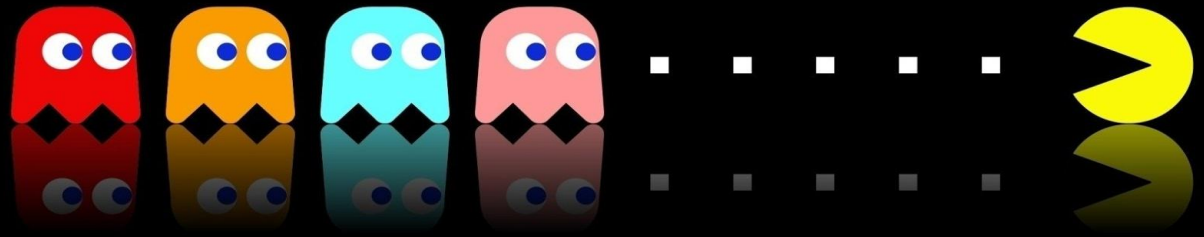
GAMIFYING THE STUDY OF ALGORITHMS



Player: Iulia Avram
Round: EuroPython 2019

Level 1

History

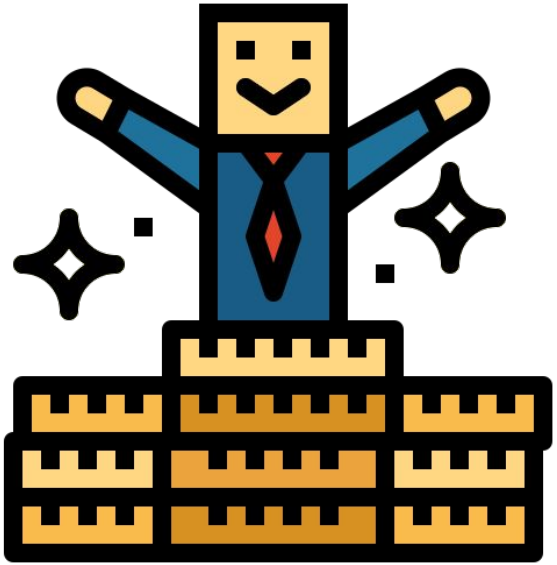
Does this run in linear time?

A case for algorithmics

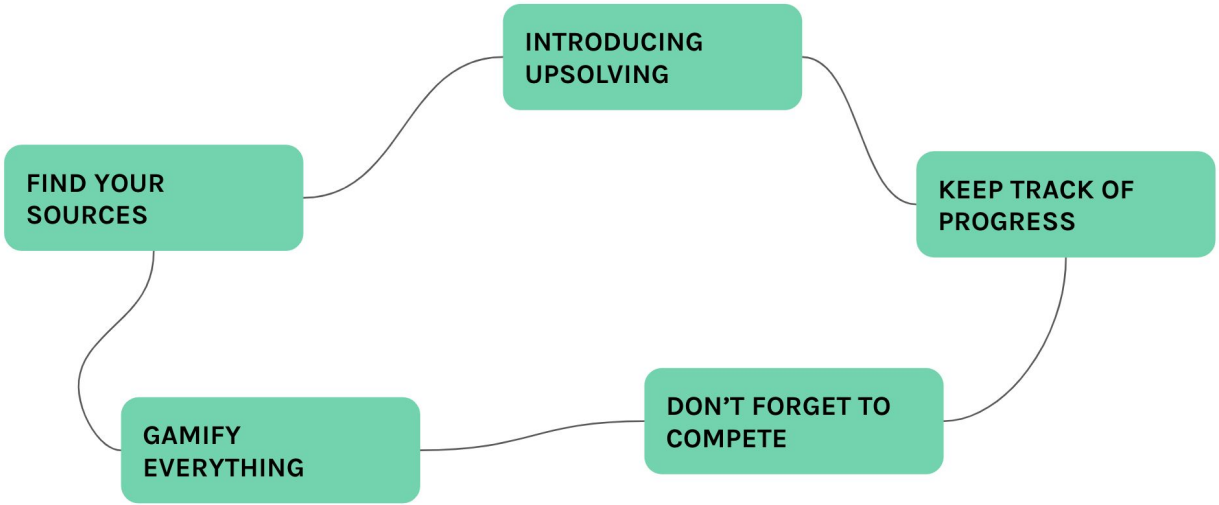
Iulia Avram

Great for

- Mental exercise
- Breaker of routine
- Logic and design improvement
- Knowing about algorithms as a social duty

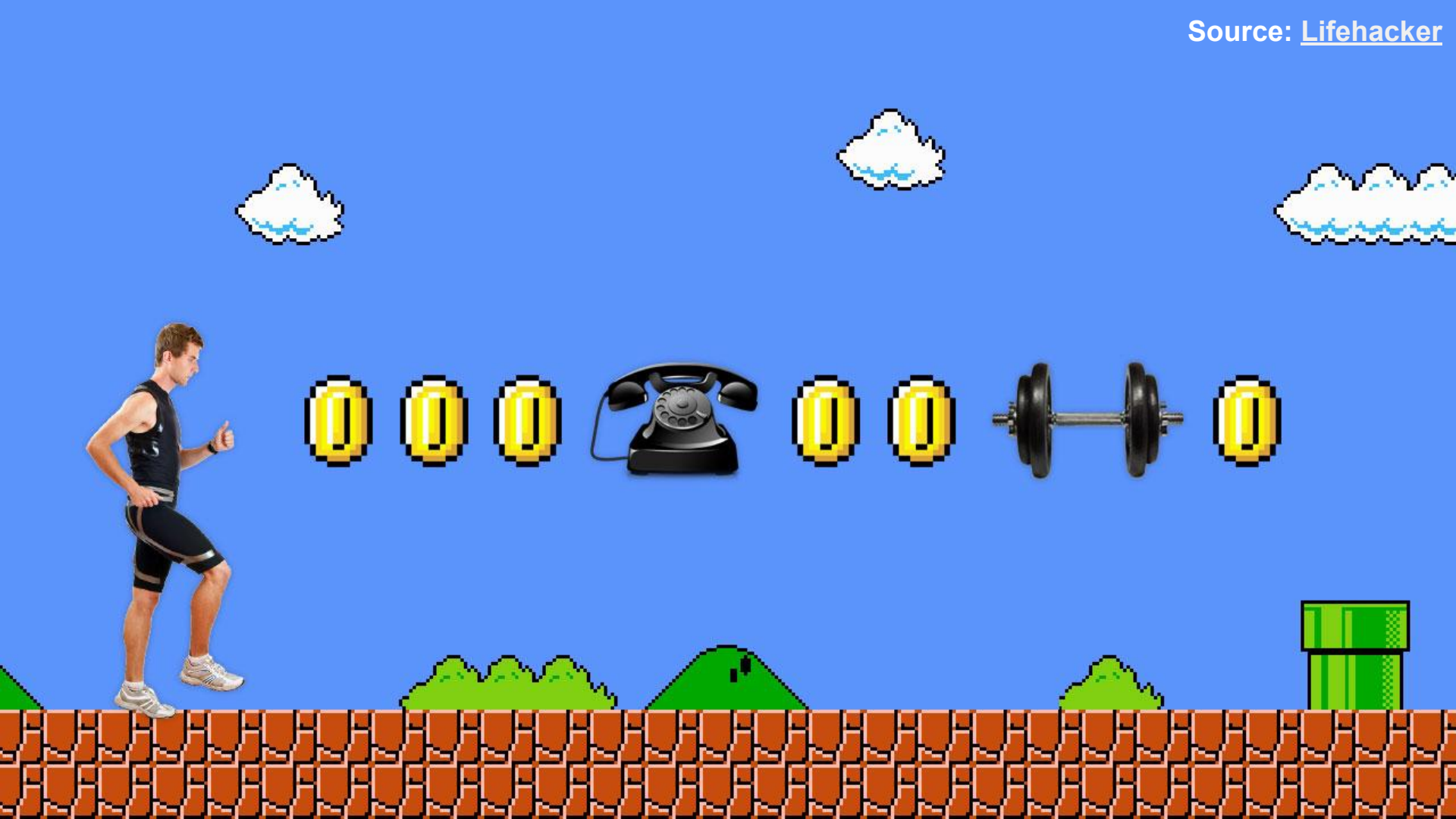


Loads to be gained

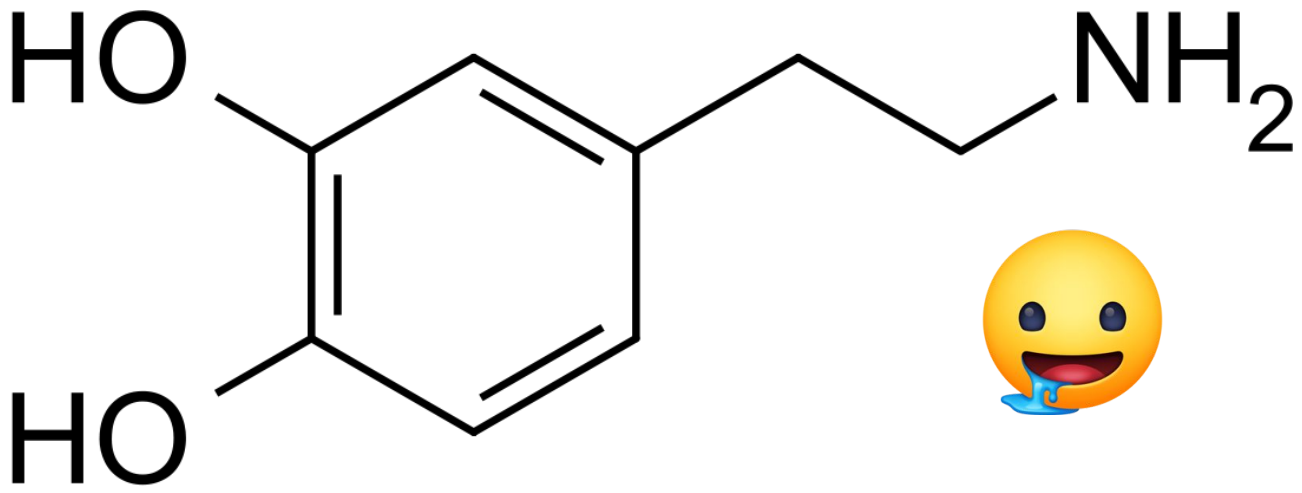

INTRODUCING UPSOLVING
FIND YOUR SOURCES
KEEP TRACK OF PROGRESS
GAMIFY EVERYTHING
DON’T FORGET TO COMPETE

What is this gamification shenanigans anyway?

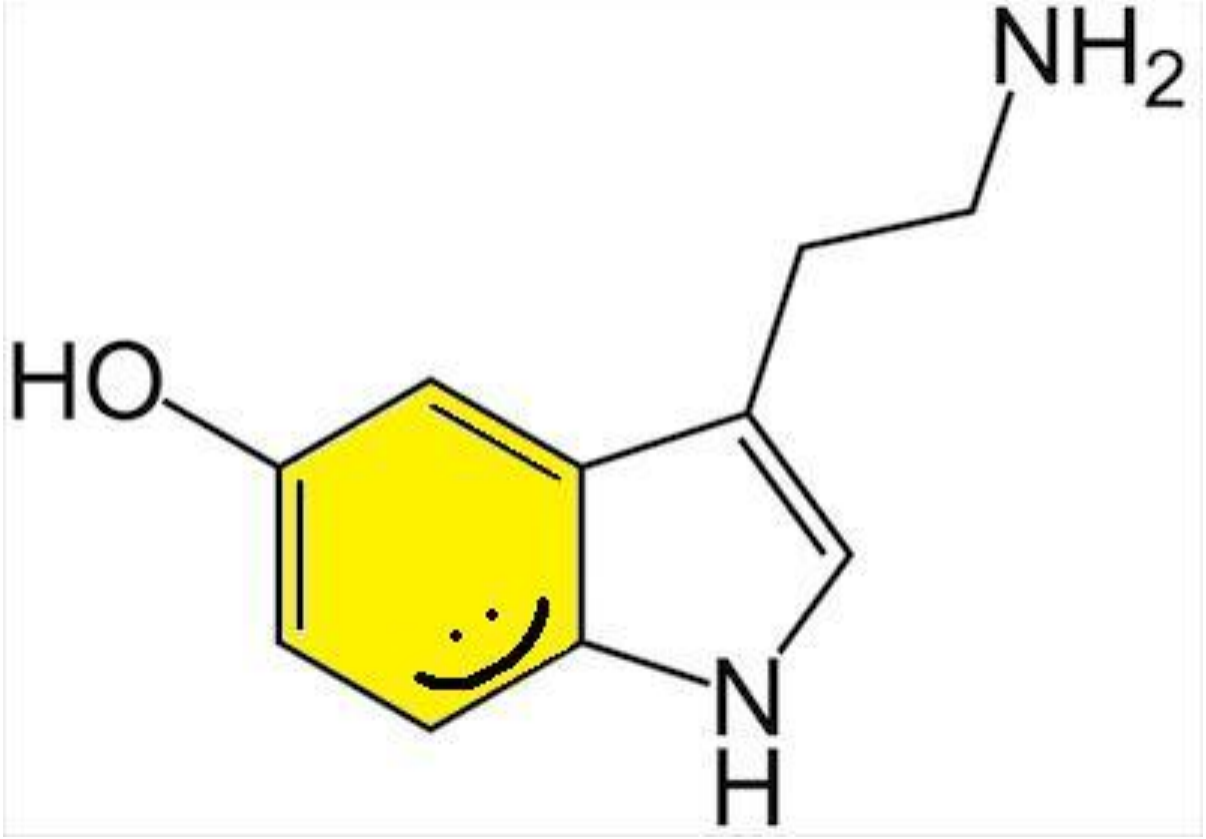
Source: Lifehacker



So why does it work?



Mmmmm...
Dopamineeee...

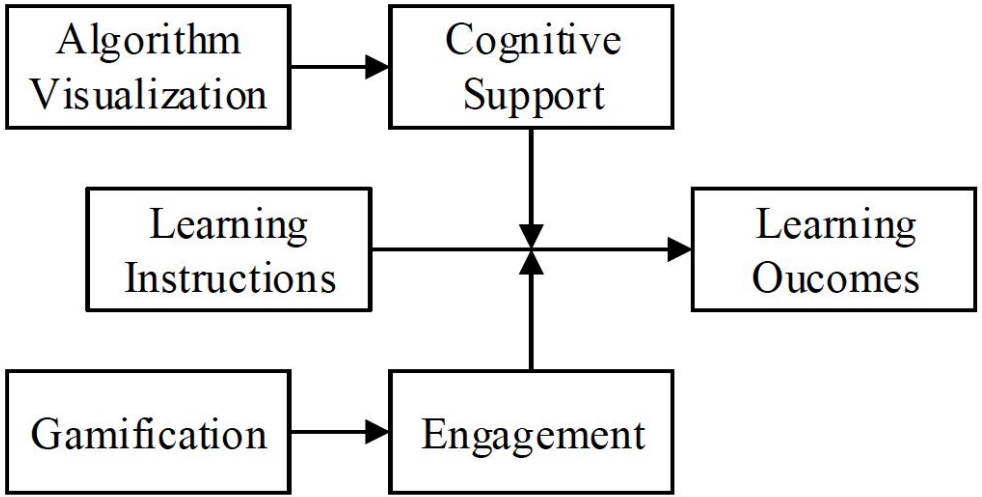

NH2
HO
N
H

Level 2

Foundations

- “Gamification” is a buzzword
- Widely implemented in various situations
- Subject of research, conference talks and blog articles
- Gaming is fun ^.^

A conceptual model of how algorithm visualization, gamification, and learning instructions interact to improve learning outcomes



Source

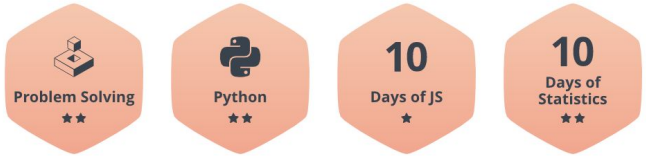
Engagement
Points
Narrative
Levels
Medals
Rules
Gamification Features
Personalization
Achievements
Rankings
Integration
Missions
Feedback
Challenges

This isn’t new

Source: HackerRank

Source: LeetCode

Badges



Contest

Finished Contests	4
Rating	1172
Global Ranking	83599 / 102091

Contest History

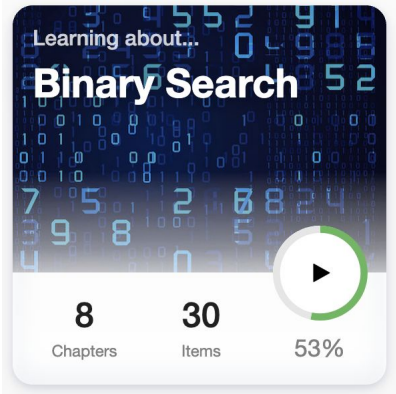
0 1 1

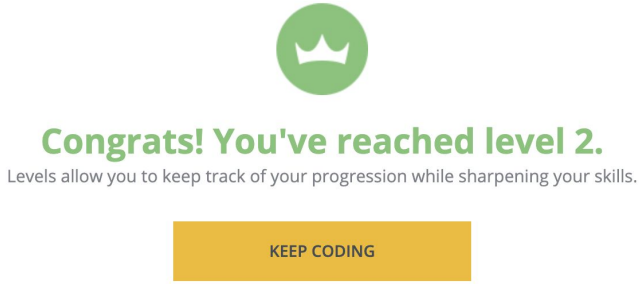
October, 2018

HourRank 30	141/ 1069 participants	View Results

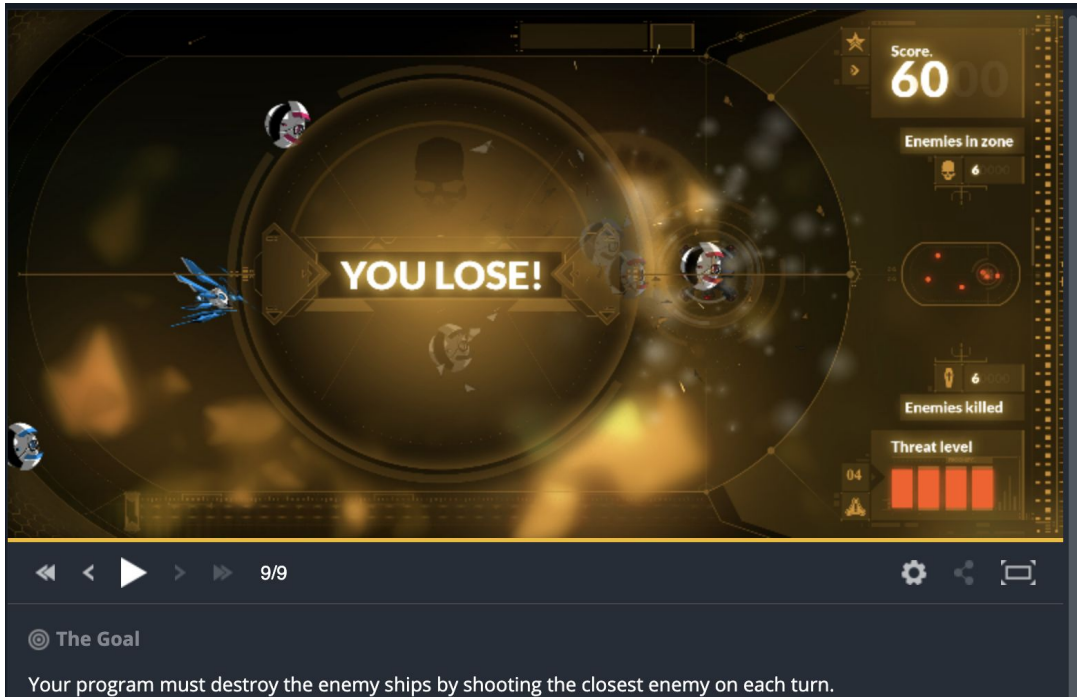
August, 2018

HourRank 29	177/ 1906 participants	View Results





Source: [Coding Game]

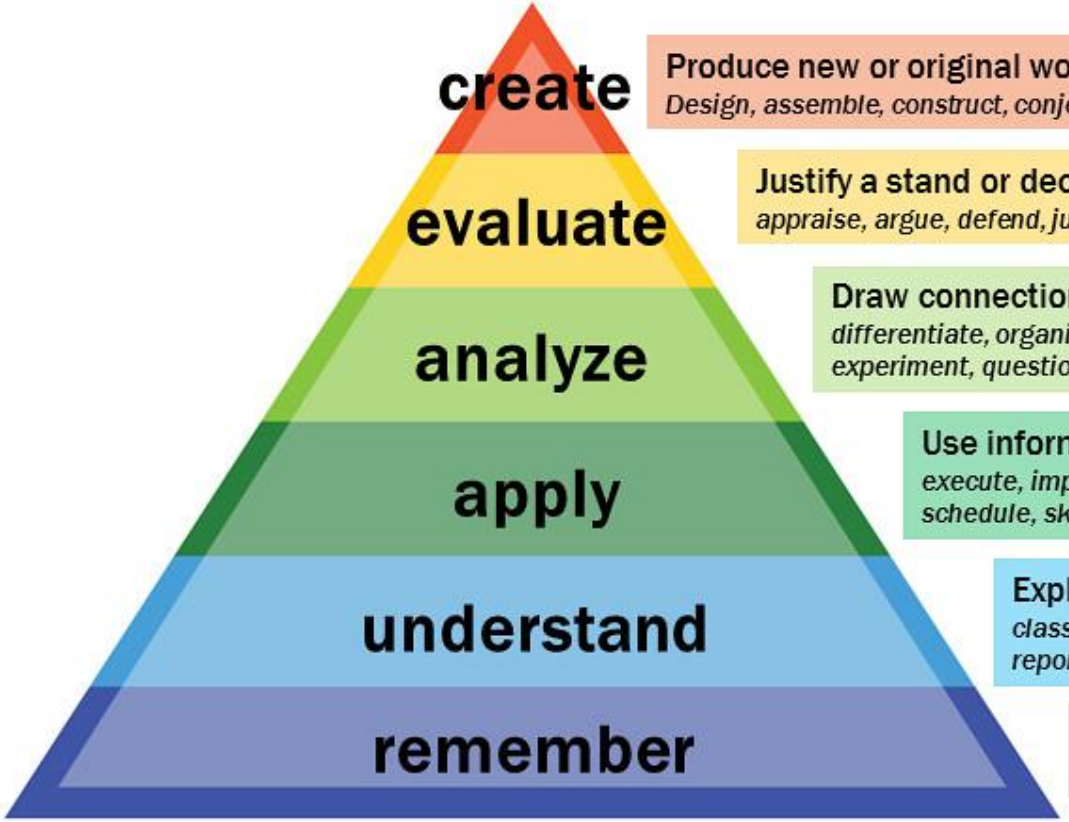


Level 3

New frontiers

Before we can imagine where to go next, let’s read the instructions manual first

Bloom's Taxonomy



Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

Vanderbilt University Center for Teaching

The legs of gamification

- Constraints drive creativity
- Easy failures
- Perseverance and grit
- Speed and pressure

Let’s make a game of it

Bonus

The mage's question

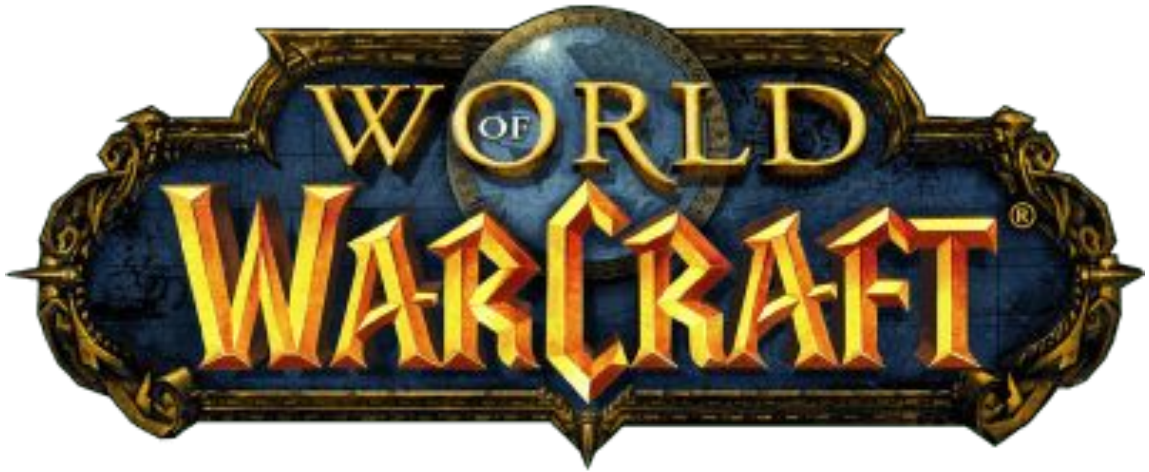
```python
def funky_max(a, start, end):
    if end - start <= 1:
        return max(a[start], a[end])
    mid = (start + end) // 2
    first_side = sum(a[start:mid])
    second_side = sum(a[mid:end])
    if first_side > second_side:
        return funky_max(a, start, mid)
    else:
        return funky_max(a, mid, end)


"""
1) What's the time complexity? # HELPER QUESTION
2) This code doesn't always provide the max, provide a counter example.
"""
```

https://pastebin.com/cRJ8uTKn

What is your favourite game?

What is your favourite game?

And why?


WORLD
OF
WARCRAFT

- Story
- Achievements
- Community
- Challenges
- Level up

- Story

  Do we like problem statements with a story? Or do we like a story to a collection of problems?
- Achievements
- Community
- Challenges
- Level up

- Story

  Do we like problem statements with a story? Or do we like a story to a collection of problems?

- Achievements

  Badges? Progress bar?

- Community

- Challenges

- Level up

- Story

  Do we like problem statements with a story? Or do we like a story to a collection of problems?

- Achievements

  Badges? Progress bar?

- Community

  Compete with friends or against them? Do we need help in solving problems?

- Challenges

- Level up

- Story

  Do we like problem statements with a story? Or do we like a story to a collection of problems?

- Achievements

  Badges? Progress bar?

- Community

  Compete with friends or against them? Do we need help in solving problems?

- Challenges

  30 day challenge? A very hard problem? Solving a known problem in a different way?

- Level up

- Story

  Do we like problem statements with a story? Or do we like a story to a collection of problems?

- Achievements

  Badges? Progress bar?

- Community

  Compete with friends or against them? Do we need help in solving problems?

- Challenges

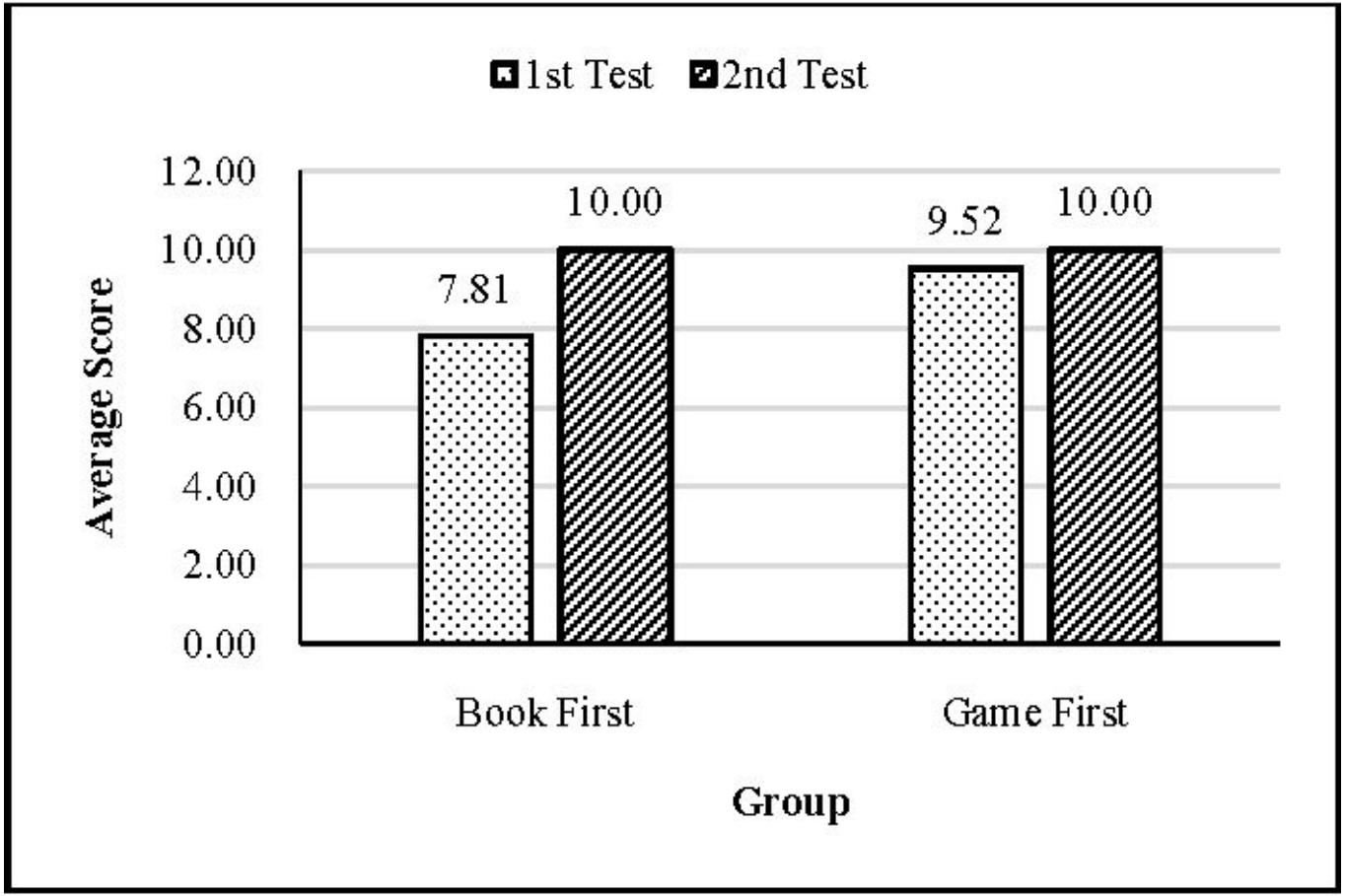
  30 day challenge? A very hard problem? Solving a known problem in a different way?

- Level up Through a number of problems solved or rating system?

Analysis is a
powerful tool

Boss level

What is the point?



Source

Fig. 4. The average scores between book-first group and game-first group after the first test and the second test.

Boss level

What is the point?

GAME OVER

Questions? YES NO

SCOREBOARD

iulyaav 2019

avram.iulia.augusta 1107