018.
- ^{lxxv} Federal Trade Commission: Report. "Lumosity to Pay \$2 Million to Settle FTC Deceptive Advertising Charges for Its "Brain Training" Program." 5 January 2016. Web. Accessed on 1 May 2018.
- ^{lxxvi} Takahashi, Dean. "When a Mobile Boom, Learning Games are a \$1.5B Market Headed Toward \$2.3B by 2017." *VentureBeat*. 16 August 2013. Web. Accessed on 30 April 2018.
- ^{lxxvii} E-Logic Learning: Blog. "15 E-LEARNING TRENDS AND STATISTICS TO KNOW FOR 2017" 2 March 2017. Web. Accessed on 30 April 2018.
- ^{lxxviii} Weintrop, David and Uri Wilensky. "Playing by Programming: Making Gameplay a Programming Activity," *Educational Technology*, Vol. 56, No. 3 (May-June 2016), pp. 36-41.