

Career Paths: Graduate School vs. Job



Gary M. Scott

Department of Paper and Bioprocess Engineering



Tappi Student Summit
Raleigh, NC
20 January 2013



State University of New York
College of Environmental Science and Forestry

Casey Kick, *M.S. Graduate Student*

Western Michigan University

- M.S. Chemical Engineering, (*expected Dec. 2013*)
- B.S. Chemical Engineering, *Energy Management* (2011)
- B.S. Paper Engineering, *Process Engineering* (2011)
- Minors: Chemistry, Math

Experience

- 2010-Present: Chemical Engineering Teaching Assistant
- 2010-Present: Chemical Engineering Assistant Lab Manager
- 2010-2012: Research Assistant in Causticizing Catalysis
- Summer 2011: Ashland Technical Sales Intern (Ohio)
- Summer 2012: Ashland Technical Sales Intern (Nevada)
- 2008: Verso Paper Process Engineering Co-op
- 2006-2009: WMU Coating and Paper Pilot Plants

Certifications

- Fundamentals of Engineering (Chemical)
- Yellow Belt Six Sigma
- Kaizen Leader, Lean Manufacturing, Value Stream Mapping, 5S

Clubs and Activities

- AIChE WMU – Chapter President
- Tau Beta Pi –Chapter Vice President
- Ts'ai Lun/TAPPI/Pima WMU Student Chapter
- Engineering Study Abroad - Beijing and Shanghai, China



Casey Kick, *M.S. Graduate Student*

■ Scholarships

- 2011 Engineering Society of Detroit (ESD) Student Engineer of the Year
- 2011 WMU Presidential Scholar Award
- 2011 WMU College of Engineering Outstanding Student in Paper Engineering
- 2011 WMU CEAS Engineering Week Scholar
- 2011 Chemical Engineering Endowed Scholar
- 2010-2011 TAPPI William L. Cullison Scholarship
- 2010 TAPPI Paper and Board Divisional Scholarship
- 2010-2011 Armstrong Energy Management Scholarship
- 2009 Robert Caine Outstanding Student Award for Paper Engineering
- 2006-2011 PTF Scholarship and Honors Scholarship Recipient



**Paper Technology
Foundation, Inc.**
Western Michigan University

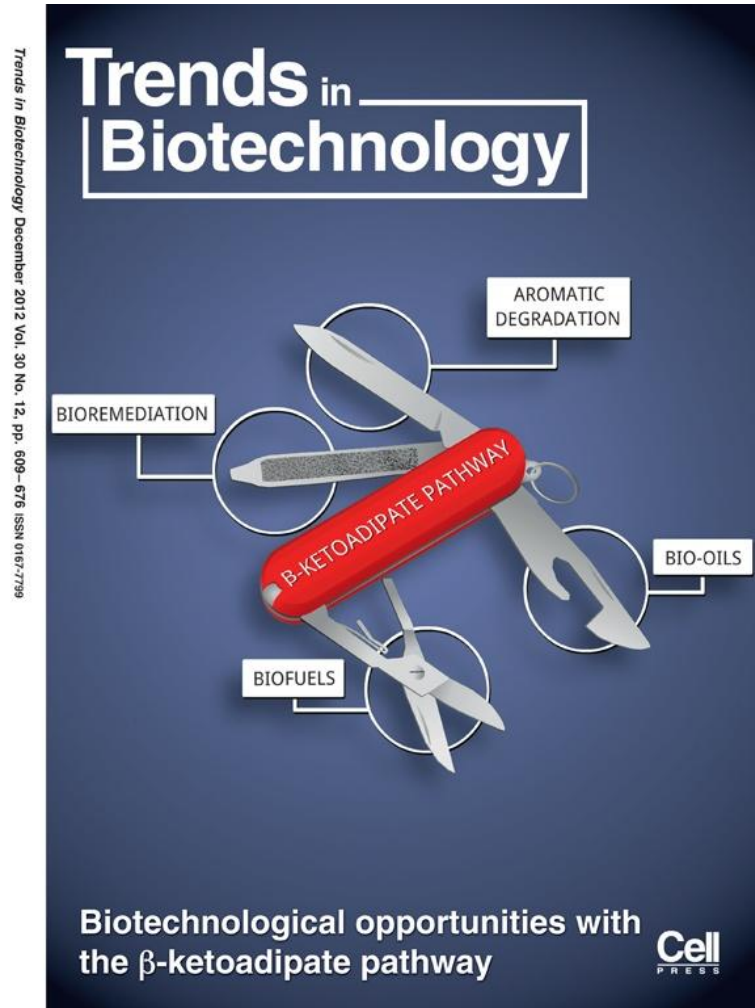
Tyrone Wells, Jr. *Ph.D. Graduate Student*

•Academic Background

- Ph.D. Biochemistry (*expected 2014*), Georgia Institute of Technology
- B.S. Chemistry (2008), Columbus State University

•Experience

- 2009 Biochemistry Teaching Assistant
- 2011-2013 Research Assistant in Lignocellulosic Bioconversion to Biodiesel
- Summer 2013-2014 Visiting Research Assistant developing Lignin-based Carbon Nanofibers in Gothenburg, Sweden



Christopher Wood,

Ph.D. Student

- **Education**

- **SUNY-ESF**
Ph.D., Paper and Bioprocess Engineering (2014)
- **Syracuse University**
M.S., Mechanical and Aerospace Engineering (2011)
- **SUNY-ESF**
B.S., Paper Engineering (2009)

- **Experience**

- **2002-2013: Senior Research Aide, SUNY-ESF**
- **2008: Pulp Mill Intern, NewPage, Inc.**
- **2007-2008: Consultant, Halifax Global**
- **2006-2007: Engineering Intern, O'Brien & Gere**

- **Publications**

- **Wood, C.D., Amidon, T.E. and Liu, S., “Membrane Separation of Hardwood Autohydrolysis Extracts for Production of Bio-Based Chemicals and Fuels,” PAPTAC Paper Week 2008 Conference Proceedings.**
- **Wood, C.D., Amidon, T.E., “Economic Analysis of a Forest Biorefinery at a 1000 T/Day Pulp & Paper Mill,” Available From SUNY Research Foundation from 2007 Forest Biorefinery Conference.**
- **Amidon, T.E., Wood, C.D., “Membrane Separation of Acetic Acid from Wood Hydrolyzate,” ESPRA Research Report, No.120, 2004.**
- **Liu, S., Lu, H., Lei, Y., Wood, C.D., Amidon, T.E., Liang, B., Sun, R., Scott, G., Nichol, D., Ward. A., (2013), Separation of Hemicellulose by Hot-Water Extraction from Woody Biomass, In Stuart, P.R., El-Halwagi, M.M., Integrated Biorefineries Design, Analysis, and Optimization, Taylor and Francis Group**

Philip E. Slesinski,

Process Engineer

- **Education**

- Western Michigan University
B.S. Paper and Chemical Engineering (2012)
Minor in Mathematics

- **Experience**

- 2013-present: Process Engineer, International Paper
- 2012 : Process Engineering Intern, International Paper-Ticonderoga Mill
- 2009-2011: Technical Services Intern, Graphic Packaging International
- 2011: Process Engineering Intern, International Paper-Ticonderoga Mill
- 2009-2010: Printing Pilot Plant Intern, Western Michigan University
- 2009: Process Engineer Co-op, Verso Paper
- 2008: Quality Control Laboratory Technician Intern, Rock-Tenn Company

- **Certifications**

- Six Sigma Green Belt
- Kaizen Leader, Lean Manufacturing, Value Stream Mapping, 5S

- **Clubs and Activities**

- WMU TAPPI Chapter - President
- WMU AIChE Chapter - Member



Jesse Ward,

Account Manager

- **Education**

- **University of Kentucky**

B.S. Chemical Engineering, (*material and polymer focus*) (2003)

- **Experience**

- **2012-Present: Account Manager, Food Packaging Market, Nova Chemicals**
- **2010-2011: Sales Representative, Missouri Territory, ColorTech, Inc USA**
- **2007-2010: Technical Service Representative, Film and Flexible Packaging, ColorTech, Inc USA**
- **2003-2007: R&D Engineer, ColorTech, Inc USA**

- **Professional Development**

- **Human Capital Development, Teamwork and Professional Training**
- **Sandler Sales Training, New Approaches to Effective Sales**
- **Blown Film Extrusion**
- **Morristown Chamber of Commerce Leadership Class, Teamwork and Professional Training**

Emily Tomes,

Account Manager

- **Education**

- **Western Michigan University**
B.S. Chemical Engineering, (*minor in Paper Engineering*) (2010)

- **Experience**

- **2011-Present: Account Manager, Ashland Water Technologies**
- **2010-2011: Technical Sales Representative, Ashland Water Technologies**

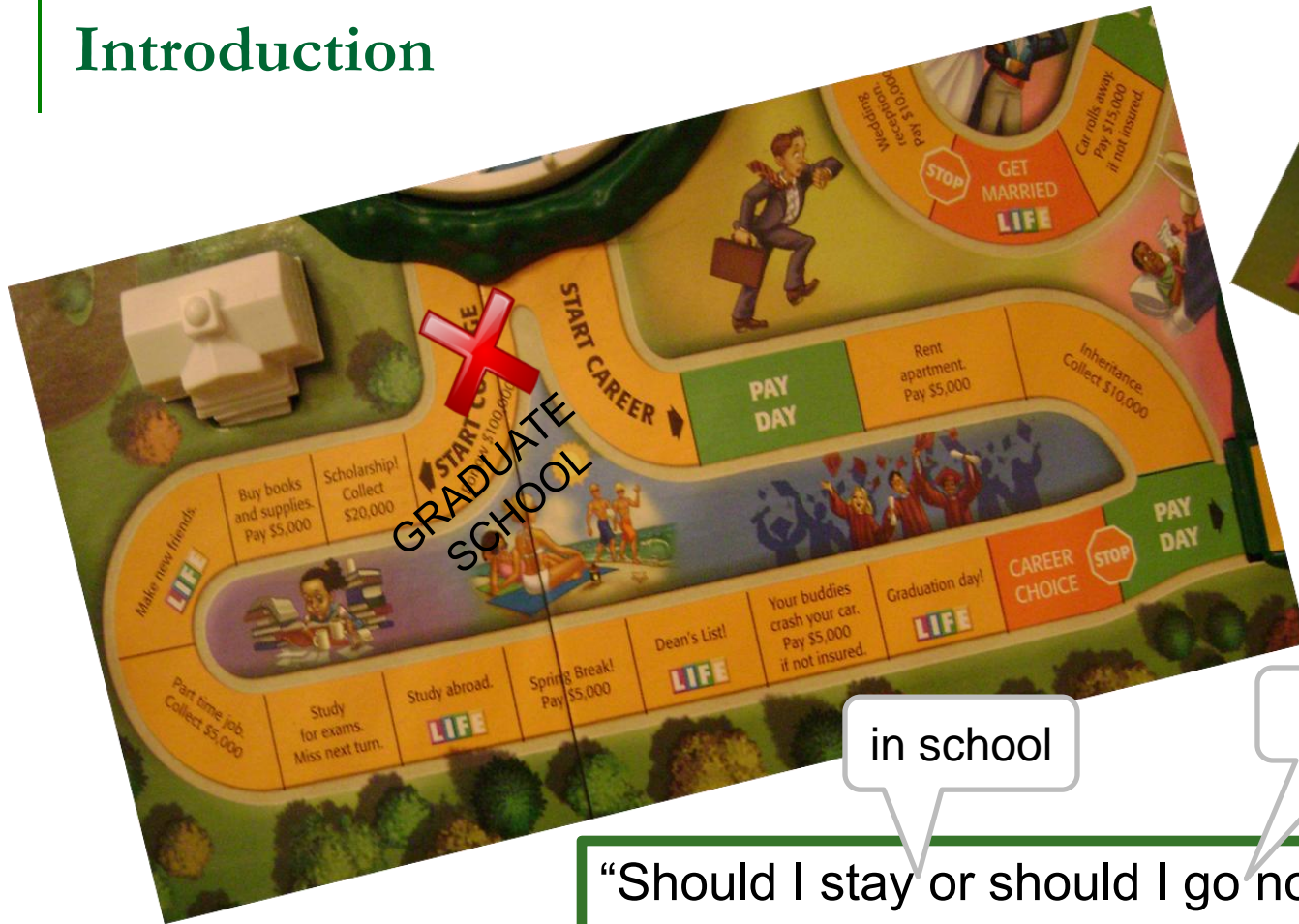
- **Internships**

- **Western Michigan Pilot Plants**
- **Arvco Containers**

Sources of Data, Information, and Advice

- National Science Foundation
 - www.nsf.gov
- Bureau of Labor Statistics
 - www.bls.gov
- Monster.com
 - www.monster.com
- Academic Keys
 - www.academickeys.com
- The Game of Life
 - www.hasbro.com
- The Clash
 - Joe Strummer, Mick Jones, Paul Simonon, Terry Chimes, Topper Headon, Keith Levene
 - www.theclash.com
- Meat Beat Manifesto
 - Jack Dangers, Marc Adams, Craig Morrison, Jonny Stephens
 - meatbeatmanifesto.com

Introduction

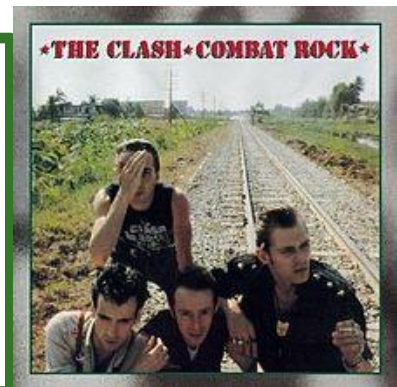


in school

to work

1 to 10 years!

“Should I stay or should I go now.
If I stay there will be trouble;
If I go it will be double.
So come on and let me know;
Should I stay or should I go.”



Graduate School Considerations

- Advanced degrees
- Career opportunities
- Post-Doctoral Fellowships
- Economics of advanced degrees
- Timing of graduate school
- Locations
- Fields of study
- Other considerations

Graduate Degrees

➤ Academic Degrees ➤ Professional Degrees

- Thesis-based
- Usually with coursework

Master of Science (MS)

Doctor of Philosophy (PhD)

- Coursework-based
- Often with practicum, internships, or professional experience

Master of Science (MS)

Master of Professional Studies (MPS)

Master of Engineering (MEng)

Professional Science Masters (PSM)

Master of Business Administration (MBA)

Doctor of Medicine, etc. (MD)

Juris Doctor (JD)

Doctor of Education (EdD)

Doctor of Divinity (DD)

Workforce Demographics

Percent of workforce

Highest Degree	All Occupations	Chemical Engineers	Registered Nurses	Taxi Drivers
<AS	58.1%	7.1%	6.6%	80.0%
AS	8.8%	3.7%	37.4%	6.7%
BS	20.8%	58.7%	42.5%	12.3%
MS	8.4%	23.4%	10.1%	2.5%
PhD	3.9%	7.0%	3.0%	0.6%
	41.9%	92.9%	93.4%	20.0%

(www.bls.gov, 2011)

Career Opportunities

➤ PhD

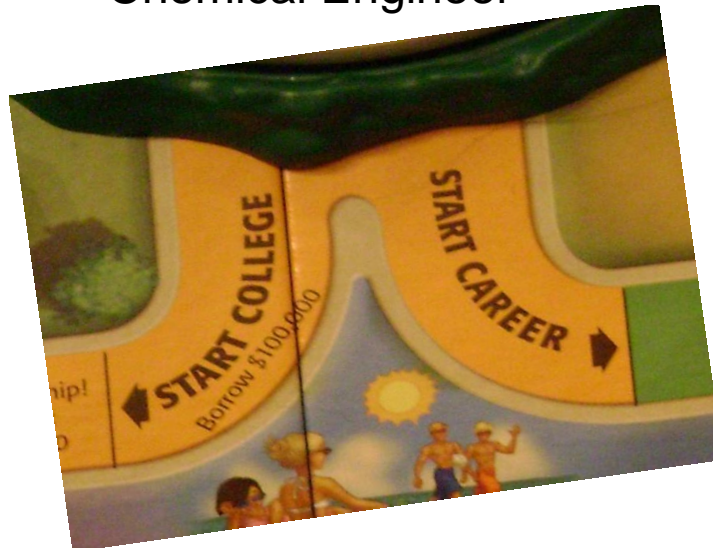
R&D Engineer
Research Engineer
Senior Engineer
Staff Engineer
Sr. Software Engineer
Operations Research Engineer
Principle Engineer
Process Technology Engineer

➤ MS

Design Engineer
Fuel Reforming Engineer
Senior Engineer
Biomechanical Engineer
Composites Engineer
Chemical Engineer

➤ BS

Engineer III
Senior RAN Engineer
Senior Advanced Engineer
Lab Engineer
MES Engineer
Process Engineer



(www.monster.com :
search on “engineer”)

Career Opportunities

Degree	Monster.com	AcademicKeys.com
BS	>1000	
MS	616	1024
PhD	126	

*“Career opportunities are the ones that never knock.
Every job they offer you is to keep you out the dock.
Career opportunities, the ones that never knock.”*



Economics of Graduate School

Chemistry Majors

Assumptions

Starting salary

HS: \$21,500

BS: \$36,000

MS: \$51,800

PhD: \$75,000

Annual increase: 4%

Inflation rate: 3%

Time in school

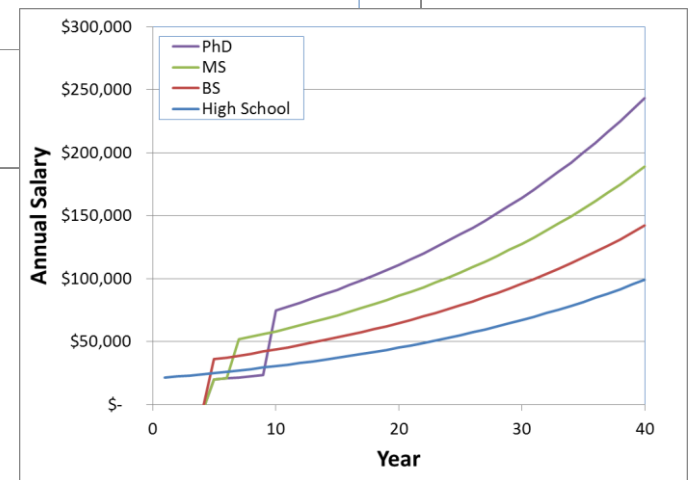
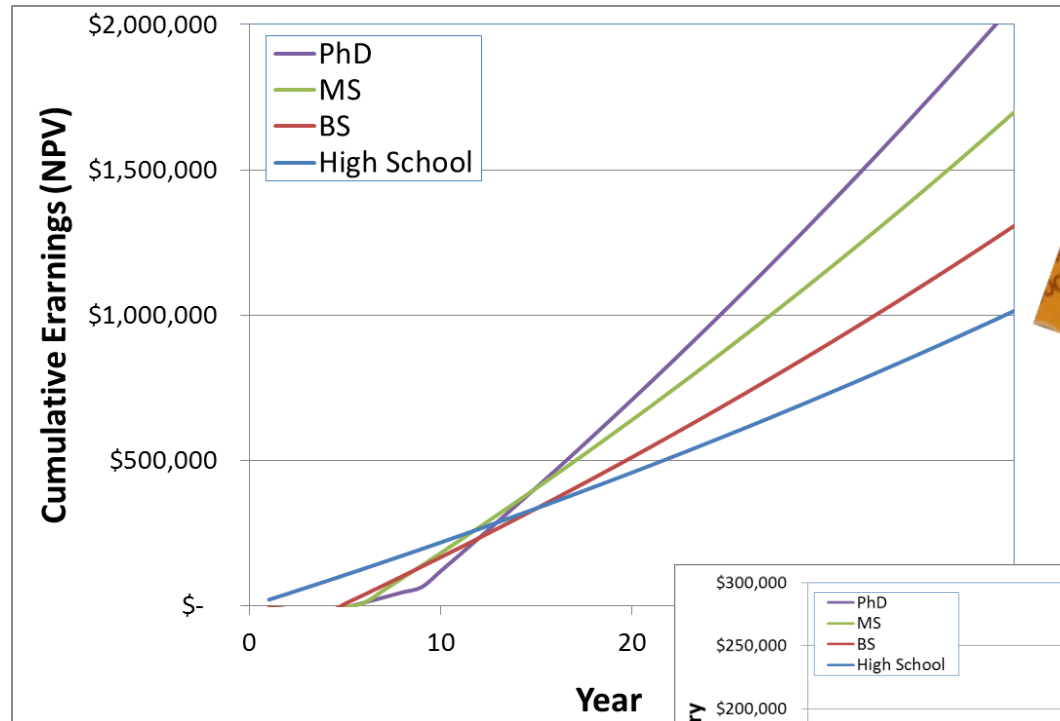
BS: 4 years

MS: 2 years

PhD: 5 years

Graduate stipend:

\$20,000



(www.cen-online.org, 4 June 2012)



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Economics of Graduate School

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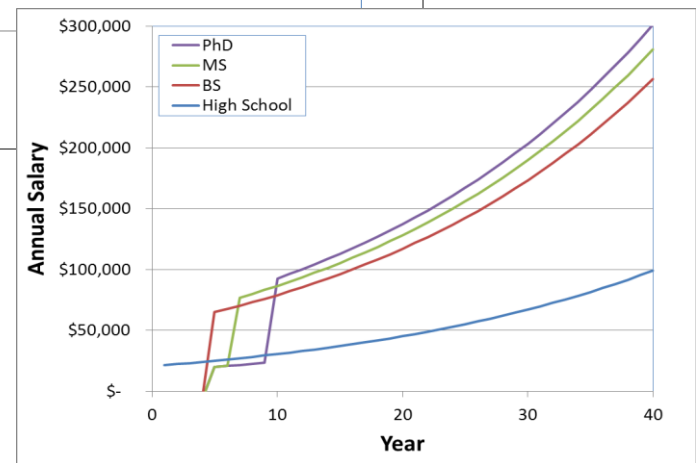
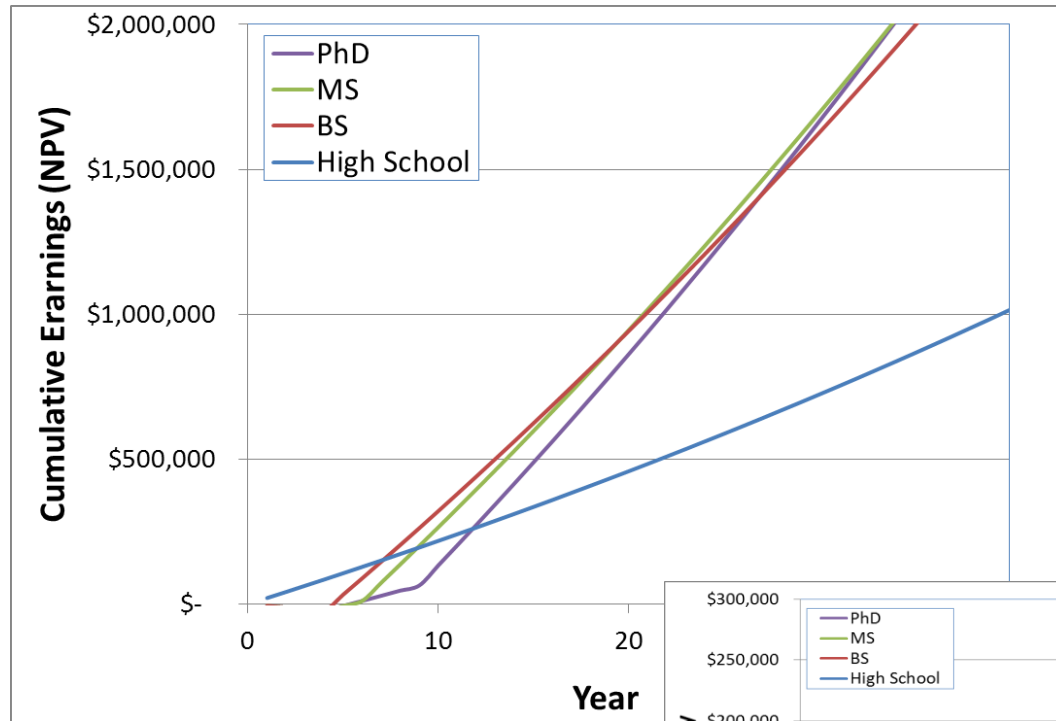
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Timing of Graduate School

- Immediately after B.S.
 - ☐ Used to being poor
 - ☐ Easiest time to go
- Work first, then go back
 - ☐ Difficult to give up salary
 - ☐ Choice may be forced on you
- Go back concurrently with work
 - ☐ Company will pay for it
 - ☐ Requires dedication and organization



Location of Graduate School

- Same institution as BS
 - ❑ Remain in your comfort zone
 - ❑ Established network
- Different institution
 - ❑ Broader perspective
 - ❑ Demonstrates ability for new situations
- International institution
 - ❑ Important in today's job market



“I’m so bored with the USA
But what can I do?”

Fields of Study

- Same field
 - Create greater depth of knowledge
- Related field
 - Broader perspective
- Different field
 - Unique perspective

My CV

◆ BS

(University of Wisconsin-Stevens Point)
Paper Science
Computer Information Systems
Minor: Chemistry
Minor: Mathematics

◆ MS

(University of Wisconsin-Madison)
Computer Sciences

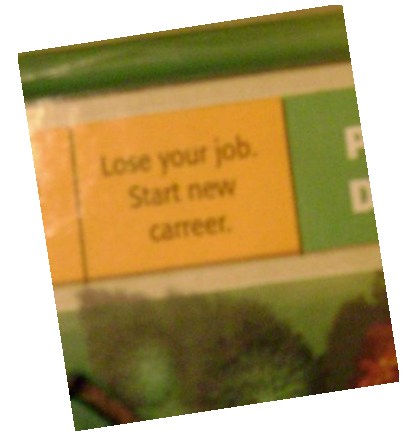
◆ PhD

(University of Wisconsin-Madison)
Chemical Engineering
Minor: Computer Sciences

Other Considerations



- Paying for it
- Family considerations
- Children
- Current career
- Location constraints



A Brief Career History of the Scott Family

2013	Chair	Assistant Provost	
2012			
2011			
2010			
2009			
2008	Professor		
2007			
2006			
2005			
2004			
2003			
2002			
2001			
2000			
1999			
1998	Research Engineer		
1997			
1996			
1995			
1994			
1993	MS/PhD		
1992			
1991			
1990			
1989			
1988	BS		
1987			
1986			
1985			
1984			
1983	Gary	Kay	Events

Conclusions and Insights

- Opens up different careers
- Allows for a broadening experience
- More a lifestyle and career choice than an economic choice (for engineers)
- Get someone else to pay for it



*“They said we’d be artistically free
When we signed that bit of paper.
They meant let’s make a lot of money
And worry about it later.”*



Questions and Discussion

- **Casey Kick**, M.S. Graduate Student, Western Michigan
- **Tyrone Wells**, Research Assistant, Georgia Tech / IPST
- **Christopher Wood**, Ph.D. Student, SUNY-ESF

- **Philip E. Slesinski**, International Paper
- **Jesse Ward**, Account Manager, Nova Chemicals
- **Emily Tomes**, Account Manager, Ashland Chemicals

“Does anybody have the right answer?
Does anybody have a clue?”



Job Search in the 21st Century

