

# Learning how to learn

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# About me/bio

## Education

- BEng in Petroleum Engineering, Baku Higher Oil School / Heriot Watt University, 2013 – 2018
- MSc in Reservoir Evaluation and Management, Baku Higher Oil School / Heriot Watt University, 2018 – 2020
- PhD in Petroleum Engineering, University of Southern California, 2021-

## Industry experience

- Summer intern, SOCAR, 2015
- Summer intern, SOCAR, 2016
- Summer camp participant, Schlumberger, 2016
- Geoscience intern, BP AGT, 2017
- Reservoir Engineering intern, BP AGT, 2019

## Involvement in SPE Azerbaijan

- Young Talents program, 2016-2018
- Student Symposium, 2017
- Petrobowl Finals, 2019

# 1. Introduction & Motivation

# Introduction

- What are you learning now?
- How effectively, do you think, are you learning?
- What effective learning strategies have you developed so far?
- What would you like to learn in near future? Why?
- How do you plan learning that thing?



# Motivation

## Move to knowledge-based economy

- In the information age, global economy has moved towards the knowledge economy (Investopedia)
- Thinkers for a living: e.g. academics, engineers, lawyers



## Volatility of job market

- Triggers: automation & optimization, pandemic & recessions, globalization & digitization
- Over 22 million jobs disappeared at the start of the pandemic — but only 12 million have so far been recovered. (NBC news)



## Increasing need in people who can learn fast and independently

- 70% of programmers are self-taught (2019, Geek for Geeks)
- Rapid growth in the number of online degrees & courses



## 2. Workflow for effective learning

# Workflow for effective learning





# 1. Motivation & goal setting

- Have a very clear idea / vision about why do want to learn that particular thing
- SMART goals: specific, measurable, attainable, realistic, time-bound
- Visualize success
- Along the way, goals might slightly change and that is perfectly fine



<b>S</b>	<b>M</b>	<b>A</b>	<b>R</b>	<b>T</b>
<b>Specific</b>	<b>Measurable</b>	<b>Attainable</b>	<b>Realistic</b>	<b>Time-bound</b>
Do: Set real numbers with real deadlines.  Don't: Say, "I want more visitors."	Do: Make sure your goal is trackable.  Don't: Hide behind buzzwords like, "brand engagement," or, "social influence."	Do: Work towards a goal that is challenging, but possible.  Don't: Try to take over the world in one night.	Do: Be honest with yourself- you know what you and your team are capable of.  Don't: Forget any hurdles you may have to overcome.	Do: Give yourself a deadline.  Don't: Keep pushing towards a goal you might hit, "some day."



# 2. Review of resources

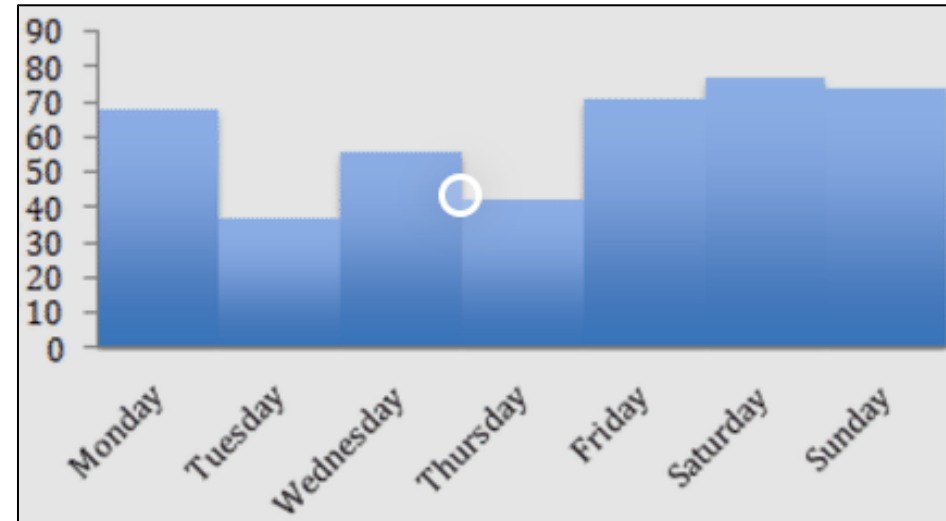
Review and define resources that you are going to use

- First, try to get a big picture view
- Consult, network, brainstorm with experts & experienced people
- Read blogs, posts about reflections of people who have gone through similar goals
- Find and locate the best books/courses/blogs/videos on topic
- Do not do very exhaustive search / spend too much time on review of resources



# 3. Planning

- Settle on few resources that you are going to use
- Estimate the required time to execute the plan
- For best results, distribute total time spent evenly
- Have concrete agenda for each week/month/quarter/year
- Some modifications/deviations from plan are usually acceptable



# 4. Execution of plan

- Stick religiously to your plan



# 5. Results and their analysis

- Make sure you have a concrete deliverable – degree, report, presentation etc
- Try to present your results to experienced people
- Squeeze out as much feedback as possible
- Summarize the learning process and reflect on what went right and wrong
- Incorporate outcomes of reflection for next learning projects

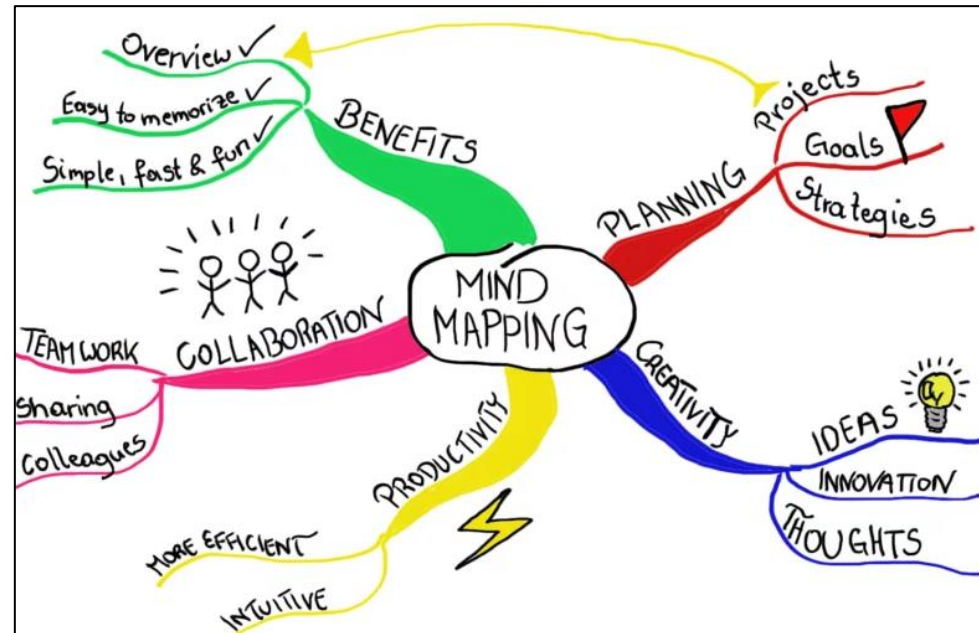
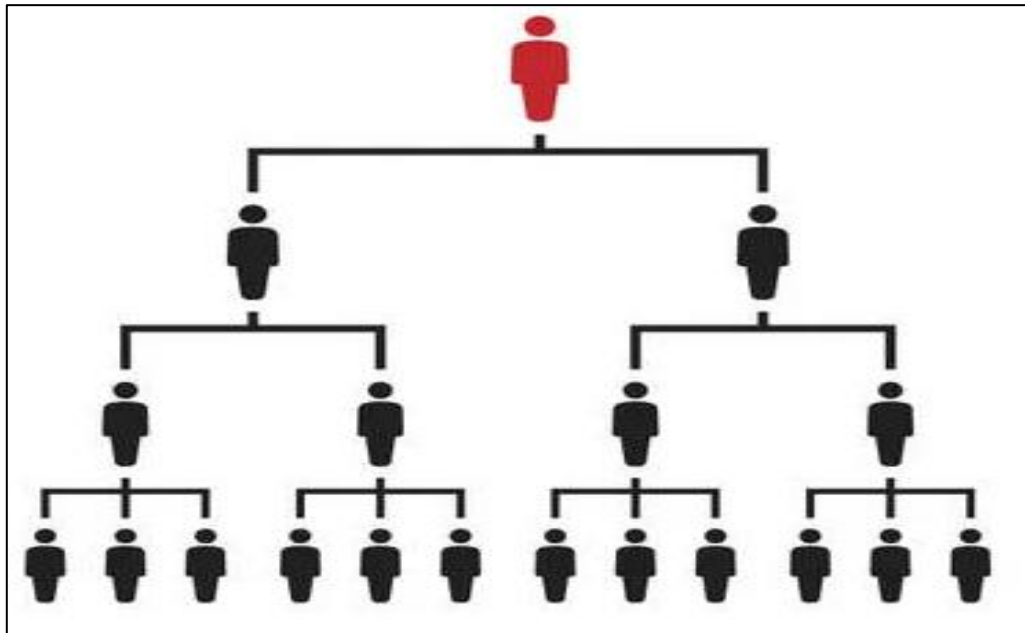


### 3. Some techniques for effective learning



# Hierarchical learning


- Big picture and fundamentals first, add details later
- Sort the information while obtaining
- Develop mindmap, connect discrete pieces of information
- Details should have something to hang on



# Learning on 'demand' / by doing

- Learning things when you need them
- Learn actively by engaging with material
- Recalling instead of review & 'Get hands dirty'
- But do not ignore theory




 **Andrej Karpathy** ✓  
@karpathy

Following


Director of AI at Tesla, leading the Autopilot Vision team. Previously OpenAI, CS231n, PhD @ Stanford. I like to train large deep neural nets 🧠🤖💡

 **Andrej Karpathy** ✓  
@karpathy

How to become expert at thing:  
1 iteratively take on concrete projects and accomplish them depth wise, learning "on demand" (ie don't learn bottom up breadth wise)  
2 teach/summarize everything you learn in your own words  
3 only compare yourself to younger you, never to others

 **Hernan Moraldo** @hhm · Nov 18, 2020

If you have concrete projects, as you make progress on them you find obstacles and gaps in your knowledge. You make progress by learning how to deal with those on demand, as they show up.

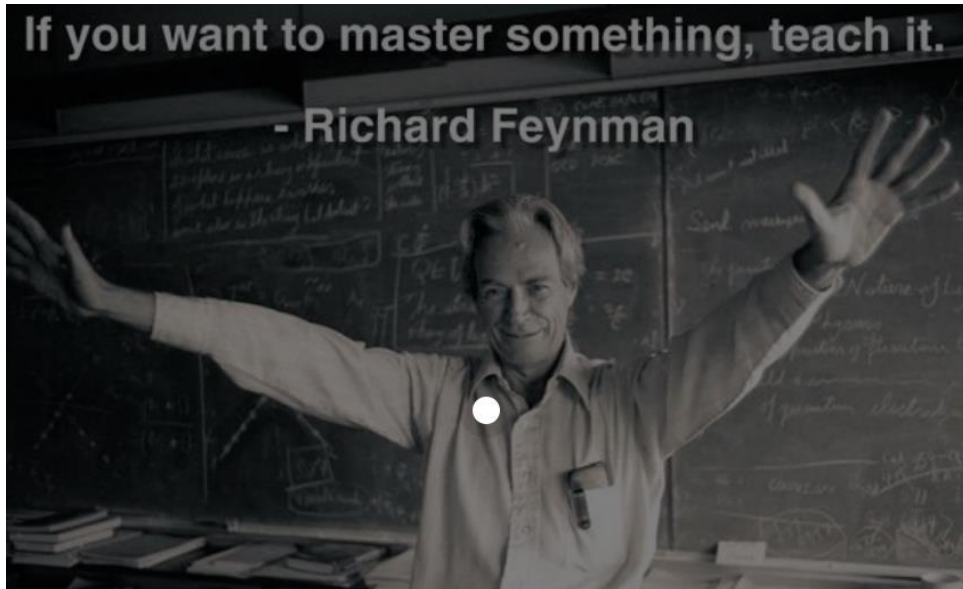
 **Dmytro Danevskyi** @DanevskiyD · Nov 7, 2020

Replying to @karpathy  
I would argue that doing 80% practice (i.e. learning "on demand") and 20% theory (i.e. bottom up breadth wise) is more effective in most cases than spending 100% of your time on the former option



# Teach

- Teaching forces you to develop a deeper understanding
- Summarize what you read/learned in your own words
- Organize information into coherent structure while teaching
- Make sure to really understand stuff
- Avoid memorization without understanding



# Automate & Optimize your learning

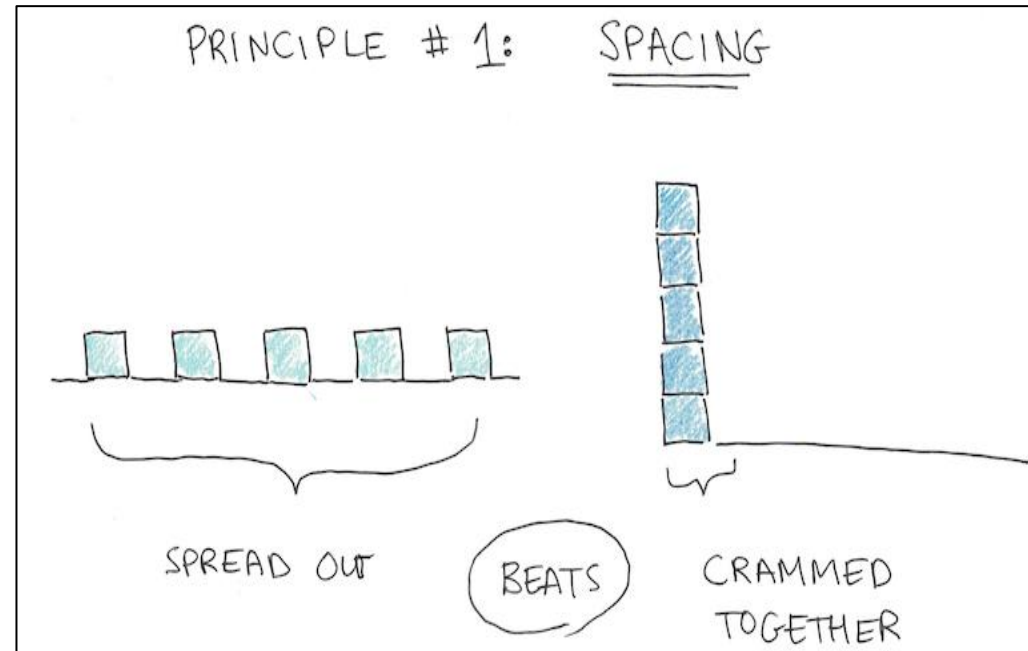
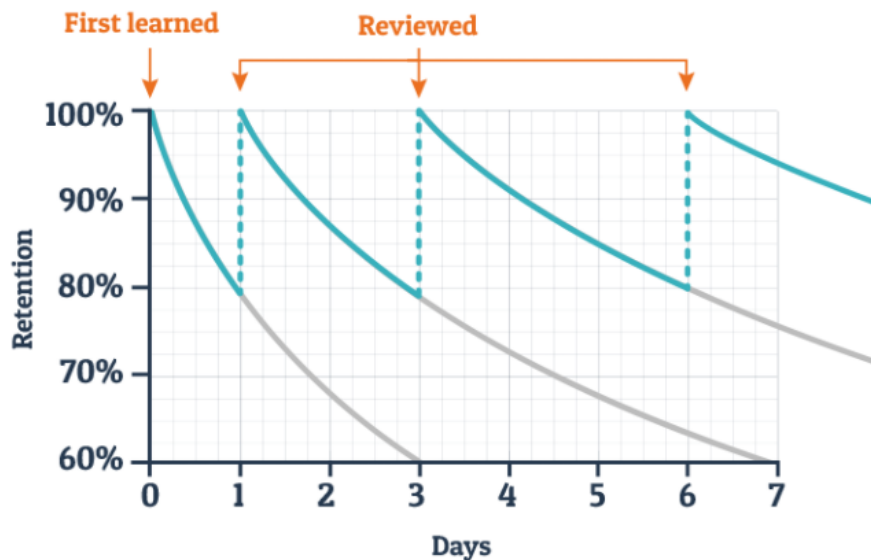
- Develop 'templates' for learning/doing different stuff: e.g. reading, programming
- Avoid running on 'autopilot' once to run on 'autopilot' for next times
- Always spend some time to reflect about your learning / progress



# Spaced repetition

- When learning new concepts, brain steadily forgets them
- Solution is to review the learned concept/info ASAP
- As you progress, review time & review interval go down
- Spaced & frequent learning over cramming / long infrequent learning

Typical Forgetting Curve for Newly Learned Information



# Productivity

- Effectiveness of learning, naturally depends also on one's productivity
- As you progress through life, develop your own productivity tricks

## Some general tips

- Basics: eat well, exercise, sleep well
- Find your optimal time windows & create your routine
- Optimize your day: hardest things first, manual/easy tasks at the end
- Do not multitask, focus intensely, avoid distractions



## 4. Case study: Learning Data Science

# Data Science

- Short definition: Extracting value from data by using scientific methods
- Relatively new field with a promising career outlook
- Lots of applications in industry, academia, government sector, non-profits
- A lot of confusion about its scope, roles, tools, required knowledge for roles



# Learning Data Science: example roadmap

## 1. Motivation & goal setting

-Land a data scientist job/internship within a year

## 2. Review of resources

-Need to learn: 1) math 2) coding 3) ML; Resources: 2 books, 3 courses, 1 project

## 3. Planning

-Will start in parallel with math and coding by taking 2 courses and using a book, follow up with project while learning ML  
- Will spend around 20 hr a week, 10/20 on weekends

## 4. Execution of plan

-Except some very unexpected and urgent things, won't skip any week

## 5. Results and their analysis

-Will compete in Kaggle competition / Write a blog post about project or courses I took, hopefully will get an internship or job and will analyze my learning process



## 5. Useful resources & QA



# Useful resources

- **Blogs / twitter accounts / youtube videos of top scientists / entrepreneurs**
- <https://www.scotthyoung.com/>: website of relatively known writer on this topic
- Learning how to learn (Coursera): around 2 million students took this course (2017)

# Stay tuned!

## Possible future sessions

- Presentation about big picture view of Petroleum Engineering and Geosciences
- Presentation about some aspects of doing PhD / doing research
- Presentation about some aspects of Machine Learning and Data Science

QA

Thanks!

Questions??