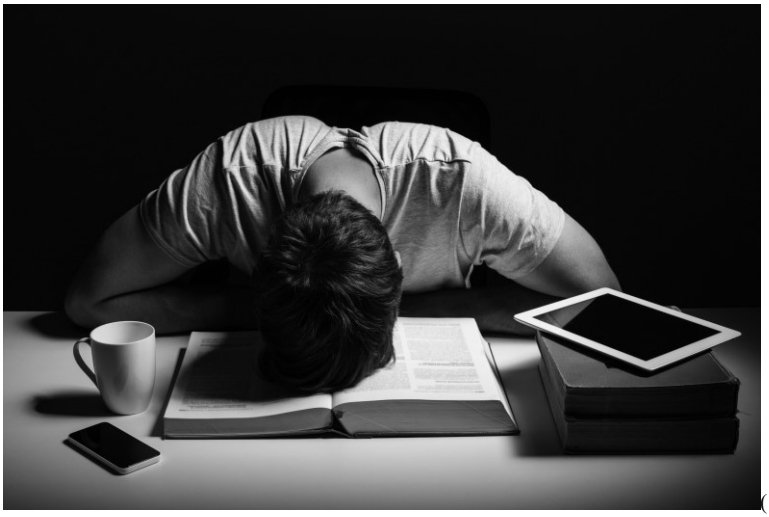
The

STEM Student Survival Guide

 (162)

Don’t let your kid go to college until you *both* read this book!

Leon Roomberg, MS, PMP, MDBA

“The Most Dangerous Man in Higher Education”

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Dedications

For Susan. Thirty-eight years of love, joy, and my ally against life's challenges.

For Catie, Skye, Zachary, Jerry, Justin, and Ryan. For bringing new perspectives and contentment into my life.

For the "Castaways" and my other friends and relatives who share my love of geeky conversation.

For Grandmom Sadie and her one relentlessly mind-warping "joke."

For the family and other friends who edited, respectfully criticized, and helped me make this a better book. (Especially Lisa and Ginny.)

And especially to the high school and college counselors, advisors, teachers, and administrators with the courage and honesty required to insist their students and parents read this book.

Leon J Roomberg

- ✓ First, understand there are people whose jobs, and institutions whose existence, depend on manipulating your actions.

- ✓ Second, understand that most of the people who will teach in your classroom are underpaid and not incented to focus on your success.

- ✓ Third, understand that there are actions you can take to ensure your own success despite your immersion in a corrupt and incompetent education system.

About the Author

Growing up prior to the popularization of the term “ADHD,” teachers classified Leon Roomberg as “trouble.”

Due to financial challenges, he attended six different colleges intermittently. He earned Bachelor and Master degrees from the University of Bridgeport, certifications in Project Management and Database Administration, then attended doctoral courses at three different colleges.

Leon is fortunate to have had many mentors including his father, Gerald “Jerry” Armon Roomberg, David Hess, Brad Calcagni, Lou Krassen, Bill Korn, and Beryl Wolk.

Leon has four decades of technical, managerial, and executive experience, serving companies large and small, hiring more than a hundred people in both intern and professional roles, mentoring more than a dozen. He founded several small businesses and maintained a non-profit counseling practice.

Leon lives in New Jersey, with his wife and love of his life, Susan. They have four grown children, two son-in-laws, three grandchildren, and two Bedlington Terriers. (Bedlingtons are the best breed of the known universe.)

It was during more than two dozen father-son college tours that the ideas for his book, “The Stem Student Survival Guide,” took form.

Teachers still think he is “trouble.”

Errata (Errors and Corrections)

Recognized Errors, Corrections, Missed Acknowledgments, and Apologies made after publication of this edition can be found at www.thestemstudentsurvivalguide.com/errata**.**

If you find something I need to correct or otherwise atone for, please send your suggestions by using the web page,

www.thestemstudentsurvivalguide.com/feedback.

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CONTENTS

Attention Parents & Students:

Not Everything is Bad

In the following pages, you will read a "whole lot of bad stuff" about mistreatment of students by colleges.

My research shows that this mistreatment occurs in the majority of the more than 3,000 U.S. colleges, including elite schools, state schools, private schools, and even community colleges.

However, that same research uncovered more than 150 colleges where small groups of teachers are taking action to reduce some of these abuses. There are even some "pockets of excellence" hidden within some colleges whose overall behavior toward STEM students is abusive.

I am sure there are other colleges that are taking such actions quietly, out of sight of the press. By the time you read this, perhaps your college (or prospective college, or former college) will have done so as well. Maybe even some of the colleges I call out by name in the book.

Before you trust your time and money and future debt to any college, you need to ask a few relevant questions.

This is not a book about condemning an entire industry because of "a few bad apples." It is about actions you can take to succeed in getting your degree despite an imperfect system.

CHAPTERS
FOR
STUDENTS & PARENTS

Introduction

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Are you thinking of a career in STEM (**S**cience, **T**echnology, **E**ngineering, **M**ath, or **M**edicine)? My friend, if you are a student, the education system is stacked against you. This book shows students and their parents what they are up against and how to succeed despite a corrupted university system. Colleges take your tuition, provide inadequate education, and then blame the students when forty to sixty percent of them fail out in the first two years, resulting in student financial losses and sometimes-permanent damage to individual self-esteem.

In the immediate term, this book provides strategies on how to **select less incompetent schools** and then how to succeed in them despite the level of incompetent education you will experience. From **course selection to course scheduling**; from **selecting your peers and study groups** to **selecting your tutors**, this book gives you strategies to be part of the fifteen to twenty percent who graduate in six years or less and graduate without forfeiting your college aid. For these reasons alone, high school juniors, seniors, college students, and their parents, need to read this book before making decisions about college they will regret for the rest of their lives.

In the medium and longer term, this book includes a roadmap of how to fix what is broken for those college administrators, lawmakers, and regulators, who possess the courage to do so.

As a business person who learned to "Manage by Exception," I wrote this book by focusing on solving problems. Do not let those challenges discourage you from a STEM education. The rewards to you and to society far outweigh four to six years of personal and financial stress.

This book addresses big issues and promotes a number of tactics that students (and their supportive families) can use to increase the odds of academic success. Not every tactic applies to everyone. If I make an observation or suggest a tactic that conflicts with your world-view, just leave it aside and embrace those that make sense for your situation. I get enough hate mail as it is and understand that change upsets people. If you can disagree without being disagreeable, I welcome your comments and suggestions for improvements in future editions of the book at **www.thestemstudentsurvivalguide.com/feedback**.

About the phrase “fail out.”

Wherever in the text you see the phrase “fail out,” it refers to students that have not just failed a course, but have been voluntarily or involuntarily removed from the STEM program they chose to study. Some students will then pursue an “easier” path in the Liberal Arts or Business. Some will drop out of college, often taking with them lower self-esteem and a lifetime of college debt.

One of my editors hates this phrase. However, it is the shortest yet clearest way I have found to describe this preventable and obnoxious result of our corrupt educational system.

About the terms “school,” “college,” and “university.”

In this book, these terms are used interchangeably. They refer to institutions that grant bachelor’s degrees.

If I am referring to “High School” or “Graduate School,” I will not use informal abbreviations.

Motorcycle Kits

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Imagine there is a club of people, who drive and enjoy highly specialized off-road motorcycles originally sold as kits. The club members appear to be smart, but not necessarily smarter than you, or your parents, or most of your friends. You decide to join the club.

You visited various dealerships who each claimed they offered the best experience for buying the kits for this highly specialized off-road vehicle. Some dealers have gourmet coffee lounges. Some have kitchenettes in their lounges. Some have gyms in the back where you can pass the time waiting for your motorcycle kit delivery. Some sponsor sporting events to entertain you during your free time.

You finally select the dealer who made you feel most at home and said you were ready to buy the motorcycle kit. The

salesperson agrees to sell you this motorcycle kit under two conditions. First, you must take a basic mechanic's course. Then, you must score highly on an exam. These steps assure the dealer that you are competent and have the skills to assemble the kit.

You took the prerequisite course and the exam and your grades in both were high enough that the salesperson consented to sell you that vehicle for between $50,000 and $200,000, depending on the features of a given model.

From the beginning, you struggled to assemble the vehicle. While the salesperson said they would grant you some office visits and maybe even some extra tutoring, their bottom line message was that if you could not assemble the motorcycle, then you must be too dumb, or too lazy, or maybe the required prerequisite course you took really didn't teach you what you needed to know.

After two years of hard work, you gave up. The salesperson said you are not entitled to any kind of refund or credit toward another purchase because they do not give refunds to people who are too stupid, or too lazy, or too ill prepared to assemble their motorcycles.

You did a little research on the web and found that depending on the dealer, between forty and sixty percent of their customers were never able to assemble their motorcycles. No dealer ever admitted to selling a defective product.

In addition, of the motorcycle buyers who succeeded in assembling their motorcycles, the majority took five or six years to do so, despite the dealers' beautiful web sites and brochures explaining how to complete the assembly in only four years.

(Also, the costs buyers actually paid went up by as much as fifty percent by taking five or six years to complete assembly.)

After all, depending on the dealer, between forty and sixty percent of their customers succeeded in assembling their motorcycles. So of course, the problem must be with customers who are too stupid, or too lazy, or too ill prepared.

What does this have to do with a STEM education? Oh boy.

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Helicopter Parenting vs. Partnership Parenting

In recent years, there has been a lot of press about "Helicopter Parents."

> **helicopter parent**
>
> **1.** The bane of the dean's existence. The parent who hovers and flaps his wings while the kid lives in his shadow. Particularly prevalent at high-priced colleges, where parents feel obliged (or entitled) to intervene on issues down to the candlepower of the lightbulbs.
>
> Yes, helicopter parent, your intentions are good, but that rotor of yours is causing a din.--Felix Carroll, Albany Times Union, January 27, 2005
>
> **2.** Parents that hover over their children, hawkishly "helping" them face the college learning scenario. It is debated whether or not parents that hover are good or bad for their child's overall development.
>
> From the Urban Dictionary [135]

Some frustrated educators have expressed that that the Helicopter Parents' "hovering" is in itself what is delaying their offspring from maturing from adolescents to young adults.

There are two reasons this concern is misplaced. (And why the information here is the concerned parent's tool (weapon?) to insure their child successfully graduates from college.)

First, there is our evolving understanding of the brain development process.

> … the BBC reports that British psychologists have established new medical guidelines for the end of adolescence, moving the age of entry into adulthood from 18 to 25 years of age.
>
> In part, the new British guidelines were informed by neurobiology, specifically the relatively recent discovery that the prefrontal cortex of the brain does not fully mature until age 25. The prefrontal cortex governs executive functioning; decision making, problem solving, understanding future consequences, and impulsivity. If this area of the brain is not grown up until 25, it makes sense that the years of the early twenties are [now understood to be] the final stage of adolescence. (136)

Second, as discussed in later chapters, about half of all STEM students will fail out within twenty-four months. They will fail out not because they did poorly in high school; in fact, they did well. They will fail out not because they had poor SAT scores; in fact, they were well above average. They will fail out not because they are lazy or stupid; in fact, they spent more than double the time of their liberal art majoring peers on homework.

They will fail out because the majority of colleges in the U.S. abuse their students with incompetent practices and then blame the students when they fail. Through a partnership that includes both parent and student, actions can be taken to increase the odds of success.

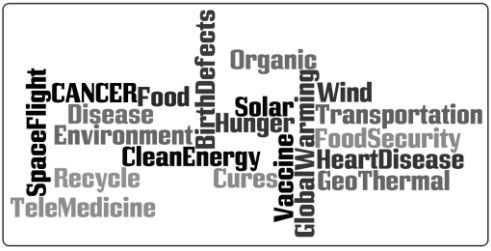
It is for these reasons that parents need to read this book first and then **partner** with their kids to plan on succeeding despite a system that is set up to fail about half of their students.

One of my editors was concerned about the "voice" of the text. When should it speak to parents? When should it speak to students? Both parents and students need to read every section. Then they can partner in the great and unexpectedly expensive adventure that is college.

Why College for a STEM Career?

Assuming your personality and intellect are a match for whatever career you are studying for, here are my list of the most important reasons to pursue a STEM career:

1. It's What Society Needs



We need scientists to invent cures for diseases, invent less expensive energy that does not harm the environment, create clean drinking water, grow healthy food, and figure out how we are to deal with Global Warming. We need Engineers and Technologists to turn those discoveries into practical solutions. We need Health Care Providers to take care of an aging population.

In short, while we also need Liberal Arts and Business majors, we desperately need more STEM professionals. That is why we compensate them so well for putting up with such an expensive, stressful, and incompetent educational system.

Despite all of these positive reasons, the number of people successfully completing STEM college programs is barely increasing. As reported in the New York Times (and originally in Investors' Business Daily):

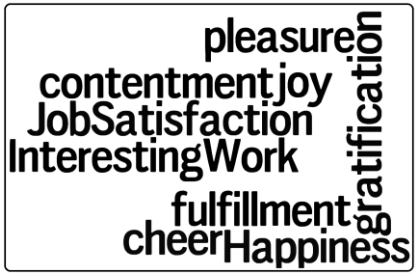
> Over the past 25 years, the total number of students in college has increased by about 50 percent. Nevertheless, the number of students graduating with degrees in science, technology, engineering, and math (the so-called STEM fields) has been flat…
>
> If students are not studying science, technology, engineering, and math, what are they studying? In 2009, the United States graduated 89,140 students in the visual and performing arts, more than in computer science, math and chemical engineering combined and more than double the number of visual and performing arts graduates in 1985. [34]

2. Money

With few exceptions, most STEM careers pay more money than most careers resulting from a Liberal Arts or Business education.
While money isn't everything in life, it does help with food, clothing, shelter, insurance, internet, educating one's children, and the ability to write a check when a family member is in need or a public disaster causes the Red Cross to beg for donations. Money may not buy happiness, but it sure can prevent or resolve a lot of misery.

Adopted from Anthony P. Carnevale, Nichole Smith, Michelle Melton, STEM *Endnote* (104)

3. Job Satisfaction & Happiness



If your passion is to teach art or English, please do so. However, there are thousands of careers that fall under the STEM umbrella that make people happy while spending their workday solving problems that help the economy, and/or society, and/or the environment.

Murray Nichol of The World Economic Forum published a study titled, "*Are These the World's Best Jobs?*" [109] In the study, people in various professions were surveyed as to how happy they are with their job and with their work/life balance. Look at the following diagram and you will see that the majority of jobs with happy workers are in fact, STEM professions:

What People Who Enjoy Their Jobs Earn

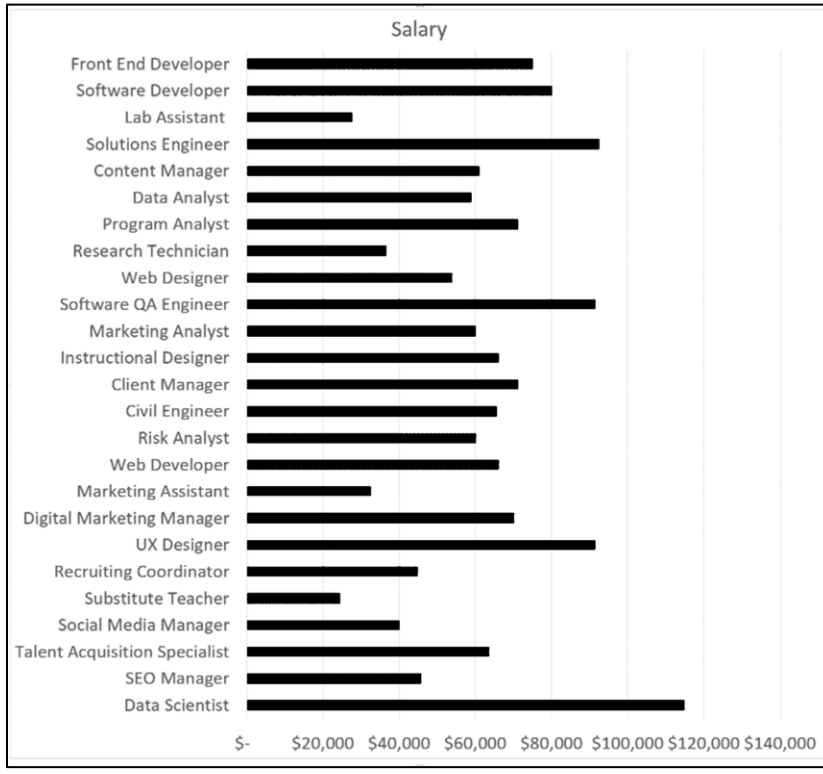
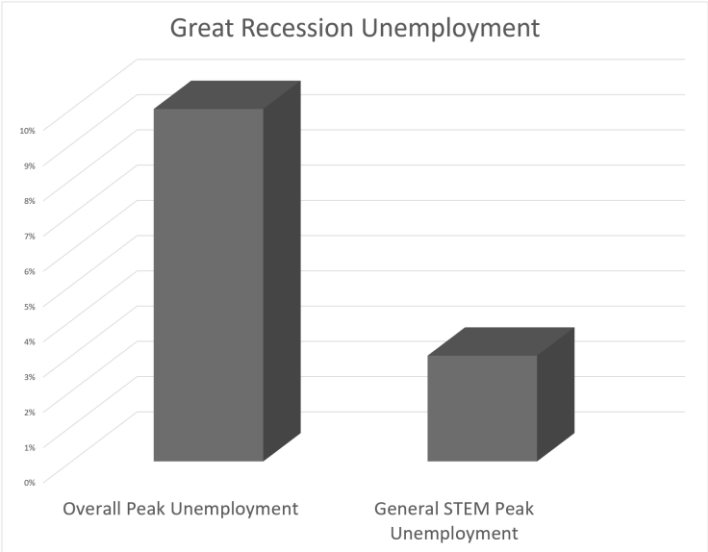


Chart Endnote [109]

The chart shows that while money is not everything (lowly paid Substitute Teachers and Marketing Assistants are included), that the vast majority of people on this list of happy people have STEM careers.

4. Job Security

The Great Recession officially lasted from 2007 through 2009. For many, the changes in the economy meant multiple years of unemployment. However, this was not generally the case for most people in STEM professions. In most locales, the STEM unemployment rarely exceeded two per cent and even then, STEM professionals willing to relocate usually found well-paying replacement jobs fairly quickly.



5. Career Launch

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The well-spoken young woman who waits on me at my favorite bagel shop has a Liberal Arts degree in Marketing with a specialization (but not a major) in statistical analysis. She earns little more than minimum wage and has few benefits.

With absolutely no experience, the starting salary for STEM graduates in the most popular fields START between $55,000 and $70,000 per year and most increase every year thereafter. A STEM education often costs roughly the same as a Liberal Arts education. Consider this: 36% of 18- to 31-year-olds were living at home in 2012. How many of these were STEM graduates struggling to pay their student loans? I bet not many. If the young woman in question had reversed her concentrations and majored in Math and minored in Marketing, her income would probably be doubled (or better) than what she currently earns.

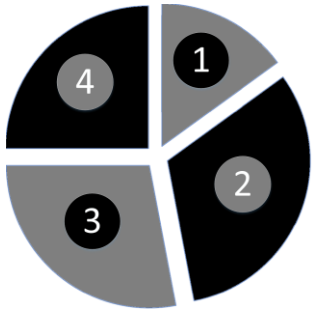
Consider, for a moment, the state of Massachusetts. The state's two and one half million households have the second highest per-capita income in the United States, (125) trailing only

Connecticut. Of the state's six and one half million residents, [126] five and one-half million are of working age. [127] The state has low unemployment. [128] Why? The state has the highest percentage of residents with a college degree as compared to the other 49 states. Thanks to the reputation of the Massachusetts Institute of Technology (among others), the state is a magnet for companies employing STEM professionals. As a result, residents of that state suffered less during the recession than almost anywhere else.

We know about high wages paid to STEM graduates. What about everyone else? More than 800,000 workers in Massachusetts earn less than $11 per hour. (Of these, about 330,000 workers earn less than $9 per hour.) [90]

The real shock comes when we examine the composition of the low-wage work force. One in four have some type of college degree while 28% have at least some college.

About Half of Low-Wage Workers Have Attended College



1. Less than High School 15%
2. High School Degree 32%
3. Some College 28%
4. AA,BA, or Higher 25%

Source: Adapted from Economic Policy Institute analysis of Current Population Survey, Outgoing Rotation Group, 2011-2012. Chart Endnote [90]

I wonder how many of those low-wage college graduates will ever pay off their student loans, leave their parents' homes, marry, and buy their own home.

There is a lot that is wrong with STEM education that this book exposes. Do not get too discouraged. The reasons above should be reason enough to take the suggestions here on how to succeed.

There are always exceptions

I have a son-in-law who has a liberal arts degree who is working to create clean drinking water, grow healthy food, and figure out how we are to deal with Global Warming. The existence of people like him and Steve Jobs and others who did not obtain STEM degrees only mean that for exceptional people, there is always a way to pursue goals that address these problems.

However, if you do not have the combined intellect and luck of a Steve Jobs, then pursuit of a STEM profession gives you great odds of both personal financial rewards and service to humanity.

Attention non-STEM students and parents

This book is not about "putting you down". Many of my undergrad studies were general liberal arts and business courses. The same goes for much of my graduate course work.

Both of my daughters and both of their husbands studied Liberal Arts. Each of them are making contributions that are more substantial to our society than I ever will.

This reason this book focuses on the STEM community is the inexcusable failure rates among STEM students. (But if you get some benefit out of the recommendations, or want to respectfully suggest an improvement or correction for a future edition, drop me an email and let me know at www.thestemstudentsurvivalguide.com/feedback)

Assumptions

From the student's perspective, this book gives you the tools to succeed within the STEM educational system as it is today.

The book does not challenge in any way that the curriculum or standards for STEM majors as defined by nationally recognized and accepted organizations. If the authorities say that your major requires Calculus III or Organic Chemistry, then so be it.

The book assumes that for most STEM courses, there either currently exists or can easily be developed, exams that are independent of any one institution that can be accepted by regionally and professionally accredited organizations as proof of mastery for most courses.

The book assumes that the existing graduation requirements for any given STEM major should not change.

The book assumes that teachers successfully improve the quality of education they provide when given reasonable metrics, feedback, workload, and compensation.

Lastly, the book assumes our educational system goal should be to graduate as many fully qualified STEM students as possible.

More than Two Dozen College Tours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Neither of my daughters needed any help from me in selecting a college. Skye, discovered Prescott College in Arizona. Prescott turned out to be the perfect vehicle for someone committed to serving humanity and the environment through an incredible Liberal Arts education. She later selected the University of New Mexico for her Masters and SUNY (the State University of New York,) for her Ph.D. studies. Catie, also went to Prescott and the school was a perfect fit for her commitment to serving humanity and the environment as well.

Zachary is my oldest son. He is a computer and math whiz. He was open to researching and touring colleges as a father-son adventure. Jerry is a chemistry, math, and business whiz. Four years younger than Zach, he too was open to jointly touring and discussing the merits of various colleges.

I thought I was in a good position to be of help in this adventure. Over the last 35 years, I have hired and/or managed more than 200 people. Most of those jobs were for technology positions that required college backgrounds. I learned which colleges, especially those in the North-East states, generally sent me graduates prepared for the challenges of the workplace.

In addition, my own nineteen-year journey of part-time college enabled me to experience one or more courses at eight different colleges. That meant experiencing the recruitment process at each of those colleges as well.

I changed my major more than once and including graduate school, took more than sixty courses. (I subsequently took more than 20 courses at technical trade schools in programming, database administration, network administration, and operating system administration.)

If anyone could help sniff out good colleges for technology positions, who was in a better position than me?

We visited more than a dozen state colleges in five different states on both sides of the country. We also visited more than a dozen private colleges in those states.

So here, in one chapter, you get to experience the essence of more than two dozen college tours.

Most colleges have online reservations for tours. Your tour-guide will often be an outgoing and enthusiastic junior or senior who has been trained on where to take you and what to discuss. With good timing, you will be able to sign up to tour with families of similar majors.

Most of what you see on your tour will have nothing to do with the quality of education. Instead, your tour usually focuses on the quality of campus life. On our tours, I discovered:

- The outdoor swimming pools and indoor exercise rooms at the University of Arizona would be acceptable to most millionaires.

- School spirit at Penn State and Rutgers is incredible.
- The variety of athletic offerings at Lafayette includes Frisbee Golf.
- Some schools have house cleaners who will not only clean your dorm, but will take your dirty laundry as well.
- The cafeteria at Rowan (at least during the week) serves a wonderful variety of both healthy and comfort food. (In time, Jerry came to disagree with this statement.)
- The engineering and chemistry labs at many of these schools display millions and millions of dollars of impressive-looking equipment.
- The number of schools with recently built engineering or chemistry buildings that cost more than sixty million dollars to create is truly impressive.

(Side rant because I can't wait for later)

If the education provided by these schools were equivalent, then perhaps any of the above items would be legitimate reasons to choose one college over another. However, the quality of STEM education at even the most well-known of these schools varies wildly.

What difference does it make that one school has better food or school spirit if they have STEM failures of between forty and sixty percent?

"Oh no," you may think. "Not my son or daughter. My offspring is intelligent, hardworking, well adjusted, and motivated. They graduated in the top quarter of their high school class and scored in the top quarter of SAT exams in the country. I bet the STEM failure students are in the bottom half of their high school classes."

Mom and Dad, I have bad news for you. The STEM students in general are from the top half if not the top third of their high school classes. They generally did well on their SAT exams. The problem is NOT with the kids. It is with a defective educational offering that abuses about half of the kids in these programs.

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At some point on every tour, you will sit through a presentation and slide show about your particular program. I have now experienced more than two dozen such presentations.

In every presentation, the professors and administrators do their best to welcome you and make you feel welcome at their school. After all, each student represents between $50,000 and $200,000 of revenue. (Once you add in room, board, books, entertainment, and miscellaneous charges, this is the true range of college prices for a four-to-six-year bachelor's degree.)

You will see slides and videos of kids in the classroom, kids on the ball field, and kids in the library. You may hear from energetic students who testify how wonderful their college career has been to-date. You are hearing from motorcycle kit salespeople who are often omitting the real experiences of the majority of students in their STEM programs who are in the process of failing out or have already failed out.

Before I unfairly condemn an entire profession, there were a few presentations where the professors or deans tried in a tactful, albeit subtle manner, to be honest about what they were selling. There were several colleges whose deans knew that their educational offerings were better than their competitors' offerings. Those deans made clear and convincing arguments as to why.

I took copious notes at each of these presentations. What follows is a paraphrased consolidation of the best speeches from the deans of the best colleges. I have added some warnings based on research that is more recent. No college has every advantage listed here. Not every dean admitted every listed deficiency. But you are about to learn in a few minutes of reading what took me more than forty-eight days of on-site college visits to learn.

While the speeches were targeted toward engineers, chemistry, and computer science majors, they apply equally well to almost every STEM profession.

The Deans' Consolidated Speech

(*The following speech is a fictional consolidation of the speeches my sons and I heard during our college tours. The speech that follows is written as if presented by a truthful, open, and honest dean of one of the better colleges*.)

Parents and prospective students, welcome to our university and associated colleges. You have already heard from some of our professors and current students. Now it is my turn.

I would like to be able to tell you that our curriculum is better than our competitors' curriculum. I would like to be able to tell you our teachers are better than our competitors' teachers. I would like to be able to tell you that we have a better library and better research facilities than at any of our competitors. However, if I told you any of these things, I would not be telling you the truth.

Standardized Curriculum

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Here, then, is the truth. Our college is regionally accredited. More importantly from your perspective, professional authorities accredit our various STEM programs. National bodies set the curriculum for most of our engineering, science, technology, and medical majors many years ago. As a result, there is little difference between colleges in the courses offered.

For example, to earn a bachelor's degree in Electrical Engineering, the student will take ten courses each year for a total of forty courses over four years. In each year, there may at most, one or maybe two "elective" courses as opposed to the eight or nine other courses they will take. The list of all of those courses is on our web site. Our list of courses will generally match the offerings of all the other regionally accredited universities for your major.

If a student majors in Electrical Engineering and minors in Math as we recommend, the three Math courses will replace the

electives and the course load will be almost identical no matter where your student attends.

Similar Quality of Instruction

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With regard to the teaching staff, every school will tell you that they think their teachers are the best. In fact, the standards for those teachers are very high and set by the same national accreditation body. All colleges are competing in the same job market to hire the most qualified teachers.

There is no shortage of qualified teachers. According to the Economist magazine, ninety percent of teachers with doctorates who desire a full-time tenured teaching position never get that position because of the enormous over-supply of qualified professionals. (50)

Do not focus too much on how most schools brag about their professors. Part-timers, graduate students, and full timers who wish they were tenured professors, teach most of the classes across the nation.

The national accrediting organizations set the rules for everyone's libraries and research facilities so there is often no real difference to your educational outcomes there either.

The Marketing Pitch

So, some schools will sell you on applying to them not because they have the best education, but because they represent they offer a "typical" education coupled with great recreation, delicious food, great school spirit, and other amenities to pamper their students.

That may be good enough for them, but in our college, there are differences in the education that I am going to reveal to you today.

What You Are Actually Paying For

[*The fictional dean's speech continues.*]

Depending on the college you attend, each of those forty courses will cost about the same amount of money no matter the class size. (Yes, four credit courses technically cost more than three credit courses, but for our discussion, we divide the four-year cost by the forty courses.) When you factor in room and board, books, and the revocation of aid and scholarships that I will tell you about later, most state colleges cost about $2,000 per course and at our private college, the cost is about $4,400 per course.

Depending on the university in question, the percentage of STEM students who fail out or drop out in the first two years typically ranges between forty and sixty percent.

Almost all regionally accredited colleges are selective on who we admit to our programs so our freshman classes are generally composed of well-educated and well-prepared students.

When I say fail out or drop out, that does not mean that all those who do are so discouraged that they never graduate from college. Many will start again in an easier program such as business or Liberal Arts and finish in six or seven years.

However, to fail out during the first two years can be an expensive learning experience. Depending on how many semesters it took to drop out, the financial loss can be between $25,000 and $125,000.

Unfortunately, some of those who drop out will be so discouraged that they will never complete college in any form. Statistically speaking, those dropouts will generally earn low wages and struggle with their student loans for decades to come.

I am going to illustrate several items that set this college apart from many others. These items are the reasons our success rate of freshman who graduate with degrees in engineering is often close to the sixty percent level of better colleges. If you are doing your job as a responsible consumer, you will ask about these three items on every college tour you take.

Hands-on Involvement

[*The dean's speech continues.*]

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The first differentiator that makes our college, so wonderful is more hands-on involvement. The classes, including the required labs, are set in the standard curriculums for each major. Typically, most STEM students at other universities will have between two and three hours per week of lab time. At our college, when not in class or participating in some sports activity, you will spend much of the rest of your time in some campus lab putting your classroom exercises into physical (hands-on) work.

Your first week of class as a freshman here, you will be given a welder's mask and safety instruction. ***Our*** freshmen spend a self-reported ***AVERAGE*** of ten to fifteen ***hours per week*** welding model steel bridges, or building robots, or concrete canoes, or any number of other hands-on activities in our labs.

STEM courses are tough. However, lots of hands-on work by students in labs is important. That activity helps convey difficult concepts. At the same time, that activity keeps up morale by simulating the fun part of real-world work. Daily extensive lab time is one of the reasons our school is so effective.

When touring those state colleges with the regionally and professionally accredited programs, you may find the multi-million-dollar engineering labs are awe-inspiring. Ask your guide how much time undergrads spend with hands-on work in those labs. In many, the truthful answer is that those pretty labs are for graduate students and their professors only. The actual labs open for undergrads to use are often be insignificant and toy-like in comparison, and access limited to a few hours per week during official lab time. Just think, some of those great schools with great reputations and school spirit report lab time of only two to three hours per week. The colleges who compete with us should all be ashamed of themselves. [*The dean's speech continues.*]

No Lecture Halls for STEM Students

The second differentiator has to do with class size. STEM classes are challenging and compared to other majors, have high failure rates. Our students deserve the help and attention of their teacher.

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Really, how much learning is really accomplished in a lecture hall?

We Have Plenty of Income

(We just have interesting spending priorities.)
[*The dean's speech continues.*]

With 40 students, a state college earns about $80,000 of total revenue (includes tuition, room, board, state and federal funding, corporate donations, and endowment contribution) per course and a private school such as ours earns about a $160,000 of revenue per course. Even if half of that money has to pay for

dorms, food, and recreation, there appears to be plenty of money to pay for the teacher, the use of the school building, and the cost of school administrators. With all this revenue, there should be funds for graduate students to tutor those who need help.

Most full-time teachers teach three courses in the fall and three courses in the spring. That means the annual revenue attributable to each teacher at a public university is about $480,000 and almost a million dollars a year at private schools such as ours.

The Competitors vs. Us

[*The dean's speech continues.*]

Let us look at how many of our competitors are teaching. Some of the most famous state schools in our area will provide up to half of the 20 courses in the first two years in a lecture hall format. Lecture halls often have 300 to 500 students.

Even in a school with only 200 students in a lecture hall, what kind of help is available to individual students? Help from Graduate Students! That is what your money pays for at other colleges.

The majority of classes taught at many colleges are taught by part time teachers and graduate students who may or may not be competent teachers. As most are paid poverty level wages, how much time outside of class do you think they make available to their struggling students? [Editor- The claims in this paragraph are documented later in this book.]

At 200 students, state schools get almost a half million dollars in tuition for each lecture hall class and private schools like ours get over a million tuition dollars per lecture hall class. This means the students who pay for lecture hall classes pay just as

much money, but receive a tiny fraction of attention they would receive in a regular classroom.

What kind of failure rate do you expect from a class with forty students as compared to class with two hundred to six hundred students?

I wish I could tell you that our university has no lecture hall classes. In fact, the Liberal Arts and Business students have many. However, this is not the case for our STEM students. Even in a crowded course, there will never be more than forty-four students in a classroom and for most courses, even less than that.

Class size caps and no lecture hall classes for STEM students, are other reasons our students fail less frequently than at other colleges. [Dear reader, the claims in the above paragraph were made by only two out of all the colleges we toured.]

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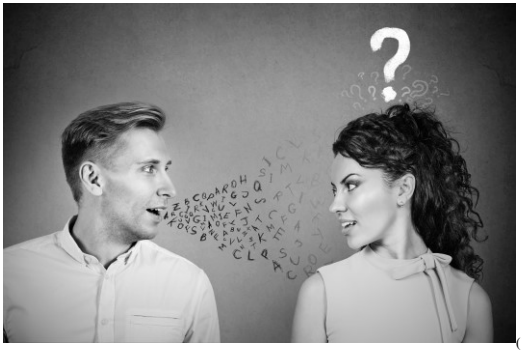
Above: Lecture Hall vs. Class Room – Same Price!

Two colleges; each are teaching the same course; and each charge the exact same tuition. One presents the course in a lecture hall with hundreds of students. One teaches the course in a classroom with twenty-two students. Can you guess which college fails 60% of the class and which college typically fails less than 10%?

College English in College Classrooms

[*The dean's speech continues.*]

 (162)

The third differentiator is that our teachers are fully and completely competent in conversational English. This may seem like an obvious requirement for courses taught in the United States, but a quick scan of student complaints on websites like "RateMyProfessor.com" shows that for many students, the teacher's English language skill deficiencies meant the tuition paid for a course was a complete waste of money. Unlike some other colleges, we value fame in the world of research in no way as compensating for deficiencies in teaching skills. We believe that English fluency is the most important of those skills.

If you are paying between two thousand and six thousand dollars to take a course at a college, shouldn't you be able to demand a teacher who speaks English at a college level of proficiency?

Actual Full-Time Professional Teaching Staff

[*The dean's speech continues.*]

In most colleges in the country, part-timers or graduate students teach the majority of classes. When full time (tenured, tenure track, and non-tenure track) professors teach undergraduate

courses, they frequently teach in large lecture halls. At our college, our policy is in most classes to employ people whose full-time and only job and only passion is who teach you.

Summing Up the Differentiators

[*The dean's speech continues.*]

Ten to fifteen extra hands-on lab hours a week; class caps with no lecture halls; teachers that can actually speak the language and whose full-time passion is to teach. Without these, you risk increasing your odds of failure and the resulting financial loss and depression to as much as sixty percent or even greater.

Oh, About Your Scholarships…

[*The dean's speech continues.*]

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You would think that this is the end of my lecture. I feel an obligation to be straight with all of you about another topic. If I did not speak about the fact that most of you will have your student aid and scholarships revoked, I might be guilty of lying by omission. Hold on to your seats. Some real "truth in advertising" is coming your way.

Colleges offer some degree of scholarship or a grant aid to almost everyone who applies to both state and private STEM programs. The aid makes families with stressed finances feel they can afford the education and from a psychological

perspective, makes the applicant feel truly wanted by the college in question.

Remember my repeated observation that depending on the school, between forty and sixty percent of STEM students fail out within two years. I did not tell you about those who hang on with passing grades.

STEM students experience much tougher grading than Liberal Arts and Business students do. (36)

Take a look at the difference in Average Grade Point Average (GPA) as reported by PrepScholar.com:

Major	Average GPA
Education	3.36
Foreign Language	3.34
English	3.33
Music	3.30
Religion	3.22
Biology	3.02
Psychology	2.98
Economics	2.95
Engineering	2.90
Math	2.90
Chemistry	2.78

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Keep in mind the Averages in the table, two thirds of merit scholarships at Tulane University are forfeited if the student's GPA falls below 2.7. One third are forfeited when the GPA falls below 3.0. Consider that the average GPA for a Chemistry major is a 2.78 and Math and Engineering majors are 2.9, that translates to almost half of those who did not fail out losing their scholarships. [138]

Perhaps you have been accepted at Wayne State University where most scholarships are lost when a student's GPA falls below either a 3.0, a 3.3 or a 3.5; [139] (or Auburn University, Louisiana State University, Stockton State University, the University of Central Florida or Arizona State University, where the scholarship retention floor is 3.0, [145] [140] [141] [142] [143])

If you think you can recover from one bad semester, it depends on the college. Auburn University's Scholarship Guidelines explicitly state that scholarship retentions (a) require at least a 3.0 cumulative, unadjusted Auburn GPA, (b) GPAs of 2.99 are not rounded to 3.0, and (c) scholarship reinstatement is not available even if the student achieves a 3.0 cumulative unadjusted GPA in a later term. [145]

(Not every college is so unfair. Texas A&M University does not cancel your scholarship until your GPA falls below a 2.0. [144] The University of Washington will place you on probation if your GPA falls below 2.0 and will allow you to average future semesters with better GPAs to retain your scholarship. [146])

A student who does not fail out and instead is still onboard even after seeing the majority of their peers fail out, may need to voluntarily withdraw anyway if the family finances truly depend on retaining student aid.

Most STEM students will have a tough first or second semester and lose their aid. This is why some colleges can award many times more in aid than they have money to give. **They do this because they know darn well that most of those scholarships will be cancelled within a few semesters as in some cases, only one scholarship in five will need to be paid in full.**

One more thing you need to know…

The Big Transferability Lie

[*The dean's speech continues.*]

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Some schools with general accreditation do not have accredited Engineering, Healthcare, or Science programs. Instead, they represent that they have a "partnership" with another college that IS accredited for the STEM major of your interest. In their presentations, they will sell you on attending their "pre-engineering" or "pre-med" programs where their students can transfer to their partner school after two years and complete their STEM degree.

If you are considering such a program, I encourage you to tour the partner school. When you get to the "question and answer"

session at the end of the presentation, just ask a simple question. Ask them how many transfer students from the first school they actually accepted in the current year. In many cases, the number will be so low as to be shocking.

There is a state college that we "partner" with. Last year, that college graduated about three hundred "pre-engineering," "pre-science," and "pre-med" students with associate degrees who then applied to transfer to our college. Out of the three hundred, we accepted twelve transfer students. Twelve! After all, we only have so much room for transfers.

Time for Truth in the Cost of College

Before I go, we need to discuss the true cost of college. Every parent I meet with budgets for a four-year adventure for their child's bachelor's degree. I already made clear that for probably eighty percent of you, your scholarships and other aid will be lost by the end of the second year if not the first.

For most of you, the true cost of your child's education is going to be higher. Much, much higher. In a study of 580 public four-year institutions, only 50 graduated the majority of their students in four years. [(111)] **For the mathematically challenged, that means less than nine percent earn their diploma in four years**. Even at many of the best, most prestigious universities that draw the best-qualified students, the four-year graduation rate is only thirty-six percent. [(111)]

If our nation truly had an effective "truth in advertising" law, we would call them "six-year schools" or even "six to eight years if you are lucky to graduate at all" schools.

Assuming your child makes it through to graduation, budgeting for five or six years of college is probably a more honest way of

understanding the true cost of this adventure for most. Again, your five or six-year budget should assume the loss of your aid.

Is all of this scary and concerning? Sure it is. By facing these unpleasant facts, you can take steps to reduce horribly unpleasant surprises down the road.


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With that, I encourage you to enjoy the tour of our new multi-million-dollar stadium!

[***The dean's speech has ended.***]

Dear reader, come back off the ledge. All is not lost. There are solutions and they are forthcoming in this book.