TEACHING FREE ENTERPRISE IN TEXAS

GUIDE FOR TEACHERS

SMU | COX

BRIDWELL INSTITUTE
FOR ECONOMIC FREEDOM

INTRODUCTION TO THE PROGRAM

The Bridwell Institute for Economic Freedom developed this Teaching Free Enterprise program to help Texas educators gain valuable content knowledge and expertise in order to meet the Texas Economics TEKS regarding Free Enterprise in classroom instruction. Top economics scholars from various higher education and research institutions are providing lessons, activities and exercises that can be readily implemented in the classroom.

This document presents one of the units that address some of the most important, yet often misunderstood, aspects of free-enterprise economies.

Q&A

01 *How should this curriculum be used?*

The modules can be taught individually or in sequence in whatever order the educator prefers. The educator can always use this guide and the materials that are available on:

teachingfreeenterprise.com

02 *What time of year is best?*

In Texas, Economics is a One-Half Credit Course per semester class. Most schools offer it twice a year. You can use these materials anytime during the semester.

03 *What grade level?*

The modules are designed for 8-12 grade implementation.

04 *Do I need written permission to use the lessons?*

The use of these lessons and materials in a classroom setting for any educational purpose is allowed. In order to make copies to share with colleagues please contact us for written authorization, although we probably have extra copies of this manual for shipping. There are unique users that we need to set up for the online portal in order to let the system function properly and teachers to have ease of use, thus free individual registration is the best possible choice.

05 *How do I get started?*

We strongly recommend giving a complete read through this manual first, then watch some of the online videos of the presentation you attended in case you missed something or didn't attend. Once these steps are taken, decide if you are making copies or using the slides provided in the website, then you are ready to go!

06 *Technology Requirements*

The http://TeachFreedomTX.org website is designed to function in all commercially available operating systems and browsers.

If you are planning to project the videos to students, we recommend a large screen set up with a projector or a large monitor for students to be able to see from any portion of the room.

07 *How are the lessons organized?*

- Title
- Introduction
- Guiding Questions
- Objectives
- Suggested Lesson Length
- TEKS Standards
- Background Reading for direct teaching or adaptations for student reading.
- Suggested Classroom Procedures
- Classroom Ready Materials
- Additional Resources and References from highly regarded institutions.

08 *How much time per lesson?*

Each unit is designed for 90 minutes of classroom interaction with students. It can be taught over 90 minutes with a small break (block schedule) or over two consecutive days with 45 minutes of instruction each (traditional schedule).

09 *Alignment to Standards*

These lesson plans, materials and activities align with:

19 TAC Chapter 113: Texas Essential Knowledge and Skills for Economics with Emphasis on the Free Enterprise System and Its Benefits

The modules can be taught individually or in groups in whatever order the Teacher prefers.

10 *How do I assess student learning?*

In the online portal, available for printing:

There is one quiz per unit with 10 multiple choice questions each.
There is one test per unit with 15 multiple choice questions each.
Student Activity Worksheets are also included with each unit.

CONTACT THE DEVELOPING TEAM

You can click on Contact Us on the http://TeachFreedomTX.org website to show our most updated contact information, or contact us directly at the Bridwell Institute for Economic Freedom at: http://smu.edu/bridwell-institute

PARADOX OF PROGRESS

TEACHING FREE ENTERPRISE

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BRIDWELL INSTITUTE
FOR ECONOMIC FREEDOM

PARADOX OF PROGRESS

INSTRUCTOR:
W. MICHAEL COX
SOUTHERN METHODIST UNIVERSITY

INTRODUCTION

This module focuses on two fundamental and interrelated aspects of America's free-enterprise system—first, how it delivers material progress and, second, why jobs and companies routinely disappear. A process of "creative destruction"— out with the old and in with the new—unites progress and job losses. Over time, economies that accept job losses will see greater economic progress. The module will feature activities that will show teachers how to engage students in exploring how innovation and new technology impact living standards and jobs.

GUIDING QUESTIONS

01 *What is the economic process that delivers progress in market economies?*

02 *What determines the path of economic progress?*

03 *What is the main reason for most job losses and business failures in America?*

04 *How do the human talents and skills needed in the workforce change over time?*

OBJECTIVES

Students will develop their own prediction of how the invention of a Star Trek-like transporter would affect existing jobs in the transportation/logistics sector as well as living standards.

Students will classify 20 jobs into the Hierarchy of Human Talents.

Students will estimate their potential earnings in the career they chose in the middle of the lesson and compare it with the 20 jobs in the Hierarchy of Human Talents exercise.

Students will describe a "new" technology and the need it served, then identify how people met that need prior to the innovation (before refrigeration, for example, the daily delivery of ice blocks to homes). Then, students will identify five types of jobs that became obsolete and five types of jobs that developed in the wake of the innovation.

SUGGESTED LENGTH

It can be divided into two 46 minute segments.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS / CHAPTER 118.4

§118.4

Economics	1	A, B, C
Economics	2	A, B
Economics	5	A
Economics	11	A, B
Social studies skills	22	A, C
Social studies skills	23	A, B, C, D, E
Social studies skills	24	A, B

KNOWLEDGE AND SKILLS

01 Economics. The student understands the concepts of scarcity and opportunity costs. The student is expected to:

a Explain why scarcity and choice are basic economic problems faced by every society.

b Describe how societies answer the basic economic questions.

c Describe the economic factors of production.

02 Economics. The student understands the interaction of supply, demand, and price. The student is expected to:

a Understand the effect of changes in price on the quantity demanded and quantity supplied.

b Identify the non-price determinants that create changes in supply and demand, which result in a new equilibrium price.

05

Economics. The student understands free enterprise, socialist, and communist economic systems. The student is expected to:

a describe the basic characteristics of economic systems, including property rights, incentives, economic freedom, competition, and the role of government.

11

Economics. The student understands key components of economic growth. The student is expected to:

a Analyze how productivity relates to growth.

b Analyze how technology relates to growth.

22

Social studies skills. The student applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology. The student is expected to:

a A nalyze economic information by sequencing, categorizing, identifying cause-and-effect relationships, comparing, contrasting, finding the main idea, summarizing, making generalizations and predictions, and drawing inferences and conclusions.

b Explain a point of view on an economic issue.

23

Social studies skills. The student communicates in written, oral, and visual forms. The student is expected to:

a

Use economic-related terminology correctly.

b

Use standard grammar, spelling, sentence structure, and punctuation;

c

Transfer information from one medium to another, including written to visual and statistical to written or visual, using computer software as appropriate;

d

Create written, oral, and visual presentations of economic information.

e

Attribute ideas and information to source materials and authors.

24

Social studies skills. The student uses problem-solving and decision-making skills, working independently and with others, in a variety of settings. The student is expected to:

a

Use a problem-solving process to identify a problem, gather information, list and consider options, consider advantages and disadvantages, choose and implement a solution, and evaluate the effectiveness of the solution.

b

Use a decision-making process to identify a situation that requires a decision, gather information, identify options, predict consequences, and take action to implement a decision.

BACKGROUND ON PARADOX OF PROGRESS

The paradox of progress refers to the process in capitalist systems that delivers higher living standards for most people while creating economic upheavals that hurt some industries, companies and workers. To be specific, the economic progress that we celebrate goes hand-in-hand with the job losses, bankruptcies and the diminished prospects that leave some people worse off in the short and medium term. Policies to alleviate or avoid the pain may save jobs and existing companies in the short term, but they will fail in the long run. New industries and jobs will be stunted, overall progress will slow and living standards will stagnate and eventually decline. A properly functioning capitalist economy routinely creates and destroys jobs as it delivers economic progress. Accepting job losses is how economies move labor and other resources to companies and industries that better meet the needs and wants of consumers.

Human beings are by nature inquisitive and creative, seeking better ways to meet consumers' needs and wants, but economic progress was glacially slow for most of human history. In societies with little innovation, living standards didn't change much from one generation to the next. Jobs lasted generations—passed on from parents to children. Over the past two centuries or so, first the Industrial Revolution and then the Information Age have accelerated the pace of technological change, particularly in the United States and other capitalist countries. The surge in technology has raised incomes and living standards dramatically and changed the nature of work. Indeed, the world has seen more economic progress in the past 200 years than it had in all previous recorded history. According to Angus Maddison's data, global per capita GDP rose from $467 in Year 1 to $666 in 1820; since then, it has jumped nearly 10-fold to about $6,000.

Innovation languished until the development and spread of economic systems based on private property, free exchange and market prices. In capitalist systems, profits and competition drive the economic process that delivers progress, providing powerful incentives to innovate and produce more efficiently. Increasing productivity—greater output from fewer inputs of labor and other resources—means that more and more consumers can afford a wider array of goods and services at lower cost (see Time Well Spent Unit).

Free enterprise gives consumers a pivotal role in determining the path of progress. Collectively, they have an endless list of needs and wants—from the basics of food, clothing and shelter to luxuries and status symbols. Consumers can meet more of these desires by taking advantage of the specialization and trade that emerges in markets. In a vibrant free-enterprise system, entrepreneurs will be constantly looking for new, better or cheaper ways of increasing consumers' welfare. Innovators don't know for sure what consumers want. They find out through a process of trial and error and a willingness to take risk. Some innovation won't catch on—i.e., they won't win consumers favor. Others will succeed by making consumers better off in big or small ways. In a free enterprise system, we are all free to take the risk that our innovation will do a better job of meeting consumers' needs and wants. In the end, though, it's the consumer who largely determines which innovations succeed and fail in the marketplace. Free enterprise produces large gains in living standards because it encourages constant innovation as new and existing firms compete for consumers' dollars.

New ideas, new products, new technologies, new forms of industrial organizations and new markets make most consumers better off; in the process, their spending gives rise

to new industries and new companies, creating better jobs for more and more workers. When consumers buy new, better or cheaper products, they spend less old goods and services, disrupting the established economic order and setting up the paradox of progress. Economist Joseph Schumpeter coined the immortal phrase "creative destruction" to describe how capitalism moves relentlessly forward by rewarding innovations that benefit consumers while roiling the existing economic order. Creative destruction's long-term effect on the overall economy is positive. Living standards rise for most people. But new, better and cheaper consumer goods and services destroys the industries, companies and jobs that no longer produce what consumers want to buy. Faster economic progress will produce more gains in overall living standards, but it means more lost jobs and bankrupt companies.

An understanding of the process of progress leads to the conclusion that most job losses and bankruptcies are a disruptive side-effect of the economic process that delivers progress. Transportation provides a dramatic, ongoing example of creative destruction at work. The introduction of the automobile sparked an upheaval in jobs, creating a multitude of new occupations: car designers, mechanics, and truck, bus and taxi drivers, to name just a few. The automobile's impact spilled over into other sectors of the economy. The oil industry, for example, created new jobs for geologists, roughnecks and refinery and pipeline workers. Nonexistent in 1870, the automobile industry, directly and indirectly, created millions of jobs in the U.S. economy. And soon after the automobile came the airplane, triggering yet another reshuffling of jobs.

The automobile and the airplane, however, weren't unalloyed benefits. They created unwelcome competition for established transportation industries— everything from the horse-and-buggy trade to railroads and water transport. Jobs disappeared by the millions. The country employed 109,000 carriage and harness makers in 1900 and 238,000 blacksmiths in 1910. Only a few thousand Americans make a living in these occupations today. In 1920, 2.1 million Americans earned their living by working for railroads, compared with just 231,000 today.

The transportation industry's experience has been repeated with thousands of innovations—farm machinery, telephones, television, computers, lasers, fax machines. The list could go on for pages, but it would show a common theme: innovation has always had the direct effect of creating new businesses and industries and the indirect effect of destroying many of the jobs in the existing industries that they eclipsed. The process frees labor in declining industries to produce more and better goods in new industries. In 1900, for example, it took nearly 40 of every 100 Americans to feed the country. Today, it requires just three of every 100. But the decline in farm jobs hasn't left the country hungry. Quite the contrary, the United States has enjoyed agricultural plenty and the creation of millions of industry and service jobs. The 37 of every 100 workers no longer needed on the farm moved on to provide new homes, computers, pharmaceuticals, appliances, movies, stock trades, video games, gourmet meals and an array of other goods and services. The result is a material abundance that wouldn't have been possible without labor released from farming. Despite a constant turnover in employment, the total number of jobs has expanded over time.

Not all job losses come from creative destruction. Natural disasters or inept management can put companies out of business. Government policies, including taxes and regulation, can make it too costly for some companies to continue employing as many workers. While these forces can destroy jobs, they don't produce any benefits for the economy. No economic progress means no paradox. These job losses are simply a loss to the economy. In Schumpeterian terms, there is no creative destruction—just destruction.

THE HIERARCHY OF HUMAN TALENTS

Advancements in technology don't just shape what we consume. They also affect how we produce, making human beings more productive while changing the very nature of work for most of the labor force. The key to the evolution of work is the tools humans have to use—that is, technology. In the Agricultural Age, with technology relatively primitive, the great bulk of the labor force tilled the soil and harvested crops using muscle power—human as well as animal. As farming became mecha-

nized, it devalued muscle power as machines proved more efficient at plowing, picking and other tasks. Fewer workers were needed to produce food, and humans moved on to another kind of physical work in Industrial Age factories. Efficient mass production entailed repetitive motion; it required workers manual dexterity and motor skills to pull the levers and push the buttons that controlled the machinery and equipment. The Industrial Age focused on physical inputs and output. It needed to inventory things, measure things and check boxes on forms—tasks requiring formulaic intelligence, the lowest wattage of brainpower. Once they became powerful enough and cheap enough, computers proved better than humans at the repetitive motions of assembly lines and the drudgery of paperwork. The Information Age devalued physical work and shifted the economy's driving force to mental activity. More and more people found jobs that put their capacity for analytic reasoning to use. As we go forward, the way we work will once again change as analytic reasoning's value ebbs and a different set of human characteristics rises to the fore—imagination, creativity, emotional intelligence, integrity. Over time, workers have been climbing the hierarchy of human talents, with each rung representing more highly developed human attribute. The U.S. labor force includes jobs at all levels. However, the array of opportunities, particularly for new jobs seekers, will be skewed toward the attributes at the top of the hierarchy.

01

What is the economic process that delivers progress in market economies?

In general, progress means higher living standards for most people. In capitalist systems, profits and competition drive the economic process that delivers progress, providing powerful incentives to innovate and produce more efficiently. These incentives spur producers to offer new, better and cheaper goods and services while trying to reduce costs and expand markets. This constant innovation raises living standards.

02

What determines the path of economic progress?

Free enterprise makes consumers the focus of innovation. New and existing companies are continually searching for ways to give consumers something new, better or cheaper. Innovators don't know for sure what consumers want. They find out through a process of trial and error and a willingness to take risk. In the end, though, it's the consumer who largely determines which innovations succeed and fail in the marketplace.

03

What is the main reason for most job losses and business failures in America?

A properly functioning capitalist economy routinely creates and destroys jobs as it delivers economic progress. Constant innovation creates competition for existing companies and industries. By taking business away from existing producers, new, better and cheaper goods and services destroy the jobs that no longer produce what consumers want to buy. Trying to preserve the threatened jobs will slow economic progress.

04

How do the human talents and skills needed in the workforce change over time?

The tools we have available (technology) shape the nature of work. The invention of machines that are better at productive tasks frees human beings to use more advanced skills on the job. With machine power to do the lifting and moving, jobs required less human muscle power, allowing more workers to move up to tasks that use manual dexterity and motor skills, then formulaic intelligence, then analytical reasoning, then the higher human characteristics of imagination, creativity, emotional intelligence, integrity.

SUGGESTED CLASSROOM PROCEDURES

01

WARM UP ACTIVITY: DISPLAY STAR TREK CLIP

Video Clip: 2:01 minutes
Section a: 5-10 minutes
Section b: 5 minutes
Section c: 3 minutes

Total: 15-20 minutes

Show students a video clip from the Star Trek television series or movie, with Capt. Kirk and his crew entering the Transporter and beaming down to some distant planet. Then ask students to imagine the invention of a technology that moves people and objects (freight) from one place to another instantaneously at little cost after the initial investment in the device itself.

a

Ask students to identify five or 10 current jobs that cheaper and faster transport will make obsolete—for example, truck driver or road-builder. For extra credit, have them use the Internet to find the number of people holding each of these jobs in the United States.

b

Ask students to imagine what new jobs might be created by the Transporter, starting with the technicians who build and service the new machines. Ask students to make an educated guess about the skill levels that would be needed for these new jobs.

c

Pose this question to students: Would invention of the Transporter be good or bad for most of us—that is, would cheaper and faster transport raise or lower average living standards.

Note: If the Transporter seems too far-fetched, the exercise can be done with another futuristic technology—for example, the self-driving cars.

https://youtu.be/QGNfrNJZin4

02

PAST DISRUPTION (10 MINUTES)

Choose an innovation from the past—the railroad, the automobile, refrigeration, the computer, motion pictures, recorded music or whatever else students find interesting. Ask them to describe the "new" technology and the need it served, then identify how people met that need prior to the innovation (before refrigeration, for example, the daily delivery of ice blocks to homes).

Then, ask students to identify five types of jobs that became obsolete and five types that grew in the wake of the innovation. By identifying both the losers and winners from each innovation, students will see the case for technological unemployment and the churn—new jobs rising, old ones waning. Finish the exercise by asking students how they thought the innovation they selected affected the lives of most people—in terms of convenience, health, safety, comfort, enjoyment.

WORKSHEET 1

03

TEACHER LED DISCUSSION: READ BACKGROUND INFORMATION (10 MINUTES)

Optional Flipped Classroom: have students read by pair the background information and teacher leads discussion with guiding questions.

04

FROM HORSE POWER TO HORSEPOWER: READING AND DEDUCTION ACTIVITY (15 MINUTES)

WORKSHEET 2

05

QUICK WRITEUP: WRITE DOWN THE PROFESSION OR JOB YOU ARE PLANNING TO ENTER. (2 MINUTES)

(Exit Ticket Day1 Traditional Schedule)

06

WARM UP: TEACHER HANDS BACK THE STUDENTS' PROFESSION OR JOB FROM PREVIOUS ACTIVITY. (5 MINUTES)

Review in Bureau of Labor Statistics Website (or Occupational Data Chart Provided in TFE Online Content) your profession or job and annotate the 1) OCC Code 2) Total # of Employed 3) Hourly Mean Wage.

WORKSHEET 3

Find your Occupation BLS Activity
http://www.bls.gov/oes/current/oes_nat.htm

(Warmup Day2 Traditional Schedule)

07

HIERARCHY OF HUMAN TALENTS (TEACHER LED): (10 MINUTES)

Show students the Hierarchy of Human Talents and describe each rung on the ladder. Then ask them to identify occupations that primarily require workers to use each of the hierarchy's innately human attributes: muscle power, manual dexterity/motor skills, formulaic intelligence, analytical reasoning and imagination/creativity. Does the bricklayer use the same skills as the programmer who created video games?

WORKSHEET 4

08

GROUP ACTIVITY: HAVE STUDENTS GROUP INTO 5 TEAMS BY EARNING QUINTILE OF THE PROFESSION OF THEIR CHOOSING. (10 MINUTES)

(BLS chart available online, make 3-5 class sets)

Initiate the discussion with the following statement:

Discuss with your classmates the classification according to the Hierarchy of Human Talents of the professions you have chosen, hypothesize why you think one profession is higher than the other in the scale and why even though there are some changes in income, the income potential is similar in these income earning activities according to the BLS.

Why do you think that the other teams' professions make more / less potential money?

09

TEACHER READS AND EXPLAINS TO CLASS THE FOLLOWING TEXT: (6 MINUTES)

Markets place different values on various jobs and professions. We know this from everyday experience—a doctor is paid a lot more than a truck driver, a professional athlete earns a lot more than waitress. Highly paid workers generally have relatively rare skills—i.e., few people can do these jobs well. The supply of doctors, for example, is small because it takes years of training to develop specialized knowledge of how to treat diseases. Entertainers, athletes and other, of course, may have natural talents that command big paychecks. However, higher pay is generally associated with more years of education. That is one way workers develop relatively rare skills.

By contrast, low-wage workers usually possess the same skills as many others who are looking for work. A lot of people are qualified to drive a truck or serve meals in a diner. Lower-paying jobs are usually associated with fewer years of schooling and usually don't require specialized knowledge and skills. It doesn't take all that much time and effort to qualify for many lower paying jobs, especially

when compared to a doctor. A large supply of willing workers keeps these workers' wages down.

Having relatively rare skills isn't enough. Consumers also have to highly value what the workers do, so they'll be willing to pay a lot for what the workers provide. Workers who make highly valued goods and services can produce a lot of revenue for each hour of work—i.e., their productivity is high. High productivity is associated with high pay. Many artists, for example, have rare skills, but they may not command much money because buyers don't see much value in their work.

Creative destruction occurs when innovations upset established ways of doing things. This can have major impacts on how markets value professions and jobs, disrupting careers. A good example comes from the telephone industry. Until around 1970, all long-distance calls required the services of telephone operations, and millions of Americans, mostly women, made a decent living routing calls to far-away places. Then companies developed automatic switches that could make connections without human interventions. Today, there aren't many telephone operators. Stenographers were another profession that fell victim to technological change. These workers—again, mostly women—were skilled at taking notes while executives dictated letters and other materials, then they'd type the documents up for the boss' signature. Today, computers, word-processing software, printers and e-mail handle most business correspondence. The stenographer went the way of the telephone operator.

All told, millions of telephone operator and stenographer jobs went by the wayside. Most of the women who held these jobs found other ways to make a living. They're sales representatives, administrators and many other things. The total number of jobs in the economy has increased by millions since the heyday of the telephone operator and stenographer. The asset to the economy is the worker, not the job.Markets place different values on various jobs and professions. We know this from everyday experience—a doctor is paid a lot more than a truck driver, a professional athlete earns a lot more than waitress. Highly paid workers generally have relatively rare skills—i.e., few people can do these jobs well. The supply of doctors, for example, is small because it takes years of training to develop specialized knowledge of how to treat diseases. Entertainers, athletes and other, of course, may have natural talents that command big paychecks. However, higher pay is generally associated with more years of education. That is one way workers develop relatively rare skills.

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10

GROUP DISCUSSION: (9 MINUTES)

Have students discuss the following questions in pairs and make each team read their answers/opinions regarding the following questions:

a *Is creative destruction something to be afraid of?*

b *If we understand it, what steps can we take when the process affects our professions?*

c *What can I do to be on the top of my income earning potential?*

Once every student team has had the opportunity to give their idea, open the floor for discussion and disagreement regarding the questions.

11

UNIT CONCLUSION AND REFLECTION: (5 MINUTES)

Students will speculate what possible disruptions (technological and otherwise) could change their income earning potential for their selected job/profession. They will write a short paragraph (5-10 sentences) on the results of their speculations and some strategies they need to keep in mind in order to maximize their income earning potential.

REFERENCES

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W. Michael Cox and Richard Alm, Myths of Rich and Poor, 1999.

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PARADOX OF PROGRESS

WORKSHEET 1 / PAST INNOVATION
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER (READ)
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER (ACTIVITY)
WORKSHEET 3/ HIERARCHY OF HUMAN TALENTS STUDENT

PARADOX OF PROGRESS
WORKSHEET 1 / PAST INNOVATION

DATE:_____

NAME:_____ **PERIOD/SECTION:**_____

Choose an innovation from the past— example: refrigeration

_____

(You may choose the railroad, the automobile, the computer, motion pictures, recorded music or whatever you find interesting).

Describe the "new" technology and the need it served.

_____

_____

_____

Now identify how people met that need prior to the innovation (before refrigeration, for example, the daily delivery of ice blocks to homes).

_____

_____

_____

Identify five types of jobs that became obsolete because of your chosen invention.

1_____

2_____

3_____

4 _____

5 _____

PARADOX OF PROGRESS
WORKSHEET 1 / PAST INNOVATION

And five types that grew in the wake of the innovation.

1_____

2_____

3_____

4 _____

5 _____

List 5 ways you think the innovation you selected affected the lives of most people—in terms of convenience, health, safety, comfort, enjoyment.

1 Convenience:_____

2 Health:_____

3 Safety:_____

4 Comfort: _____

5 Enjoyment _____

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

FROM HORSE POWER TO HORSEPOWER

BY **ERIC MORRIS**
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In 1898, delegates from across the globe gathered in New York City for the world's first international urban planning conference. One topic dominated the discussion. It was not housing, land use, economic development, or infrastructure. The delegates were driven to desperation by horse manure.

The horse was no newcomer on the urban scene. But by the late 1800s, the problem of horse pollution had reached unprecedented heights. The growth in the horse population was outstripping even the rapid rise in the number of human city dwellers. American cities were drowning in horse manure as well as other unpleasant byproducts of the era's predominant mode of transportation: urine, flies, congestion, carcasses, and traffic accidents. Widespread cruelty to horses was a form of environmental degradation as well.

The situation seemed dire. In 1894, the Times of London estimated that by 1950 every street in the city would be buried nine feet deep in horse manure. One New York prognosticator of the 1890s concluded that by 1930 the horse droppings would rise to Manhattan's third story windows. A public health and sanitation crisis of almost unimaginable dimensions loomed.

And no possible solution could be devised. After all, the horse had been the dominant mode of transportation for thousands of years. Horses were absolutely essential for the functioning of the nineteenth century city—for personal transportation, freight haulage, and even mechanical power. Without horses, cities would quite literally starve.

All efforts to mitigate the problem were proving woefully inadequate. Stumped by the crisis, the urban planning conference declared its work fruitless and broke up in three days instead of the scheduled ten.

SADDLED WITH THE URBAN HORSE

The horse pollution problem was not a new one. Julius Caesar banned horse drawn carts from ancient Rome between dawn and dusk in an effort to curb gridlock, noise, accidents, and other unpleasant byproducts of the urban equine. But conditions in the nineteenth century pushed the problem to new heights. First, America's urban population swelled by thirty million souls between 1800 and 1900. These new citizens needed to be fed, clothed, and sheltered using materials delivered by horse. Second, despite the fact that cities were expanding outward, the tidal wave of new residents sent density levels soaring; New York's rose from 39,183 per square mile in 1800 to 90,366 per square mile in 1900. Greater human crowding meant greater horse crowding as well, and problems that might have been tolerable in a sparsely populated rural region became unbearable in a densely packed urban one.

Not only was the absolute number of people rising; per capita reliance on the horse was rising as well. Living standards were skyrocketing—from 1800 to 1900, US per capita GDP rose from $1,148 to $4,676 (in 2000 dollars). This meant greater trade, and virtually all goods were, at some point in their journey, transported by horse. In ten major US cities, the number of teamsters rose 328 percent between 1870 and 1900, while the population as a whole rose only 105 percent.

At first glance, it might seem as if the railroad would have offered relief from the horse pollution problem. But in fact it exacerbated it. Railroads were as much a complement for horses as a substitute for them. Nearly every item shipped by rail needed to be collected and distributed by horses at both ends of the journey. So as rail shipments boomed, so did shipments by horse. Ironically, railroads tended to own the largest fleets of horses in nineteenth century cities.

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

This situation was made even worse by the introduction of the horse into an area from which it had been conspicuously absent: personal intra urban transportation. Prior to the nineteenth century, cities were traversed almost exclusively on foot. Mounted riders in US cities were uncommon, and due to their expense, slow speeds, and jarring rides, private carriages were rare; in 1761, only eighteen families in the colony of Pennsylvania (population 250,000) owned one. The hackney cab, ancestor of the modern taxi, was priced far beyond the means of the ordinary citizen.

This changed with the introduction of the omnibus in the 1820s. Essentially large stagecoaches traveling fixed routes, these vehicles were reasonably priced enough to cater to a much larger swathe of the urban population. By 1853 New York omnibuses carried 120,000 passengers per day. Needless to say, this required a tremendous number of horses, given that a typical omnibus line used eleven horses per vehicle per day. And the need for horses was to spiral even further when omnibuses were placed on tracks, increasing their speeds by fifty percent and doubling the load a horse could pull. Fares dropped again, and passengers clamored for the new service. By 1890 New Yorkers took 297 horse car rides per capita per year.

MAKING HAY: FEEDING THE URBAN HORSE

The consequences of the horse population boom were sobering. While the horse may be a charming and even romantic animal, when packed into already teeming and unsanitary cities its environmental byproducts created an intolerable situation.

Horses need to eat. According to one estimate each urban horse probably consumed on the order of 1.4 tons of oats and 2.4 tons of hay per year. One contemporary British farmer calculated that each horse consumed the product of five acres of land, a footprint which could have produced enough to feed six to eight people. Probably fifteen million acres were needed to feed the urban horse population at its zenith, an area about the size of West Virginia. Directly or indirectly, feeding the horse meant placing new land under cultivation, clearing it of its natural animal life and vegetation, and sometimes diverting water to irrigate it, with considerable negative effects on the natural ecosystem.

And what goes in must come out. Experts of the day estimated that each horse produced between fifteen and thirty pounds of manure per day. For New York and Brooklyn, which had a combined horse population of between 150,000 and 175,000 in 1880 (long before the horse population reached its peak), this meant that between three and four million pounds of manure were deposited on city streets and in city stables every day. Each horse also produced about a quart of urine daily, which added up to around 40,000 gallons per day for New York and Brooklyn.

The aesthetics of the situation require little editorial comment. Horse droppings were not only unsightly but their stench was omnipresent in the nineteenth century city. Urban streets were minefields that needed to be navigated with the greatest care. “Crossing sweepers” stood on street corners; for a fee they would clear a path through the mire for pedestrians. Wet weather turned the streets into swamps and rivers of muck, but dry weather brought little improvement; the manure turned to dust, which was then whipped up by the wind, choking pedestrians and coating buildings. Municipal street cleaning services across the country were woefully inadequate.

Moreover, thanks to the skyrocketing horse population, even when it had been removed from the streets the manure piled up faster than it could be disposed of. Manure makes fine fertilizer, and an active manure trade existed in the nineteenth century city.

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

However, as the century wore on the surge in the number of horses caused the bottom to fall out of this market; while early in the century farmers were happy to pay good money for the manure, by the end of the 1800s stable owners had to pay to have it carted off. As a result of this glut (which became particularly severe in summer months when farmers were unable to leave their crops to collect the dung), vacant lots in cities across America became piled high with manure; in New York these sometimes rose to forty and even sixty feet. Needless to say, these were not particularly beloved by the inhabitants of the nineteenth century city.

FILTH, FLIES, AND FATALITIES

The problem extended far beyond aesthetics. Though horse manure harbors tetanus spores, in and of itself it is not a major health risk. But a byproduct of it is. Horse manure is the favored breeding ground for the house fly, and clouds of flies hatched in it (one estimate is that three billion flies hatched in horse manure per day in US cities in the year 1900).

Vacant lots across America were piled high with manure; in New York these sometimes rose to forty and even sixty feet.

A fallen horse would be shot on the spot or abandoned to die, creating an obstruction that clogged streets and brought traffic to a halt. Flies are, of course, unsightly and annoying pests, and they are also potent disease vectors. Flies pick up bacteria and other pathogens on their feet, hairy appendages, and proboscides, then transmit them as they fly between filth and humans and their food. They also deposit germs through their feces and vomit. Flies transmit dozens of diseases, and studies have found that nineteenth century outbreaks of deadly infectious maladies like typhoid and infant diarrheal diseases can be traced to spikes in the fly population.

REIN OF TERROR: THE HORSE AND ACCIDENTS

Horses killed in other, more direct ways as well. As difficult as it may be to believe given their low speeds, horse drawn vehicles were far deadlier than their modern counterparts. In New York in 1900, 200 persons were killed by horses and horse drawn vehicles. This contrasts with 344 auto-related fatalities in New York in 2003; given the modern city's greater population, this means the fatality rate per capita in the horse era was roughly 75 percent higher than today. Data from Chicago show that in 1916 there were 16.9 horse related fatalities for each 10,000 horse drawn vehicles; this is nearly seven times the city's fatality rate per auto in 1997.

The reason is that horse drawn vehicles have an engine with a mind of its own. The skittishness of horses added a dangerous level of unpredictability to nineteenth century transportation. This was particularly true in a bustling urban environment, full of surprises that could shock and spook the animals. Horses often stampeded, but a more common danger came from horses kicking, biting, or trampling bystanders. Children were particularly at risk.

In addition, the vehicles themselves (especially the omnibus) presented safety hazards. They were difficult to brake, and the need to minimize friction meant that they required large wheels. These made for top heavy, ungainly carriages prone to capsizing, a problem exacerbated by winding street layouts. Moreover, drivers had a reputation for recklessness.

CLATTER AND CONGESTION

Other byproducts of the urban horse were less deadly but unwelcome nevertheless. The clatter of horseshoes and wagon wheels on cobblestone pavement jangled nineteenth century nerves. Many have blamed the noise created by iron horseshoes on hard pavement for the nervous disorders which seemed to plague cities far more than rural areas.

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

Congestion was another problem. Traffic counts indicate that traffic across the nation more than doubled between 1885 and 1905. Not only was the number of vehicles rising rapidly, but the nature of the vehicles themselves caused tremendous problems. A horse and wagon occupied more street space than a modern truck. Obviously, horse drawn vehicles traveled at very slow speeds, and horses, especially those pulling heavy loads or hitched in teams, started forward very slowly, a great difficulty in stop and go conditions. Streets of the era were not adequate to handle the traffic, and hills caused problems.

In addition, horses often fell, on average once every hundred miles of travel. When this took place, the horse (weighing on average 1,300 pounds) would have to be helped to its feet, which was no mean feat. If injured badly, a fallen horse would be shot on the spot or simply abandoned to die, creating an obstruction that clogged streets and brought traffic to a halt. Dead horses were extremely unwieldy, and although special horse removal vehicles were employed, the technology of the era could not easily move such a burden. As a result, street cleaners often waited for the corpses to putrefy so they could more easily be sawed into pieces and carted off. Thus the corpses rotted in the streets, sometimes for days, with less than appealing consequences for traffic circulation, aesthetics, and public health.

TAIL OF WOE: THE SAD LOT OF THE URBAN HORSE

Falls were not the only reason horses expired in the streets. One might think it would be in the interest of horse owners to keep their animals in good condition; a horse was a fairly large capital investment. But unfortunately, economics caused owners to reach quite the opposite conclusion. Due to the costs of feeding the animals and stabling them on expensive urban land, it made financial sense to rapidly work a small number of horses to death rather than care for a larger group and work them more humanely. As a result, horses were rapidly driven to death; the average streetcar horse had a life expectancy of barely two years. In 1880, New York carted away nearly 15,000 dead equines from its streets, a rate of 41 per day.

In addition to frequent whippings and beatings from drivers, urban horses faced another peril: the condition of the street surfaces. Paved streets were far more slippery than the dirt roads they replaced. They were especially slick when wet or frozen. Horses, shod in iron shoes providing poor traction, frequently lost their step and tumbled, often to their deaths.

STABLE CONDITION

All of these problems—the filth, flies, disease, and cruelty—came to a head in the nineteenth century stable. Stables were generally dark and lacked ventilation; some were rarely cleaned and reeked of excrement. Due to the expense of urban land, horses were crowded into them. This was not just uncomfortable; it was deadly as well, as it left horses open to the ravages of infectious disease. The Great Epizootic Epidemic of 1872 killed approximately five percent of the urban horses in the Northeast and debilitated many others. Transportation halted, food prices soared, goods piled up at the docks. Fire ravaged downtown Boston because there were not enough healthy horses to pull the fire trucks.

THE CAR BEFORE THE HORSE

Society eventually took action against the problem on numerous fronts. Henry Bergh founded the ASPCA in 1866 primarily to improve the lot of the urban horse. In the 1890s, Col. George E. Waring Jr. professionalized New York's street sweeping service with tremendous effect; his reforms were widely copied across the country. At the same time the electric streetcar usurped the horse's role as the primary mode for intra urban personal transportation. At the turn of the 20th cen-

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

tury, William Phelps Eno invented the rules of the road to reduce the number of accidents caused by horse drawn vehicles; he is credited with devising the stop sign, the stop light, the yield sign, the crosswalk, the pedestrian island, the one-way street, the traffic circle, and the taxi stand. In addition, he codified driving on the right side of the road.

But it would take one more innovation to end the problem once and for all. In the 1890s improvements in the internal combustion engine, legal and political developments which severely restricted the power of cities to regulate the types of traffic on their streets (won by bicycle advocates), the aforementioned invention of traffic rules, and smooth new asphalt street surfaces paved the way for the private automobile.

Enticed by high speeds, point to point travel and the flexibility to roam across the urban landscape, the public adopted the new innovation in droves. Contemporary observers calculated that cars were cheaper to own and operate than horse drawn vehicles, both for the individual and for society. In 1900, 4,192 cars were sold in the US; by 1912 that number had risen to 356,000. In 1912, traffic counts in New York showed more cars than horses for the first time. The equine was not replaced all at once, but function by function. Freight haulage was the last bastion of horse drawn transportation; the motorized truck finally supplanted the horse cart in the 1920s.

As difficult as it may be to believe for the modern observer, at the time the private automobile was widely hailed as an environmental savior. In the span of two decades, technology eradicated a major urban planning nightmare that had strained governments to the breaking point, vexed the media, tormented the citizenry, and brought society to the brink of despair. Yet, given the environmental problems that the automobile has brought, it is worth asking: was this a Faustian bargain?

HORSE POWER TO HORSEPOWER

In all probability the answer is no. Perhaps in total the negative externalities produced by the automobile are greater than the damage caused by the urban horse, but this is because the numbers of vehicles and the amount of travel have skyrocketed. Per vehicle and per mile, it seems highly likely that the environmental problems caused by the horse were far greater than those of the modern car. Horses even contribute to global warming: manure releases methane, a greenhouse gas eight times more potent that CO2.

The environmental triumph of the private automobile sheds interesting light on modern problems of transportation and the environment. Today, many observers believe that only a drastic reduction of travel and/or a switch to slower and more inconvenient modes can mitigate transportation's negative externalities. But neither draconian regulations nor disincentives for travel were necessary to fix the horse pollution problem. Human ingenuity and technology (enabled by government, which provided infrastructure and regulations) did the job—and at the same time they brought a tremendous concurrent increase in mobility. Of course, the technological solution brought externalities of its own, and our solutions for those externalities will undoubtedly introduce a fresh set of unexpected problems. But with determination and inventiveness, perhaps one day the environmental consequences of the private car will be as dim a memory as the horse pollution crisis of the nineteenth century.

PARADOX OF PROGRESS
WORKSHEET 2/ FROM HORSE POWER TO HORSEPOWER

DATE:_____

NAME:_____ **PERIOD/SECTION:**_____

Read the Article: From Horse Power to Horsepower By: Eric Morris
Then, write a List of Pros and Cons of Horses being used as the main means of transportation in a city.

	PROS	**CONS**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

PARADOX OF PROGRESS
WORKSHEET 3/ HIERARCHY OF HUMAN TALENTS

DATE:_____

NAME:_____ **PERIOD/SECTION:**_____

HIERARCHY OF HUMAN TALENTS

Advancements in technology don't just shape what we consume. They also affect how we produce, making human beings more productive while changing the very nature of work for most of the labor force. The key to the evolution of work is the tools humans have to use—that is, technology. In the Agricultural Age, with technology relatively primitive, the great bulk of the labor force tilled the soil and harvested crops using muscle power—human as well as animal. As farming became mechanized, it devalued muscle power as machines proved more efficient at plowing, picking and other tasks. Fewer workers were needed to produce food, and humans moved on to another kind of physical work in Industrial Age factories. Efficient mass production entailed repetitive motion; it required workers manual dexterity and motor skills to pull the levers and push the buttons that controlled the machinery and equipment. The Industrial Age focused on physical inputs and output. It needed to inventory things, measure things and check boxes on forms—tasks requiring formulaic intelligence, the lowest wattage of brainpower. Once they became powerful enough and cheap enough, computers proved better than humans at the repetitive motions of assembly lines and the drudgery of paperwork. The Information Age devalued physical work and shifted the economy's driving force to mental activity. More and more people found jobs that put their capacity for analytic reasoning to use. As we go forward, the way we work will once again change as analytic reasoning's value ebbs and a different set of human characteristics rises to the fore—imagination, creativity, emotional intelligence, integrity. Over time, workers have been climbing the hierarchy of human talents, with each rung representing more highly developed human attribute. The U.S. labor force includes jobs at all levels. However, the array of opportunities, particularly for new jobs seekers, will be skewed toward the attributes at the top of the hierarchy.

This also translates into wages as we can see in the following chart:

	2014 AVERAGE ANNUAL WAGES
INTEGRITY / HONESTY / TRUST / BRAND	
ANESTHESIOLOGISTS	$246,320
PHYSICIANS AND SURGEONS	$194,990
CHIEF EXECUTIVES	$180,700
ARCHITECTURAL ENGINEERS	$138,720
AIRLINE PILOTS AND FLIGHT ENGINEERS	$131,760
PEOPLE SKILLS	
PSYCHIATRISTS	$182,700
LAWYERS	$133,470
MARKETING AND SALES MANAGERS	$129,900
HUMAN RESOURCES MANAGERS	$114,140
FINANCIAL SERVICES SALESPERSONS	$103,260
IMAGINATION / CREATIVITY	
SOFTWARE DESIGNERS AND ENGINEERS	$101,863
ART DIRECTORS	$97,850
ARCHITECTS	$80,490
FASHION DESIGNERS	$73,690
WRITERS	$71,950
ANALYTIC REASONING	
ACTUARIES	$110,090
ELECTRONIC ENGINEERS	$97,460
FINANCIAL ANALYSTS	$92,250
MEDICAL SCIENTISTS	$90,160
COMPUTER PROGRAMMERS	$82,690

	2014 AVERAGE ANNUAL WAGES
FORMULAIC INTELLIGENCE	
LIBRARIANS	$51,110
TAX PREPARERS	$50,140
HEALTH TECHNICIANS	$47,520
BOOKKEEPERS	$38,070
SECRETARIES AND TYPISTS	$34,500
MANUAL DEXTERITY	
TOOL AND DIE MAKERS	$50,090
CONSTRUCTION EQUIPMENT OPERATORS	$47,340
LATHE OPERATORS	$37,370
BUTCHERS	$30,380
SEWING MACHINE OPERATORS	$23,990
MUSCLE POWER	
FISHING WORKERS	$36,280
GARBAGE COLLECTORS	$36,030
MATERIAL MOVERS AND LOADERS	$28,120
GROUNDSKEEPERS	$26,720
AGRICULTURAL WORKERS	$22,870

PARADOX OF PROGRESS
WORKSHEET 3/ HIERARCHY OF HUMAN TALENTS

Student Activity: Identify occupations that primarily require workers to use each of the hierarchy's innately human attributes: muscle power, manual dexterity/motor skills, formulaic intelligence, analytical reasoning, imagination/creativity, people skills and integrity/honesty/trust/brand.

Keep in mind a question like this:

Does the bricklayer use the same skills as the programmer who created video games?

Write 21 Professions in any order. Do not use the ones in the previous chart.

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____
9 _____
10 _____
11 _____
12 _____
13 _____
14 _____
15 _____
16 _____
17 _____
18 _____
19 _____
20 _____
21 _____

Now classify these professions by these human attributes: muscle power, manual dexterity/motor skills, formulaic intelligence, analytical reasoning and imagination/creativity, people skills and integrity/honesty/trust/brand.

Muscle Power	Manual Dexterity / Motor Skills	Formulaic Intelligence	Analytical Reasoning

Imagination/Creativity	People Skills	Integrity/Trust/Brand