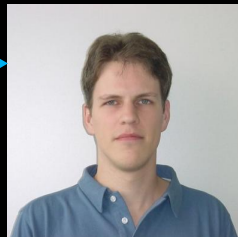


On the Future of Higher Education: Gamification, The Pyramid of Needs, and ICT to the Rescue

Alexandru Iosup, Otto Visser, Ana Lucia Varbanescu,
Tim Hegeman, Jesse Donkervliet, etc.

Teaching
is done by
teams!



1994: How to improve education?

A: ICT for education!

ADEVĂRUL

marți, 8 martie 1994

ÎNVĂȚĂMÂNT

"România trebuie să devină o putere" - consideră un câștigător (ne)obișnuit -

Alexandru Iosup are 14 ani (născut în 12 iunie 1980) și este elev al Școlii nr. 19 din București. Mic la stat, dar mare la sfat, Alexandru este unul din cei patru câștigători ai concursului „Ce să faci cu un miliard” inițiat de MTS. Cei 50 de mil de lei primiți ca premiu al revistei „Modelism” i-a cheltuit cu „cap”, luându-și o minge de fotbal **adeverată** pentru că este microbist convins și are ca idoli pe Maradona și Van Basten. În privința banilor, copilul are o nedumerire: „Am primit exact 42 de mil lei. De ce s-o fi împozitând și premiul, nu înțeleg”. Nici noi nu pricepem, dar asta e. Oricum, din ce i-a rămas, își va luat ceva pentru calculatorul pe care de curând (după premiere) l-a primit ca dar de la părinți. Jubesc calculatorul și am câștigat acest concurs tocmai propunând celor mari ca din miliard să cumpere 1.000 de calculatoare pentru a se realiza în școli o rețea națională”, spune Alexandru.



vine de la faptul că s-ar simți sărac.

Romanian

NRC
HANDELSBLAD

2004: How to improve education?

A: Make games coursework!



2014: How to improve education?

A: ICT + Gamification

Actually, Alexandru, what took you so long?!

"România trebuie
să devină o putere"
- consideră un câștigător (ne)obișnuit -



vine de la faptul că s-a născut alina.

1994



2004



The “Leaky Faucet”

**The main challenge for the future?
Every student counts!**

- Top* technical university in the Netherlands

- “P-in-een” of an important BSc track

<40%

- Completion “in time” of the BSc

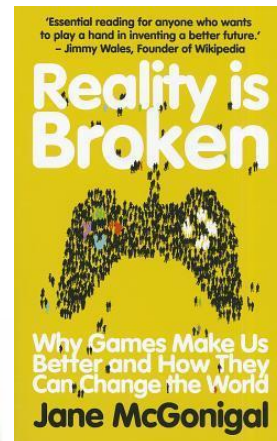
<50%

- (What do students think about it?)

ELSEVIER

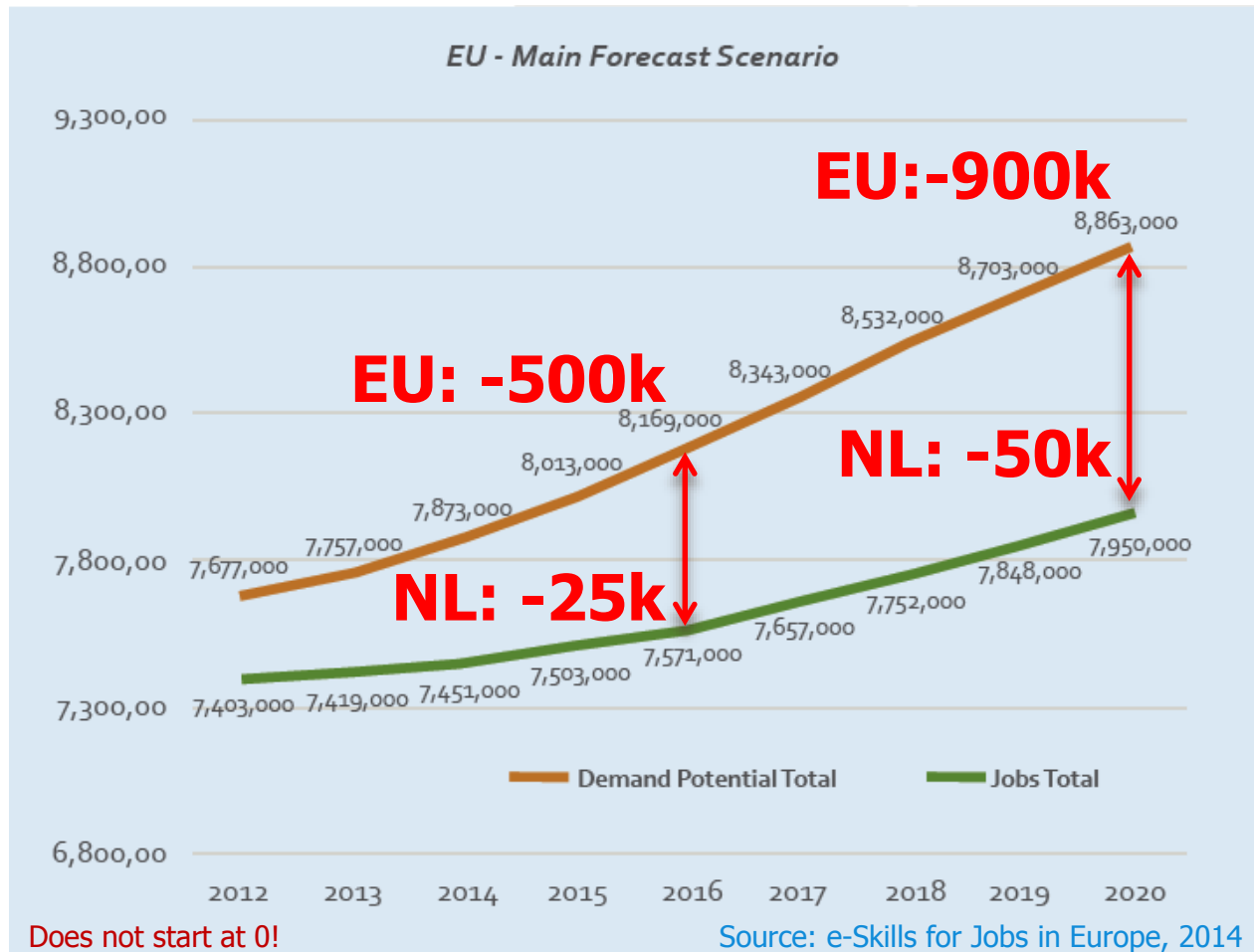
Who Is Responsible For the Leaky Faucet?

- New generation of students
- New types of students, especially multi-culti
- It's not you, it's me
- New ambition of Dutch universities, but no selection



**The main challenge
for the future?
Every student
is different!**

Let's Look At Europe: The Workforce Gap in ICT



Let's Look At Europe: The Workforce Gap in ICT

EU - Main Forecast Scenario

9,300,00

The main challenges for the future?
Every student counts!
Every student is different!



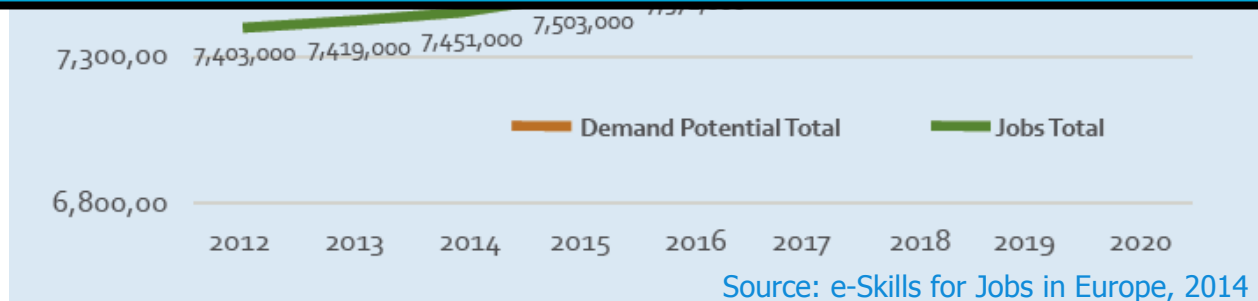
Does not start at 0!

Source: e-Skills for Jobs in Europe, 2014

Let's Extrapolate to Europe: The Workforce Gap in ICT

Rhetorical Q:
What can we do about this?

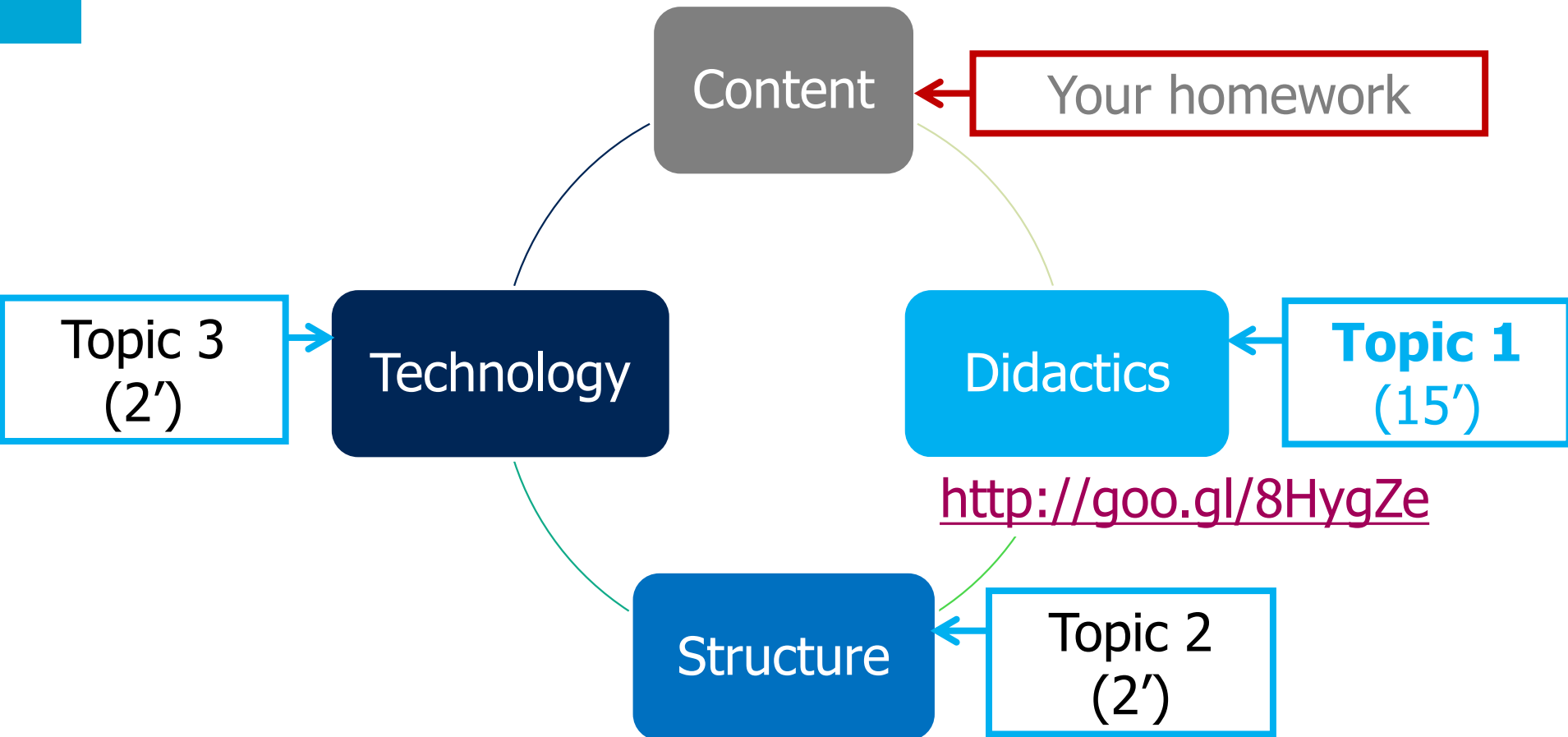
The main challenges for the future?
Every student counts!
Every student is different!



Source: e-Skills for Jobs in Europe, 2014

What To Do About Higher Education?

Focus On ...



Didactics: What is Gamification?

A: Game Thinking + Techniques

Q: What is **gamification**?

A: The use in non-gaming settings, e.g., in education, of thinking and techniques designed for gaming.



<http://goo.gl/v97zSW>



What is the intuition behind gamification?



How can gamification be used?

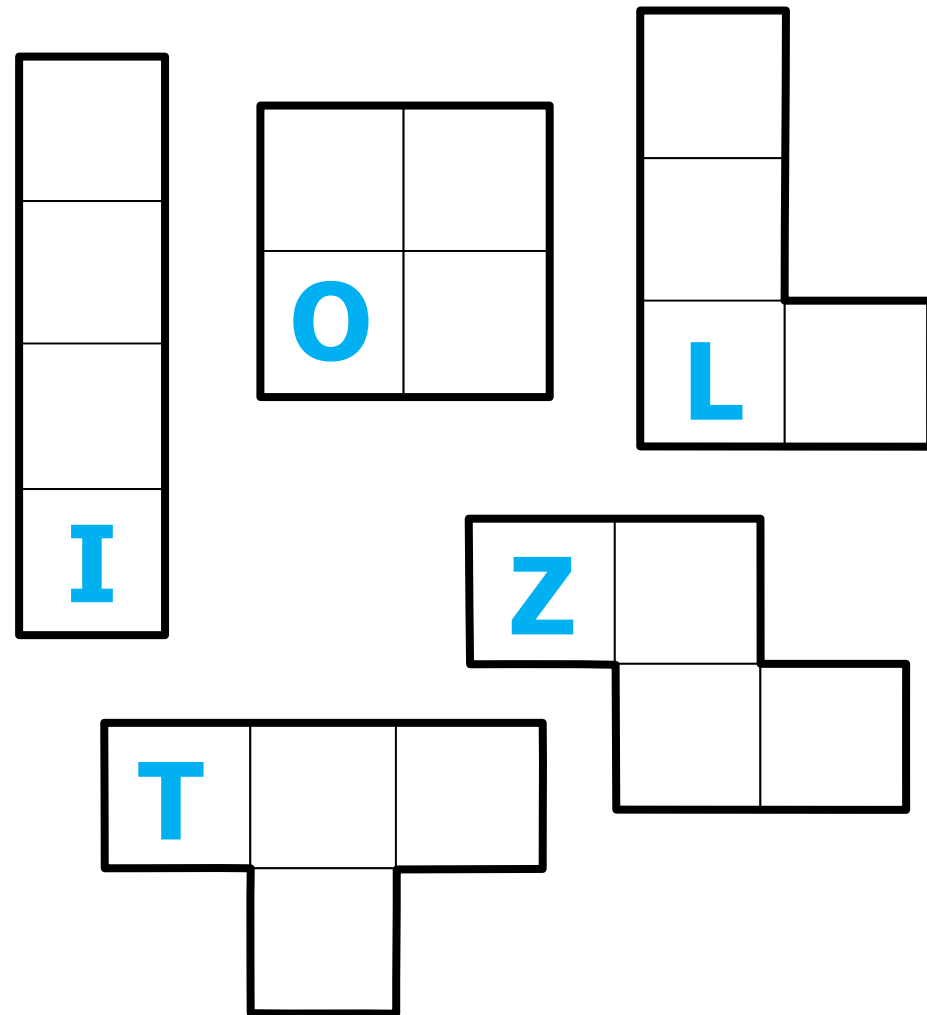
<http://goo.gl/ILSNeB>

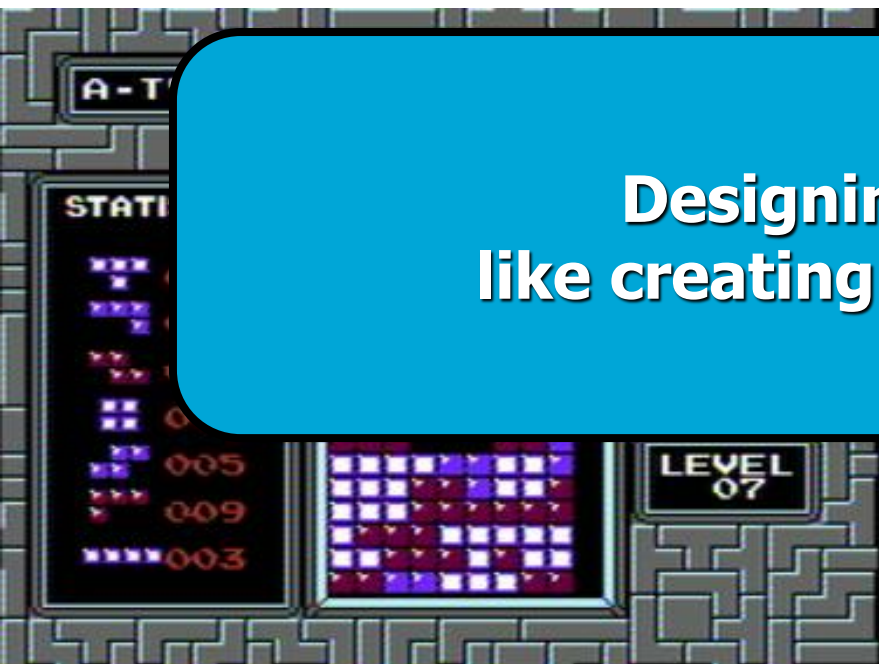


Do You Know This Person?

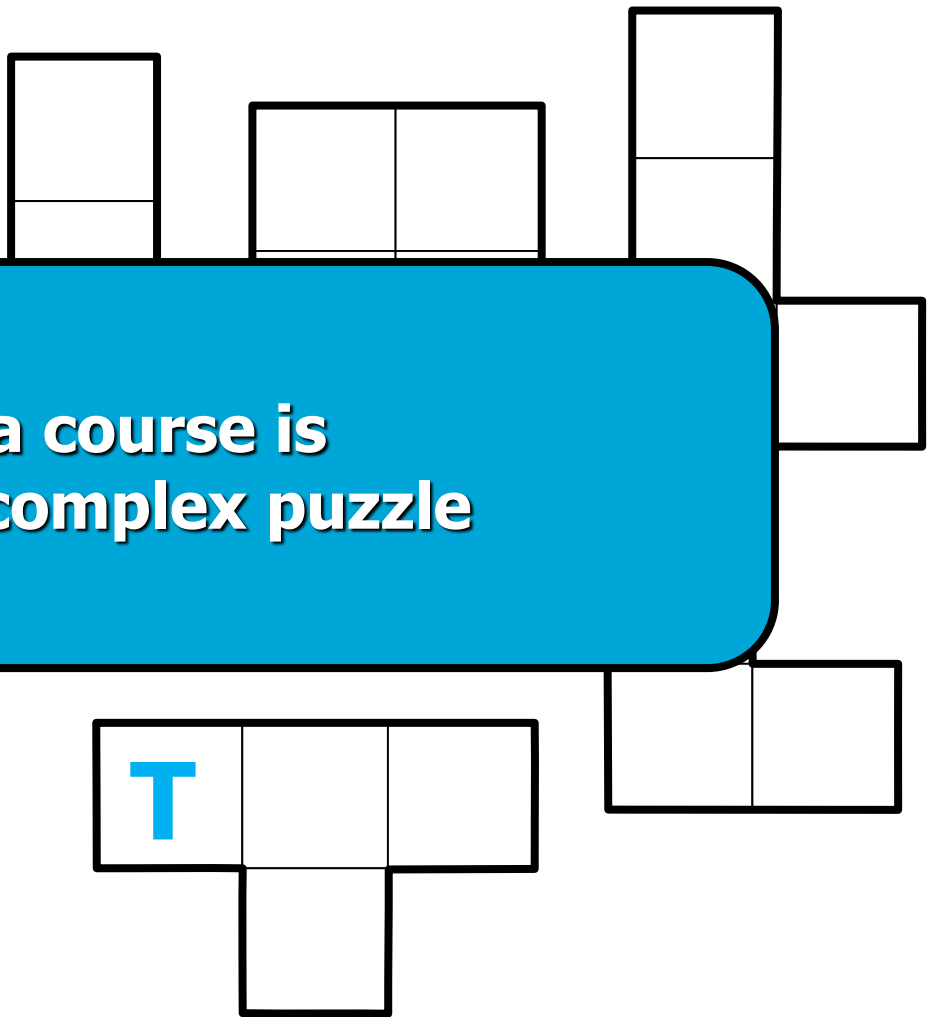






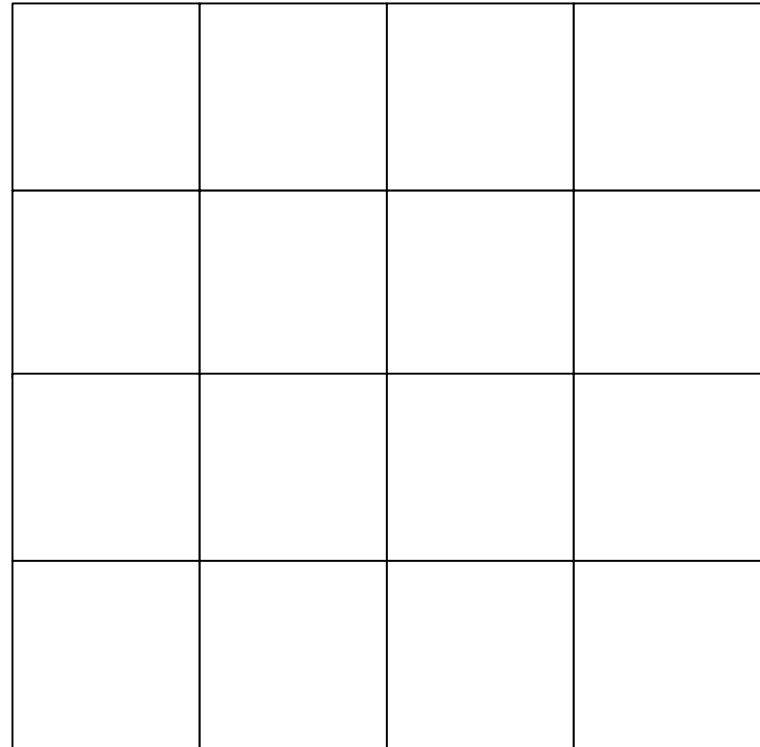
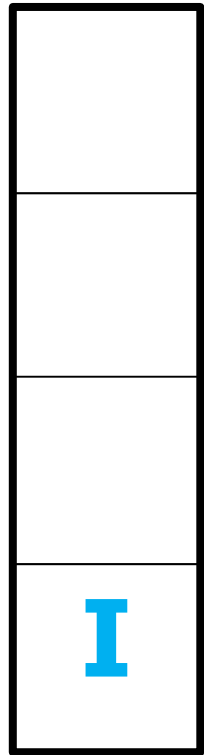


**Designing a course is
like creating a complex puzzle**

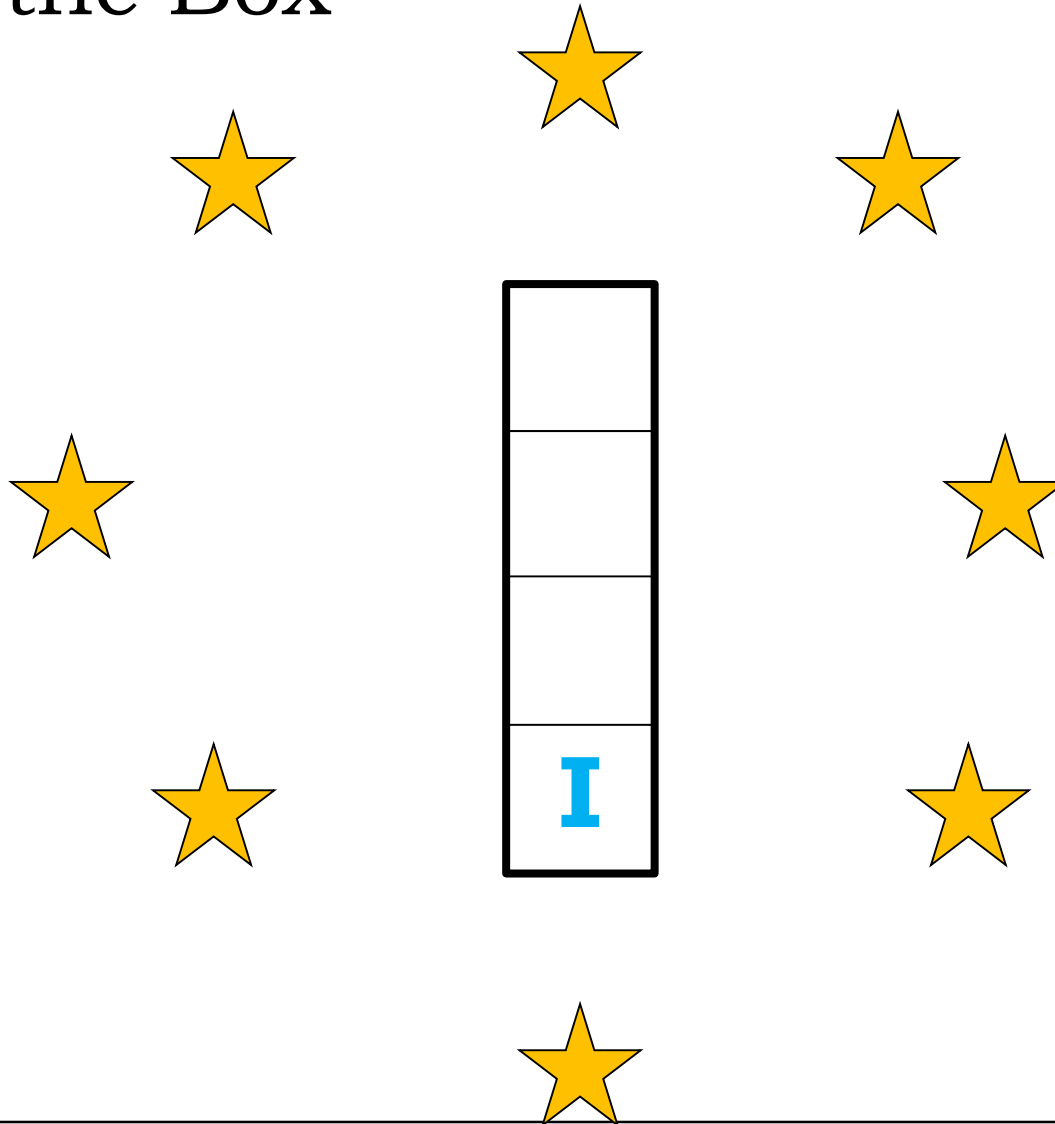


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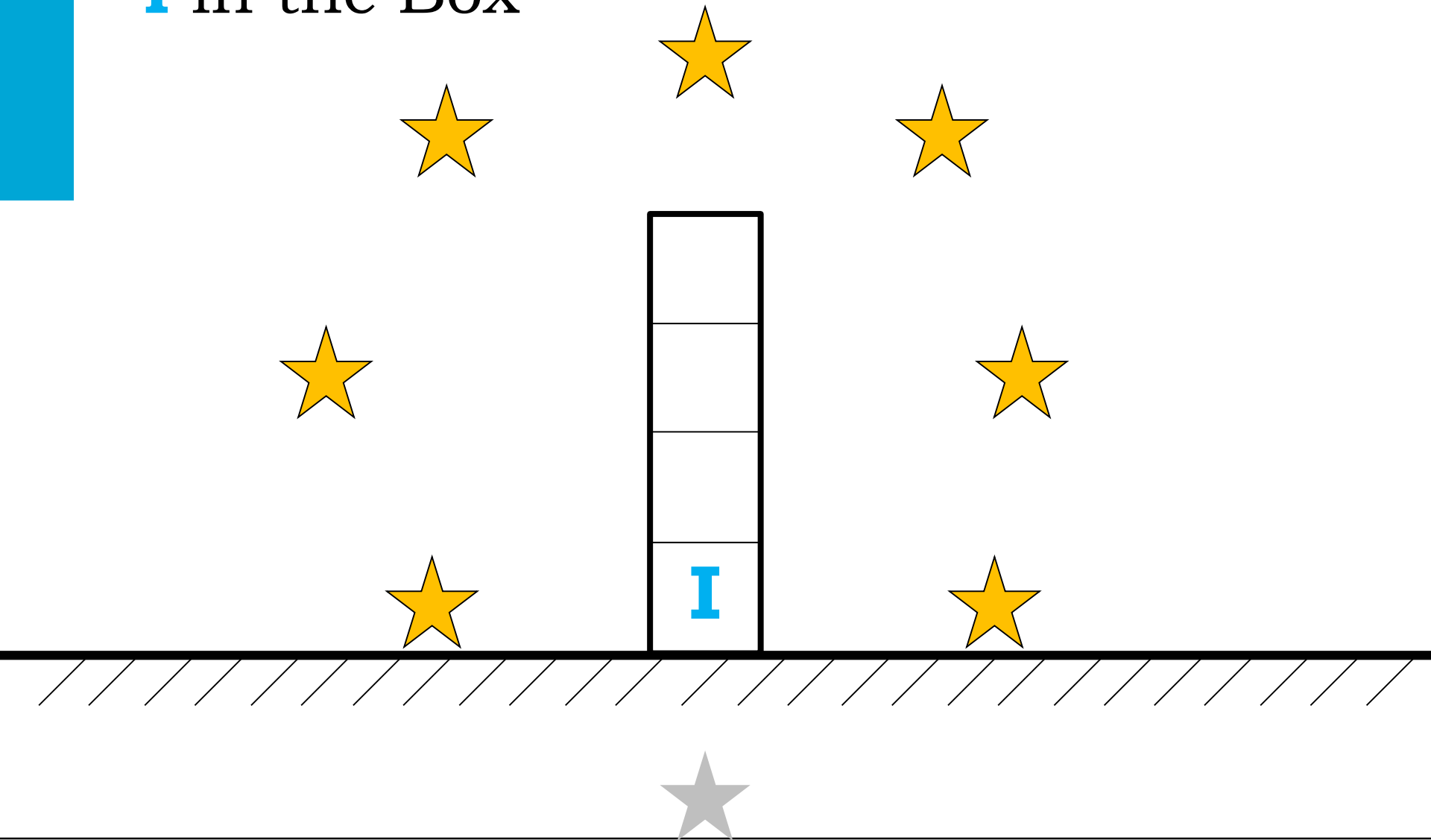
I in the Box



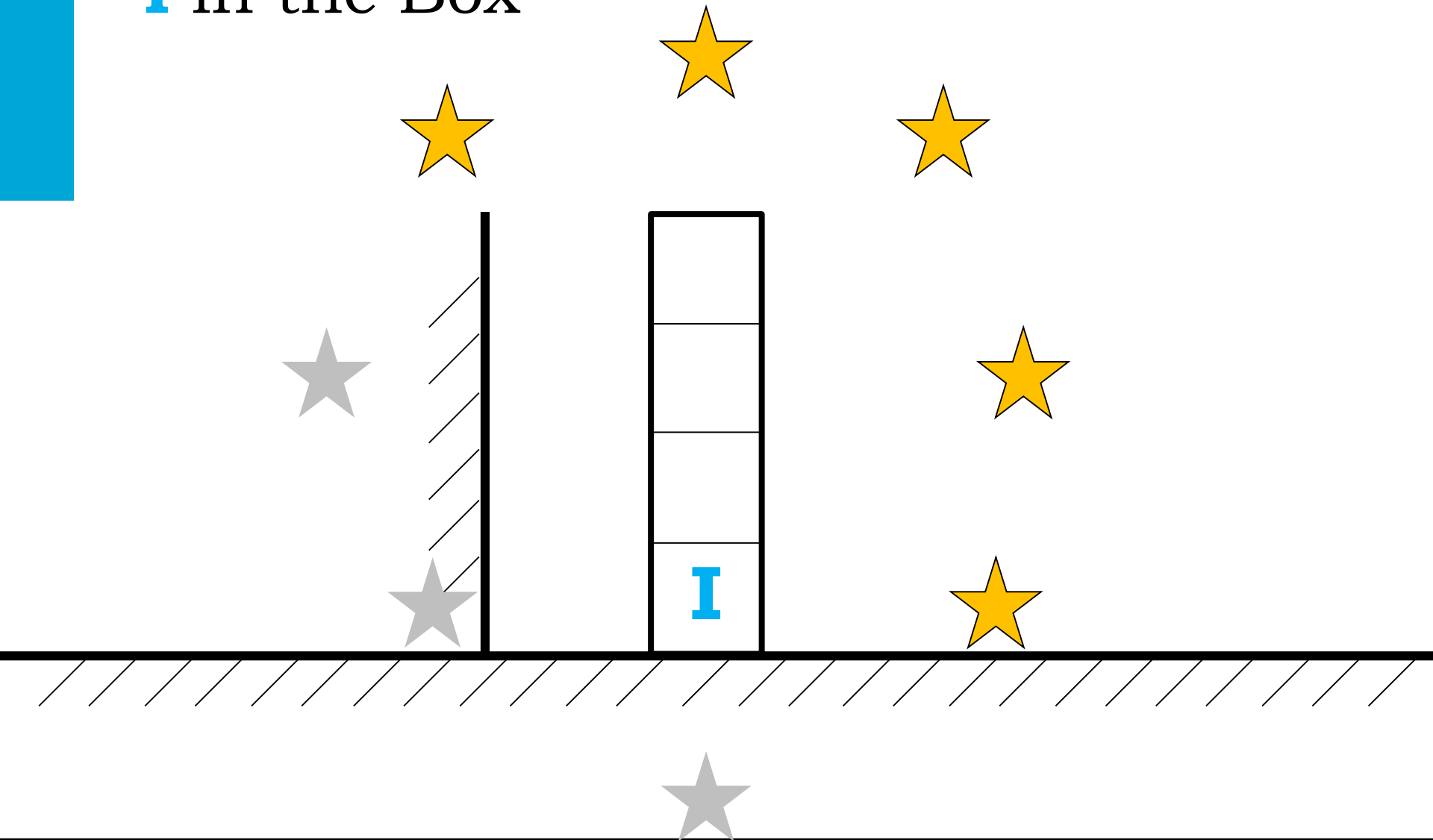
I in the Box



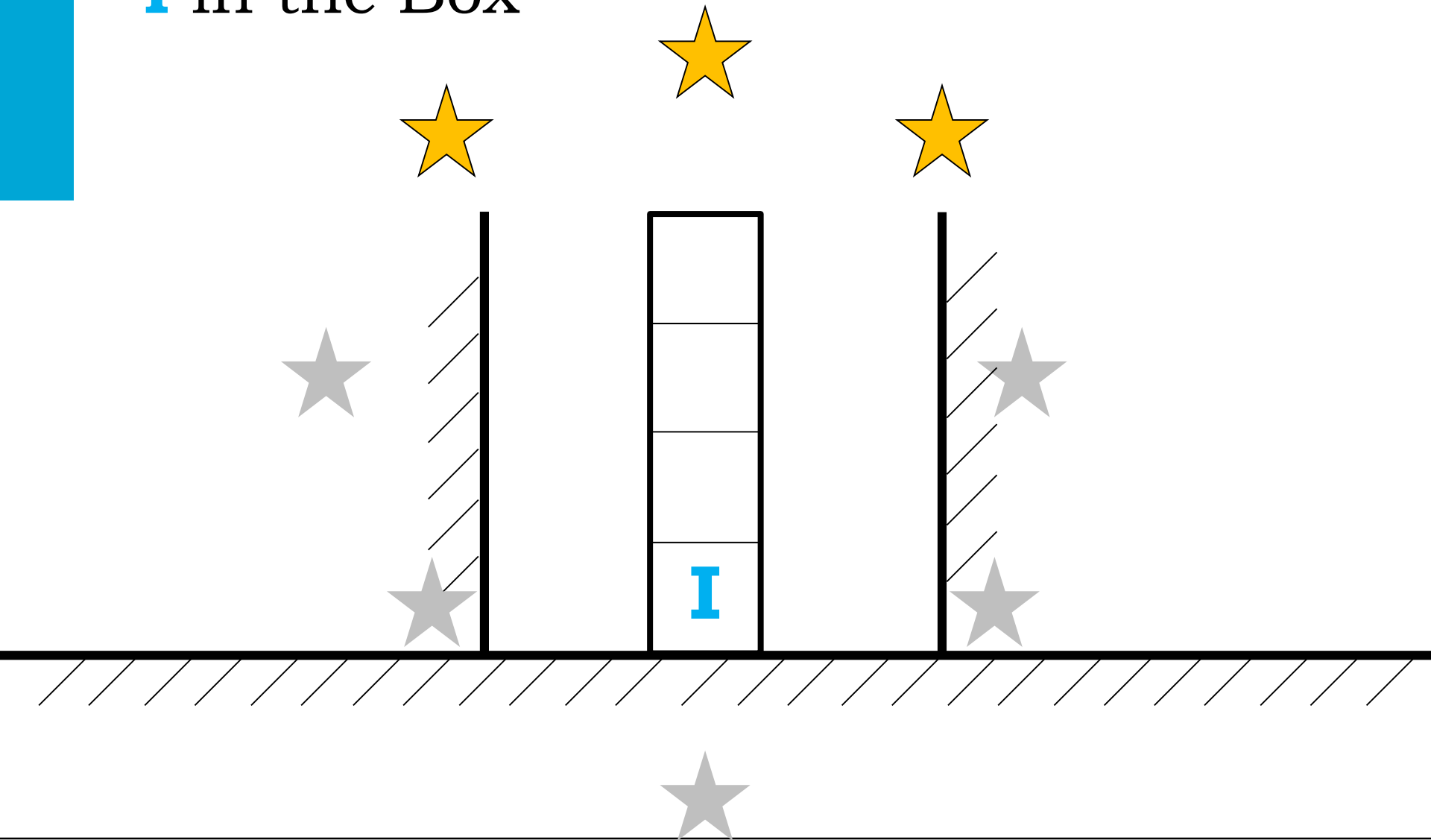
I in the Box



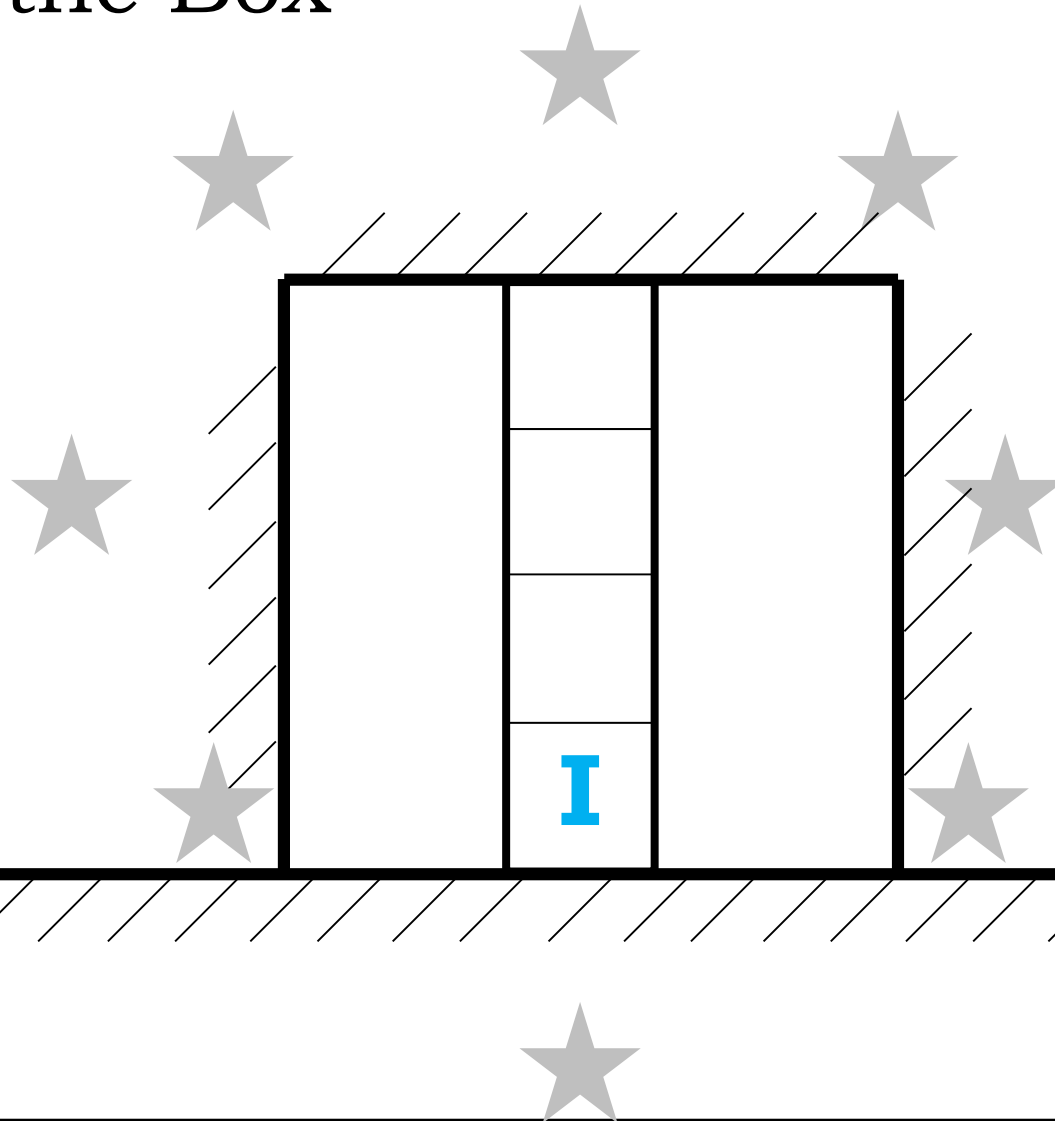
I in the Box

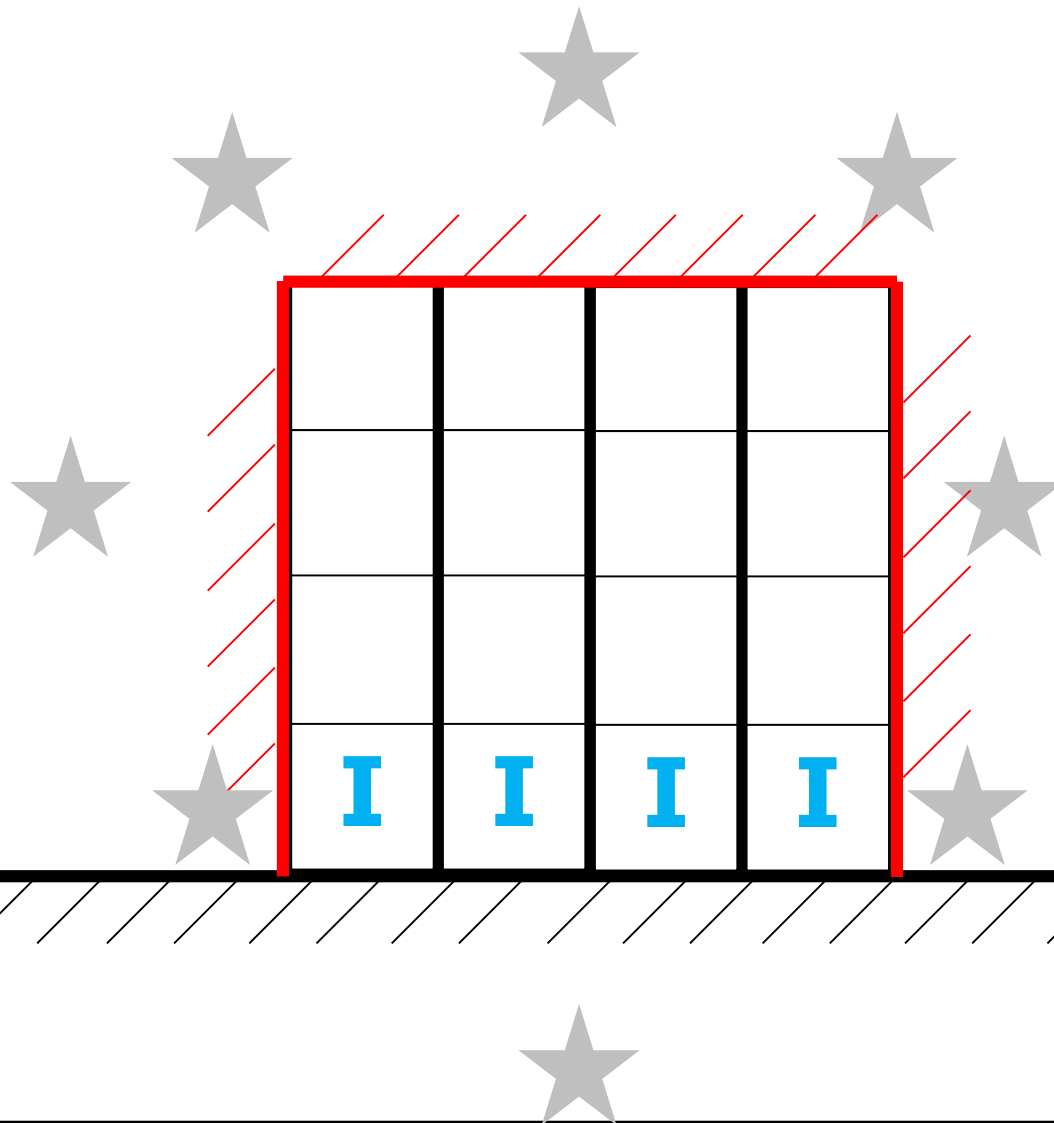


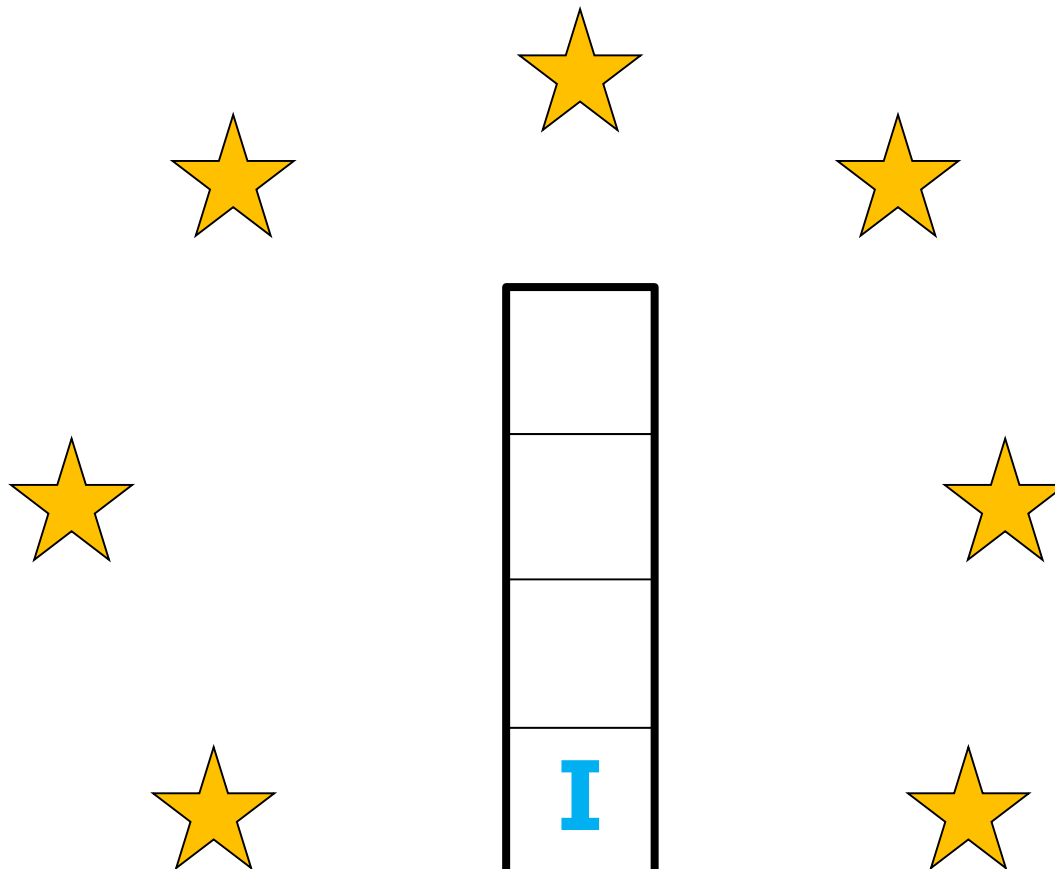
I in the Box



I in the Box







A Framework for Gamification in Higher Education

1. Decide on Learning Objectives and on core content*.

* You already have this

2. Describe the perfect student.
3. Design the gamified experience for every student.
4. Playtest your design and check for fun!
5. Operate your gamified course.

A Framework for Gamification in Higher Education

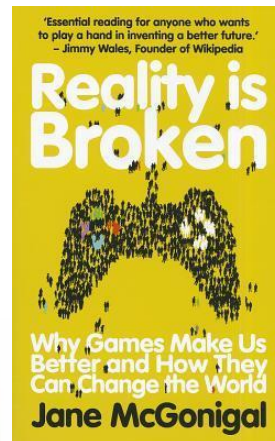
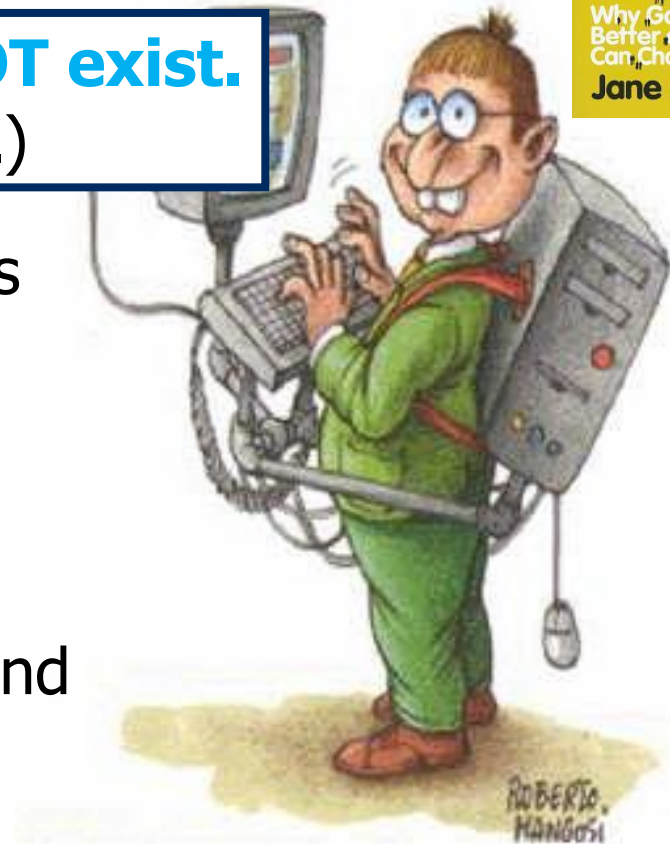
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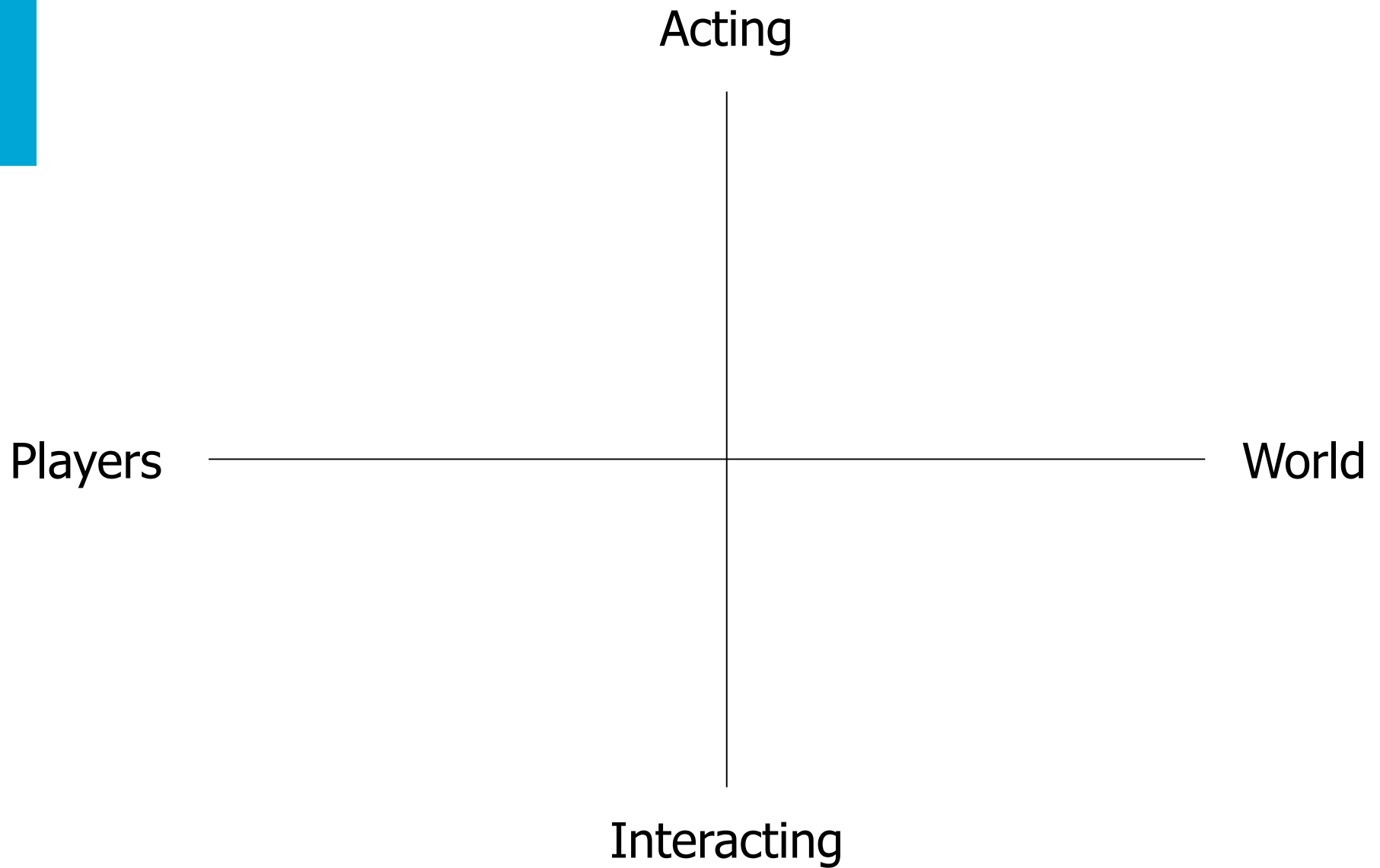
2. Design For the Perfect Student

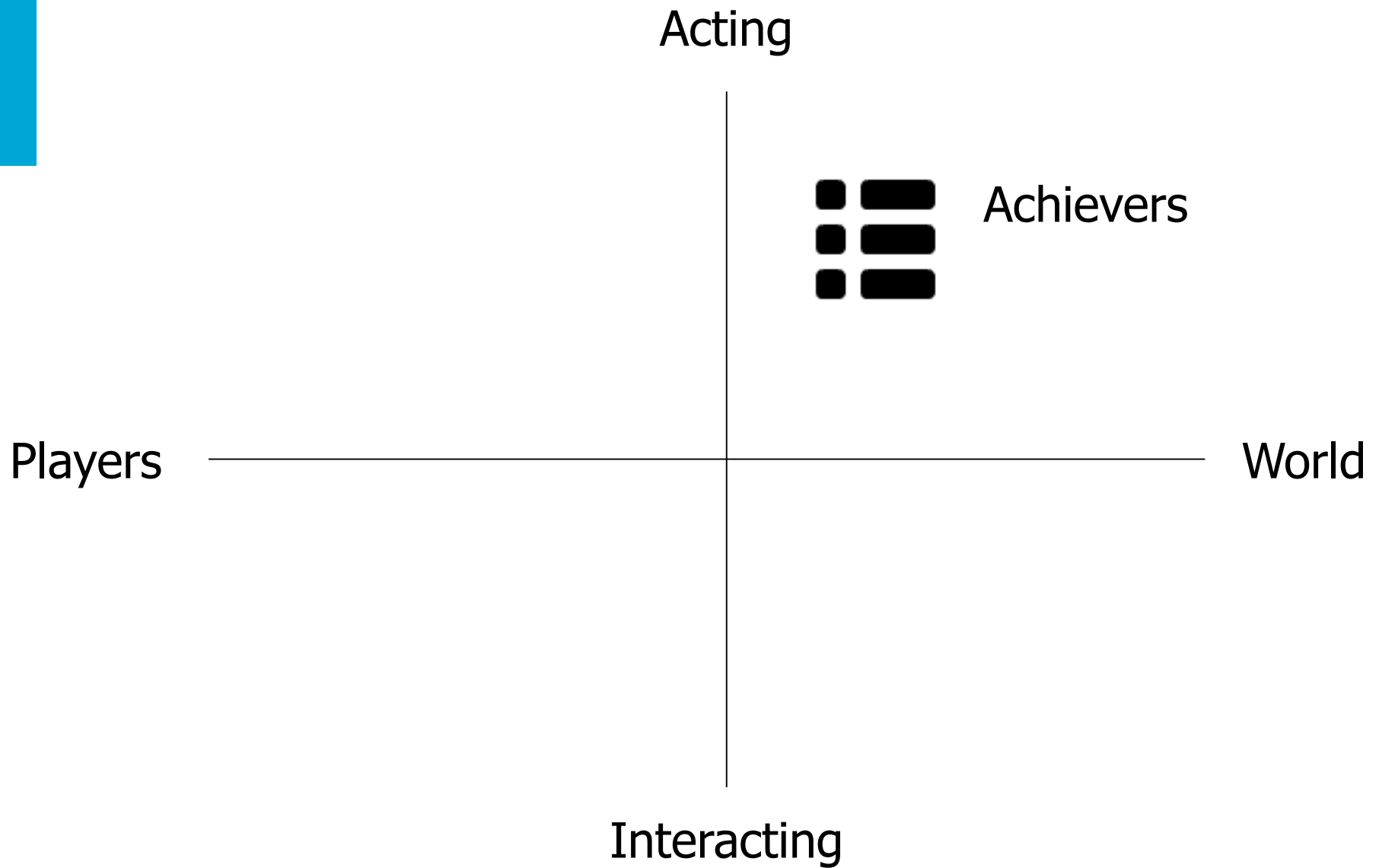
Q: What's Wrong With the Perfect Student?

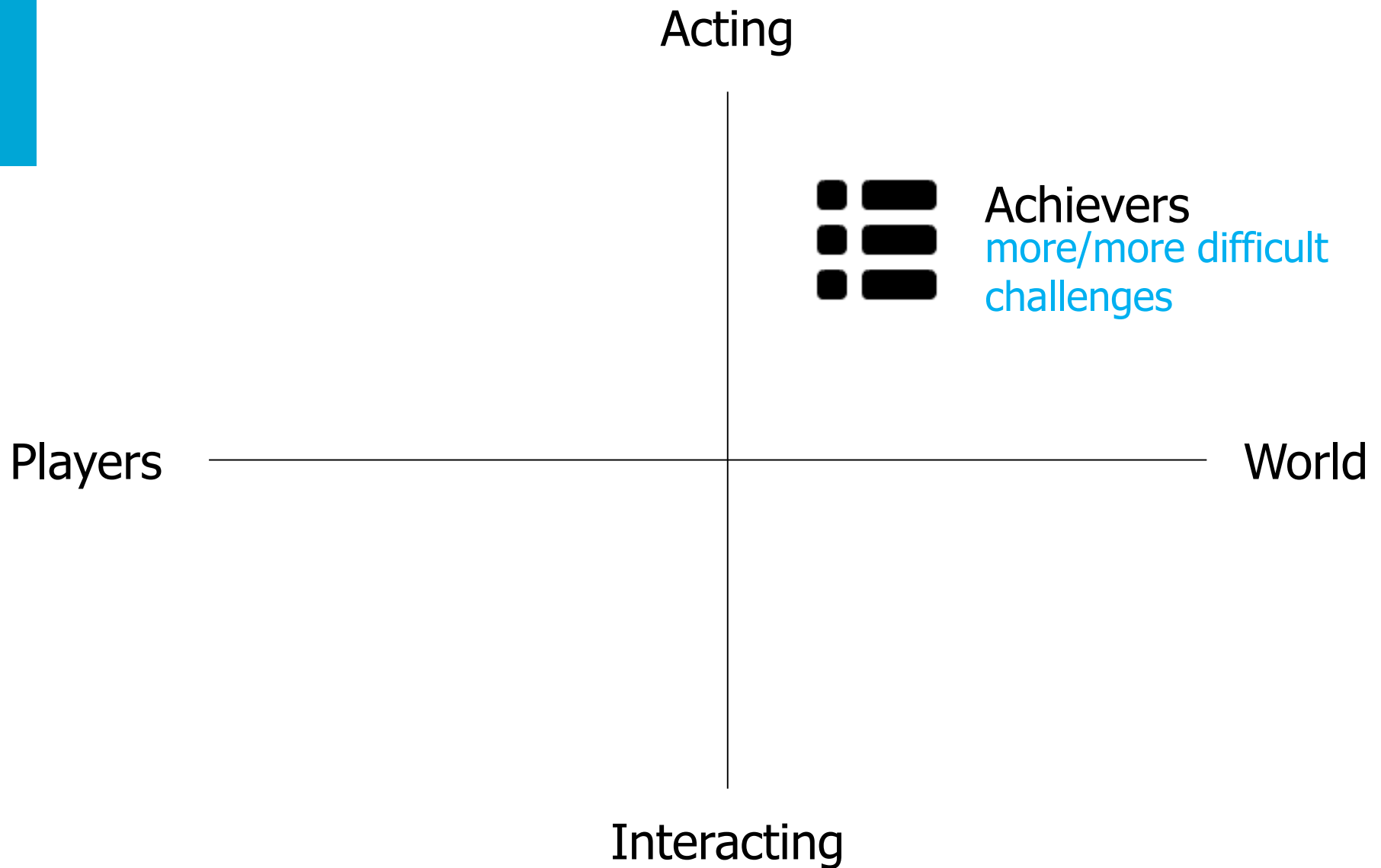
The perfect student does NOT exist.
(And yet we are all here.)

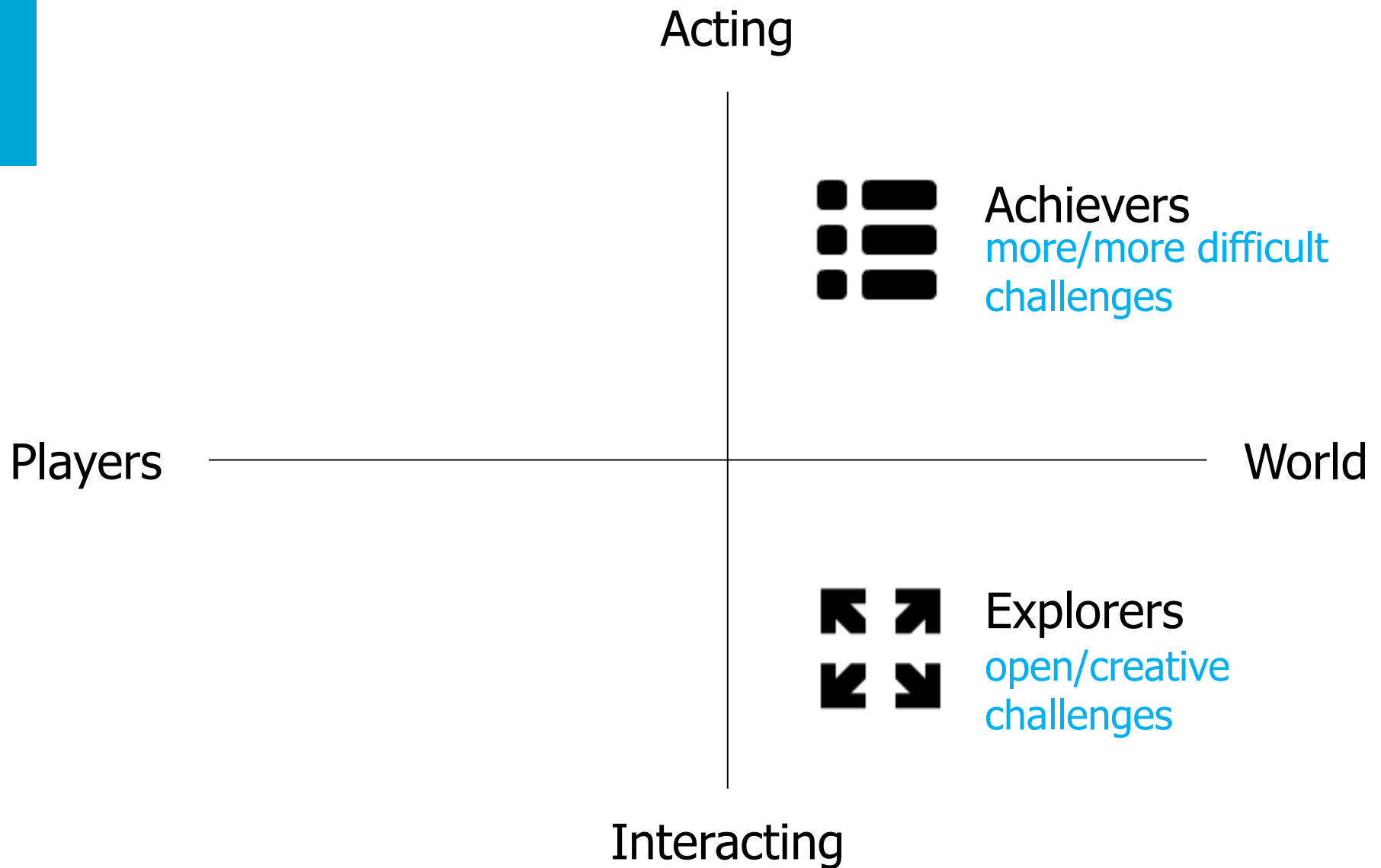
- Achieves all course objectives
- Explores new directions
- Socializes with students around
- Excels in all tests, early

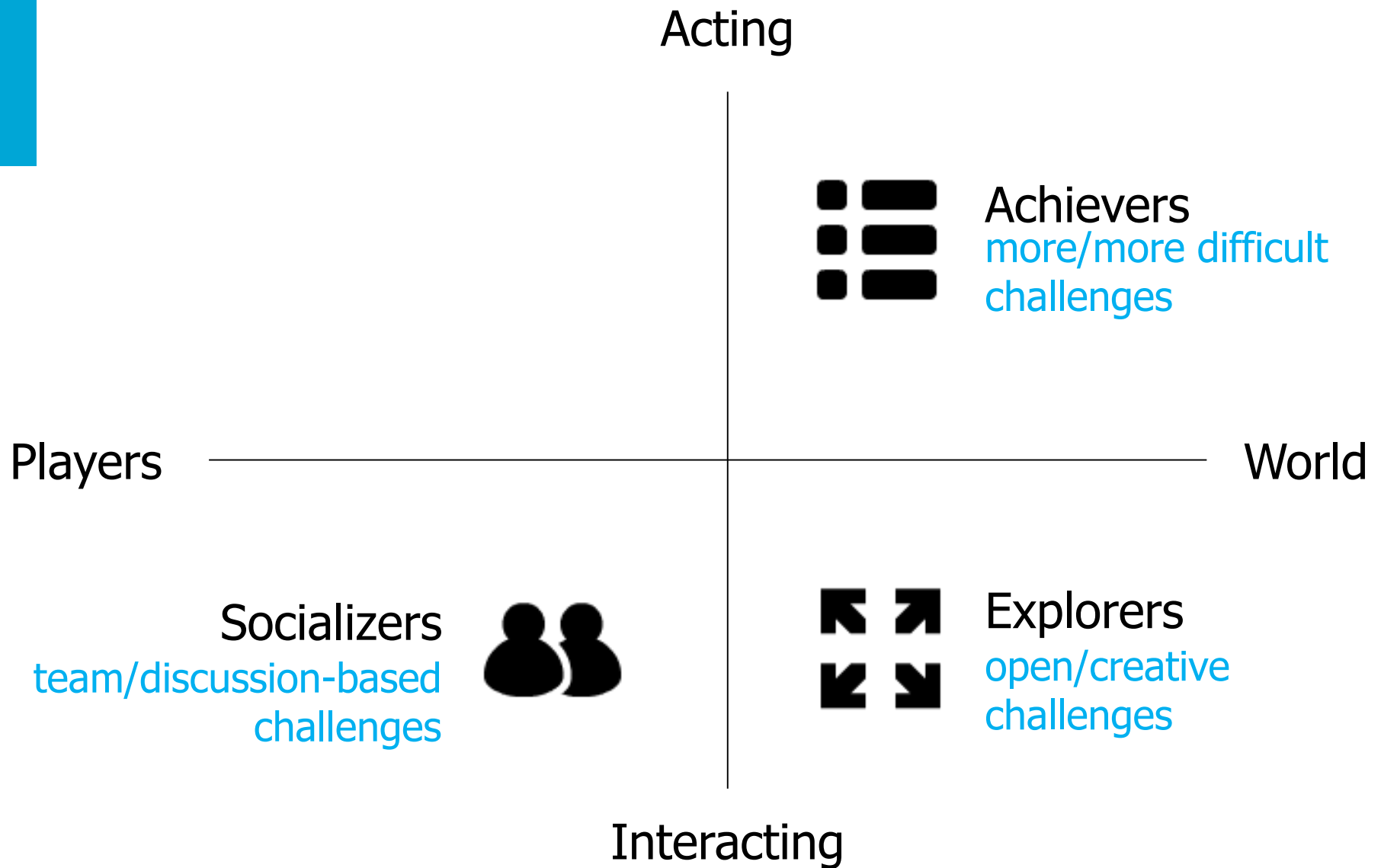












Acting

Winners

competitive/single-winner
challenges



Achievers

more/more difficult
challenges

Players

World

Socializers

team/discussion-based
challenges



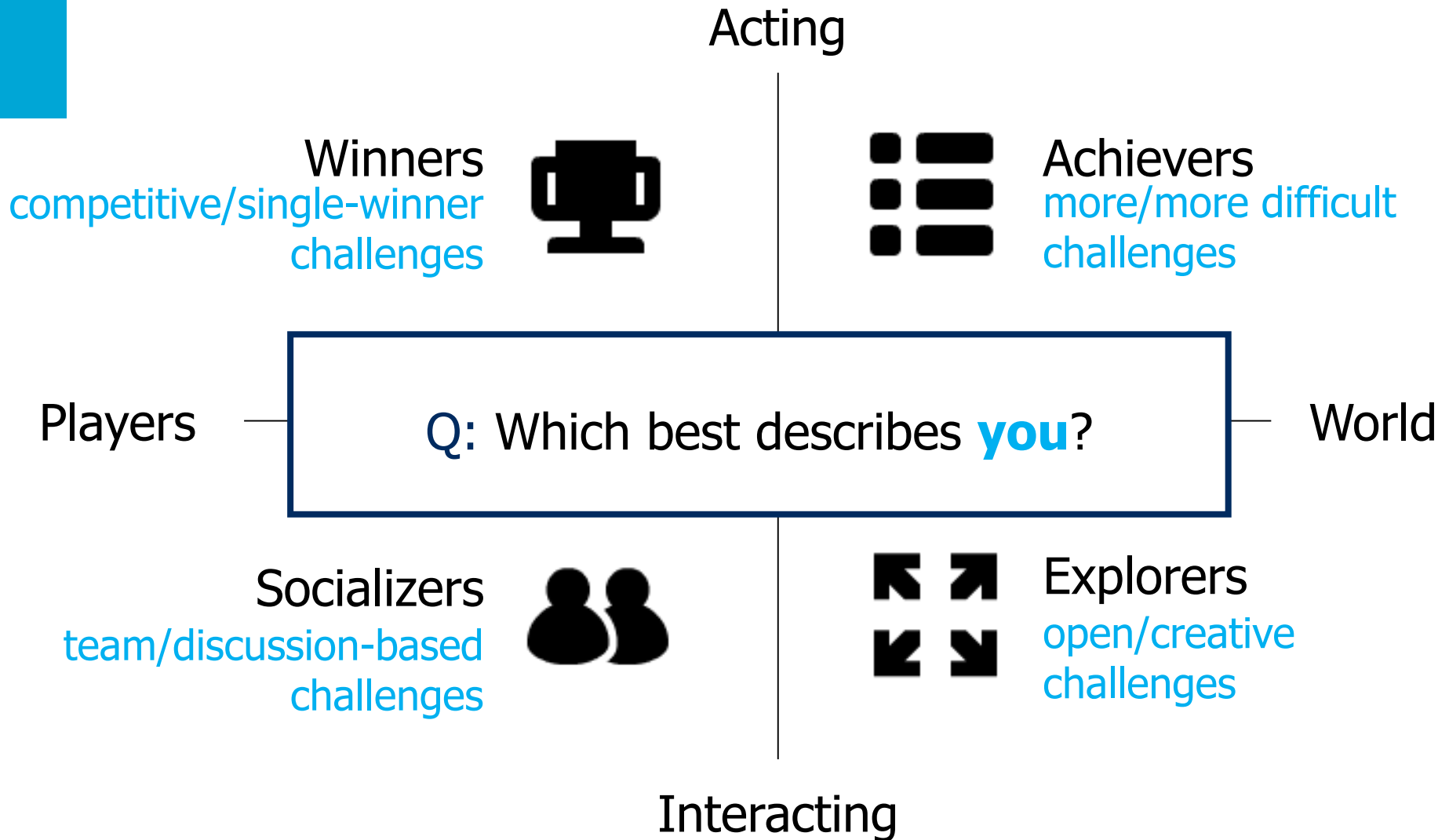
Explorers

open/creative
challenges

Interacting



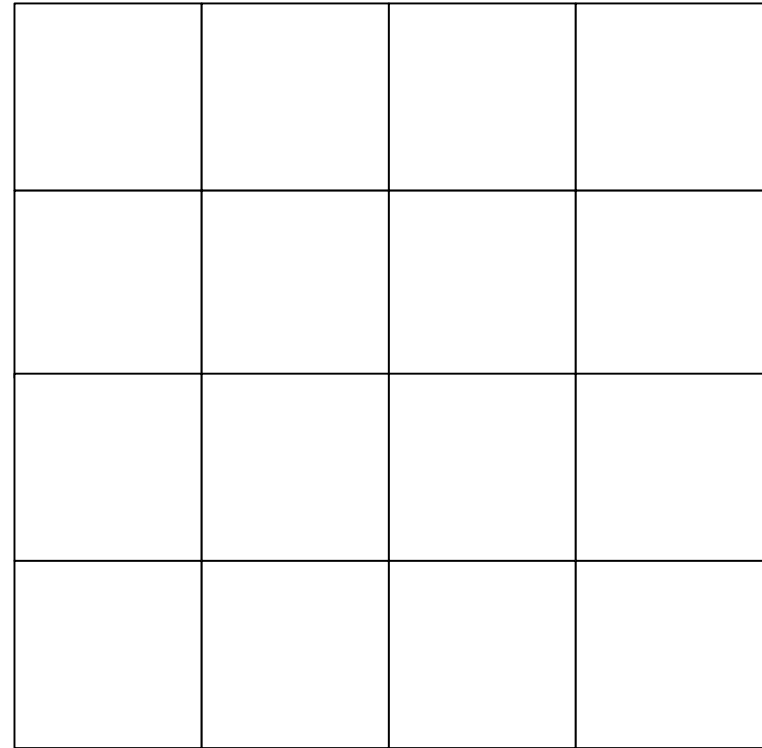
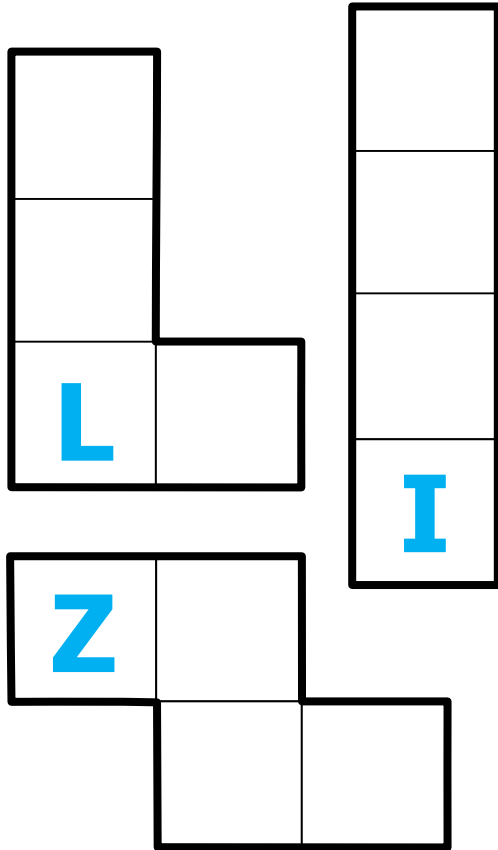
Exercise: The “Who Are You?” Game





Content Unlocked!

2 x



A Framework for Gamification in Higher Education

1. Decide on Learning Objectives and related content.
2. Describe the perfect student.
3. Design the gamified experience.
4. Playtest your design and check for fun!
5. Operate your gamified course.

Q: What's in a game?

A: **250,000,000+ active players**

Social Gaming =

100,000k+ players who
benefit from social engagement



Gamification should scale

1. Mechanics

Explore, do, learn,
socialize, compete
+

2. Dynamics

Player progress and
interaction, ...
+

3. Aesthetics =

Game Content*
puzzles, challenges,
extra-projects, culture

* Art class pending.

Mechanics

Possible ~~Games~~ for Teaching Facts, Concepts, Procedures, and Systems

What?	How? Common teaching elements
Facts	Story w terms, acronyms, and jargon Taxonomies and Venn diagrams Games of repetition, recognition, matching
Concepts	Story w metaphors Boundary examples (what is/is not) Games to experience, classify, compare, sort
Procedures (Rules)	Top-to-bottom view, story w Why? What? Role-playing (Mechanics + feedback)
Systems	Simulations to experience (Tutorials to experience under guidance)



Gamification Mechanics & Dynamics in Our Courses

- Too many to list here

- Scoring system is but one element
- Badges? Only for B.Sc., some “random”*

* Manga cum laude

- Onboarding (mechanics)

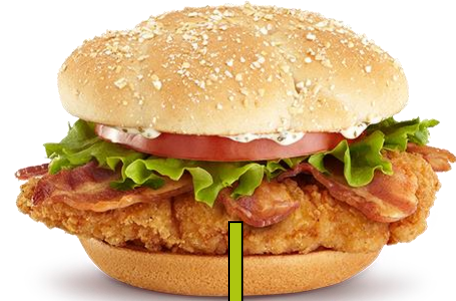
- Entry quiz
- Story every lecture

- Social Learning (dynamics)

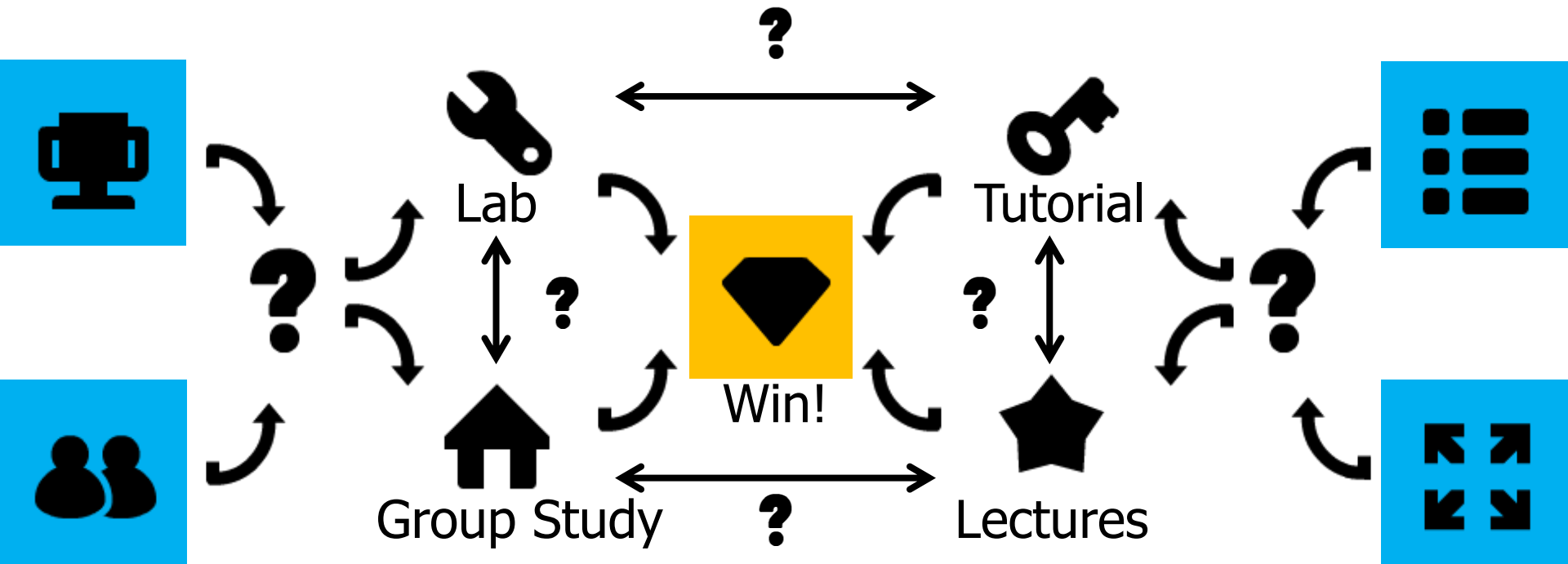
- In-class teams, competing casually
- Self-study as team effort, competing
- Involve Winners and Achievers in class
- Involve Winners and Explorers in self-study

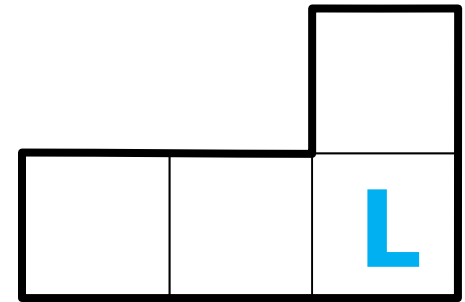
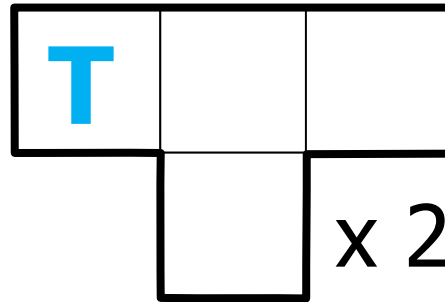
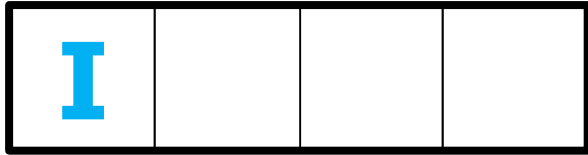
- Different player types → different Mechanics, Dynamics, Aesthetics

- Ladders, ranking, end-lecture quiz: mostly for Winners
- Content unlocking (dynamics): Explorers and Achievers

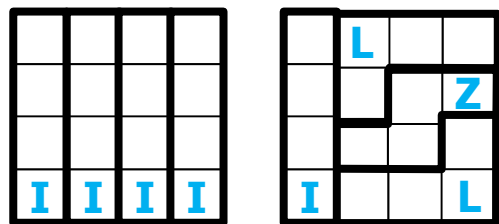


**Designing a course is
like creating a complex puzzle:
you design its Mechanics, Dynamics, Aesthetics**

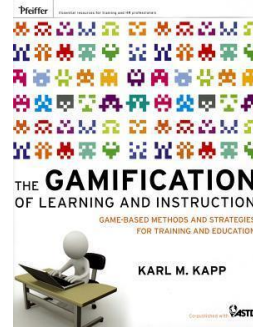




Does gamification work?

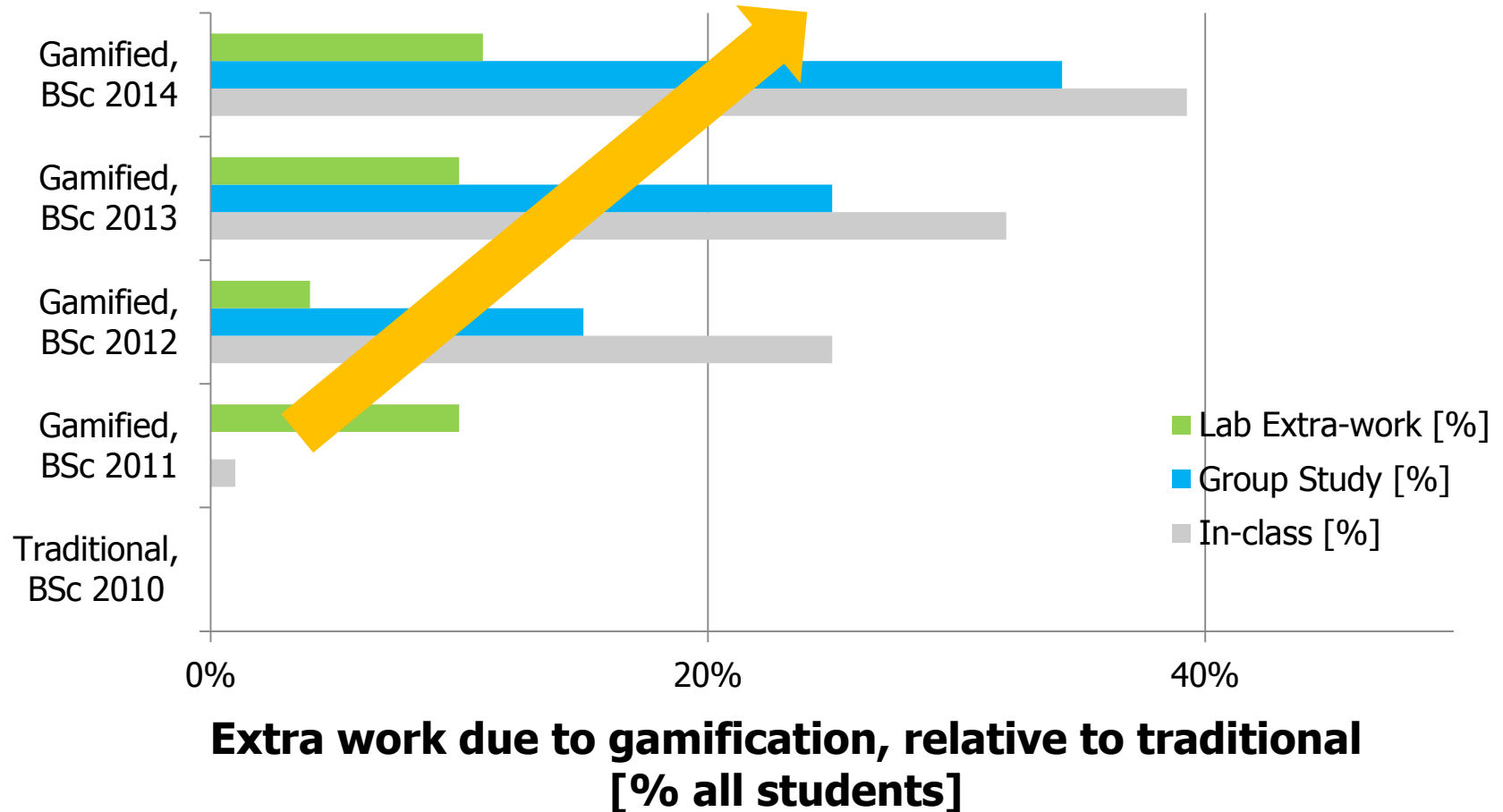


(Meta-)Research on Gamification in Education Is Inconclusive...



Study	Meta-study of ... studies	Findings
Randel et al. (1992)	>60	>50% no difference if using games. >30% significant improvement when using games.
Hays (2005)	>100	Game design must match learning objectives.
Vogel et al. (2006)	>30	Games can help improve cognitive skills vs. traditional.
Sitzman (2011)	>60	Playing improves confidence. Vs. traditional, better retention, declarative and procedural knowledge

Gamification works!



What Happens When A Student Does Not Like the Course Topic?

“ I want to thank you for showing that even though I'm not that good at written exams, I still can excel at other points in my study. I'd love to have a copy of my badge, as physical reminder of a course that made me eager to learn about things. Even when some of those things will never really have my interest.

This course, and the way it was given, learned me a few things about what motivates me, and only for that reason it was totally worth getting up for every lecture.

”

**Designing a course is
like creating a complex puzzle**

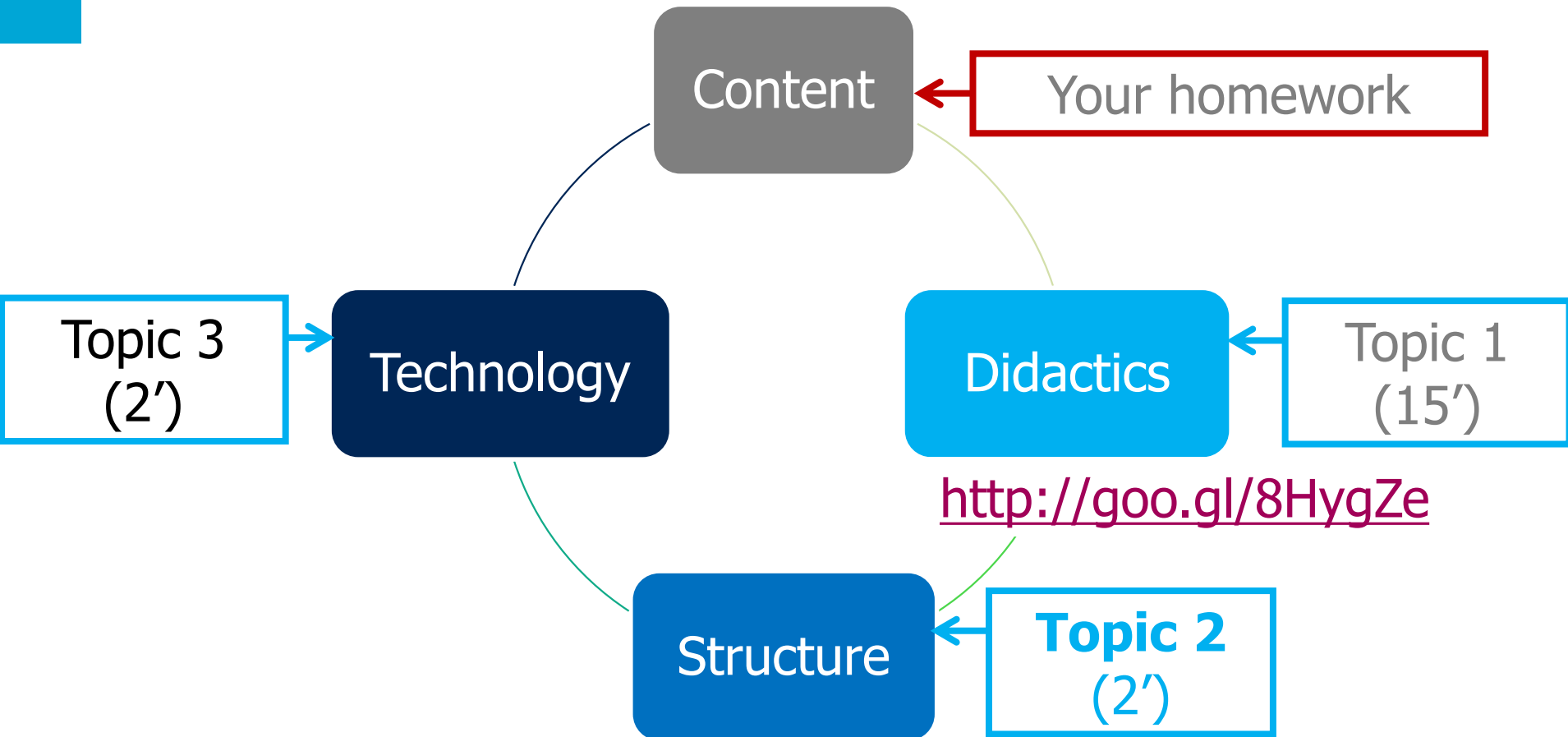
**Gamification framework:
concept & intuition, mechanics & dynamics, ...**

Gamification works!

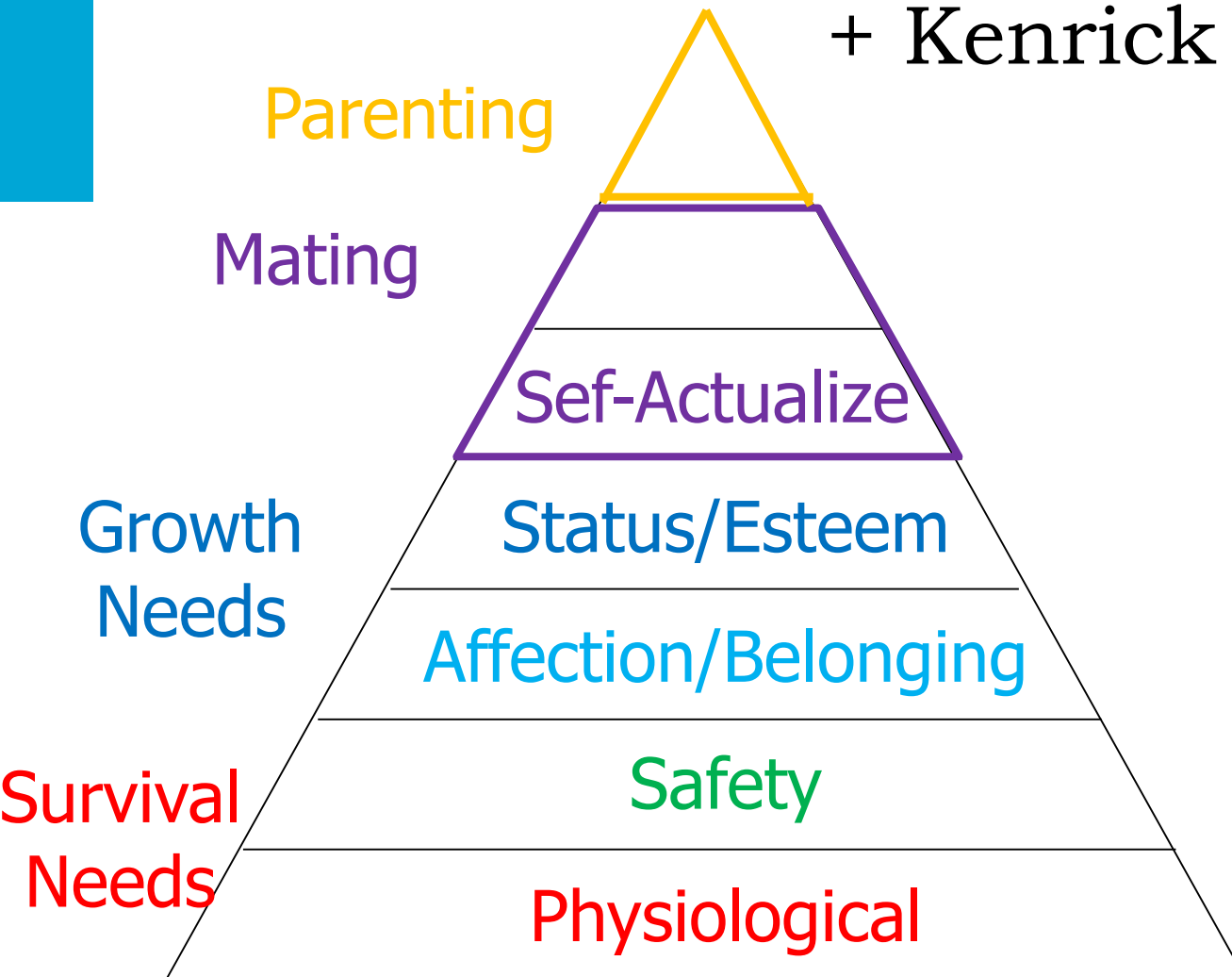


What Can We Do About Education?

Improve Everything, But Focus On



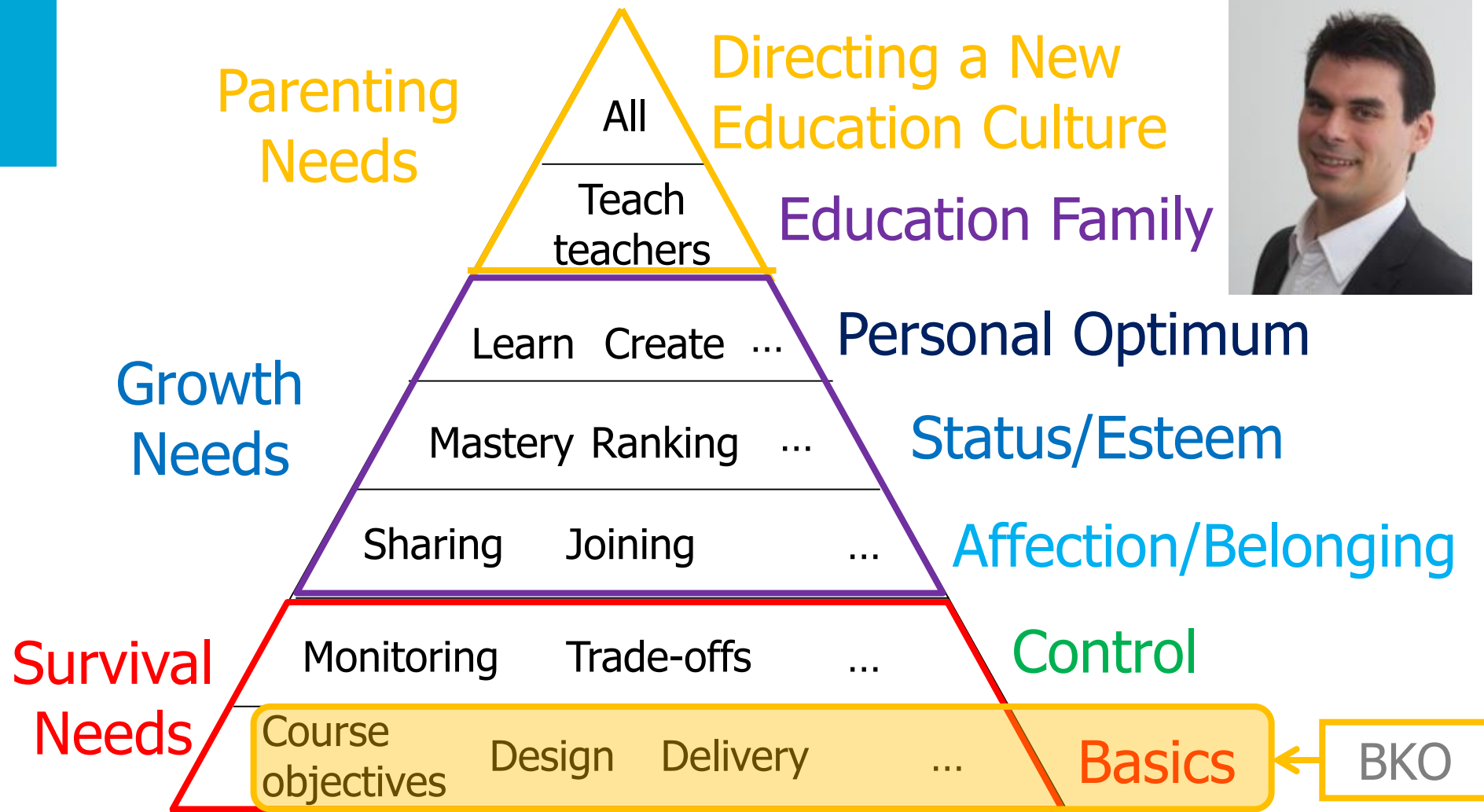
Maslow's Hierarchy of Needs (1943) + Kenrick et al. (2010)



Abraham Maslow

The Hierarchy of Needs for Teachers

Alexandru Iosup (2015)



The Hierarchy of Needs for Teachers (2015)

- We all know about the basics of teaching
- But:
 - Need to improve the BKO, especially for new conditions
 - Need a “diurnal” cycle (sleep=research)
 - Need much better content-authoring **tools**, especially for new conditions (MOOCs, blended, ...)

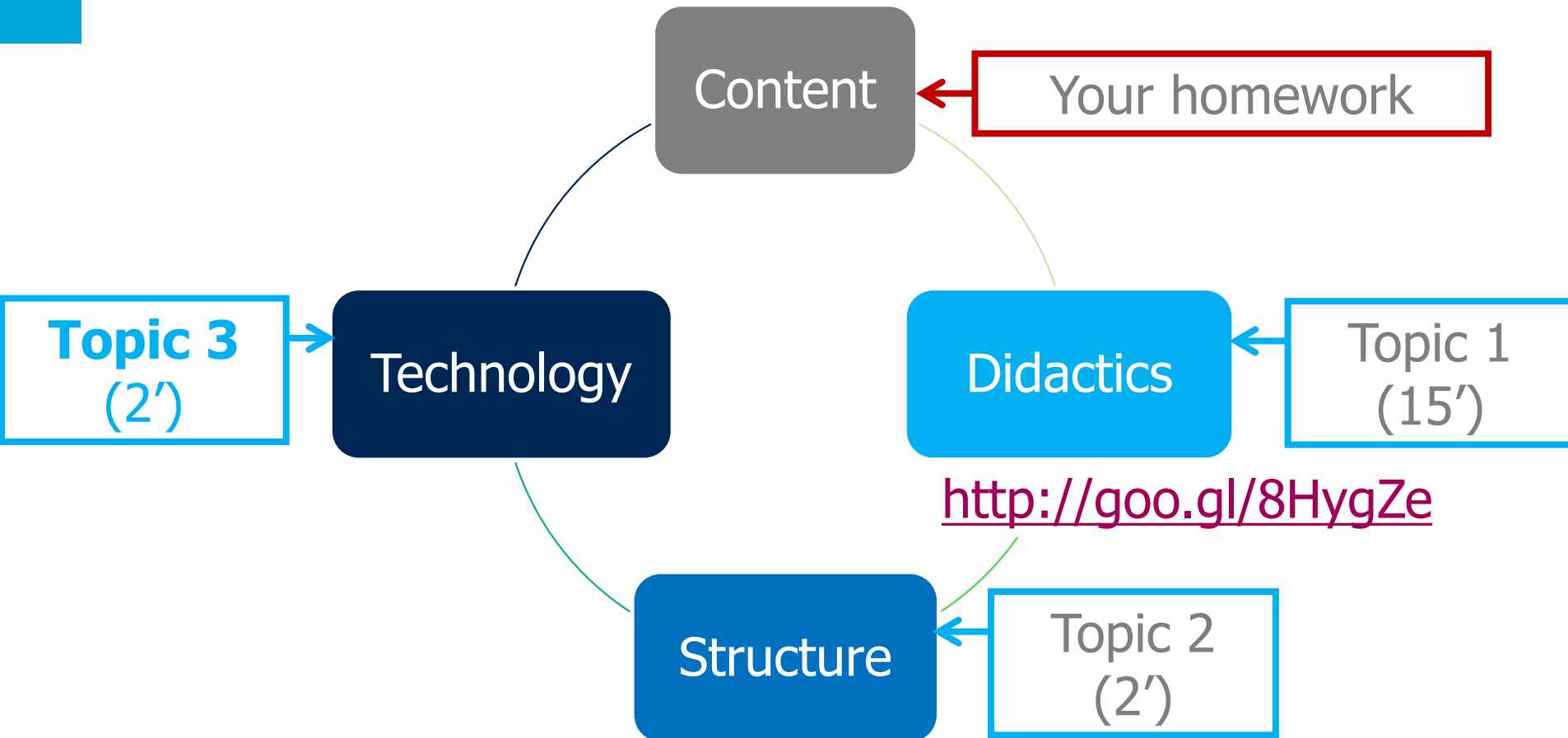


Survival
Needs

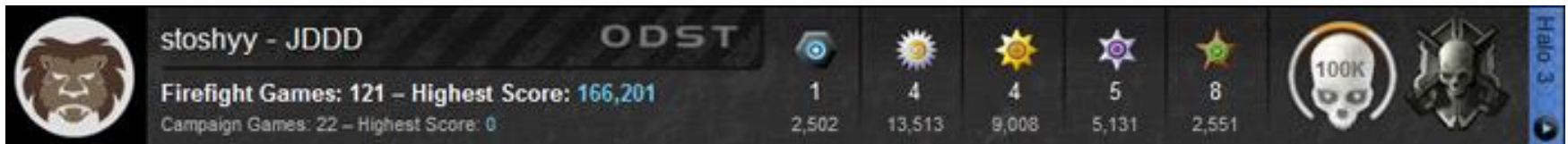
Basics

What Can We Do About Education?

Improve Everything, But Focus On



Gamers Must Be the Most Informed Citizens on the Planet



- Halo 3 is one of the **many** successful games
- Halo 3 produced and transferred to its players $\sim 1.5\text{PB/year}$
 - Detailed player profiles
 - Detailed usage stats
 - Ranking
 - Content details
- At the same time, CERN produced $\sim 15\text{PB/year}$

What If Students Were Truly Informed About Their Education Status?

The Personal Academic File: Ethical Use of Student Data

- Enable data access and processing to help students
- Develop automated tools to inform and, if possible, to suggest course of action
- Use data ethically: opt-in, etc.

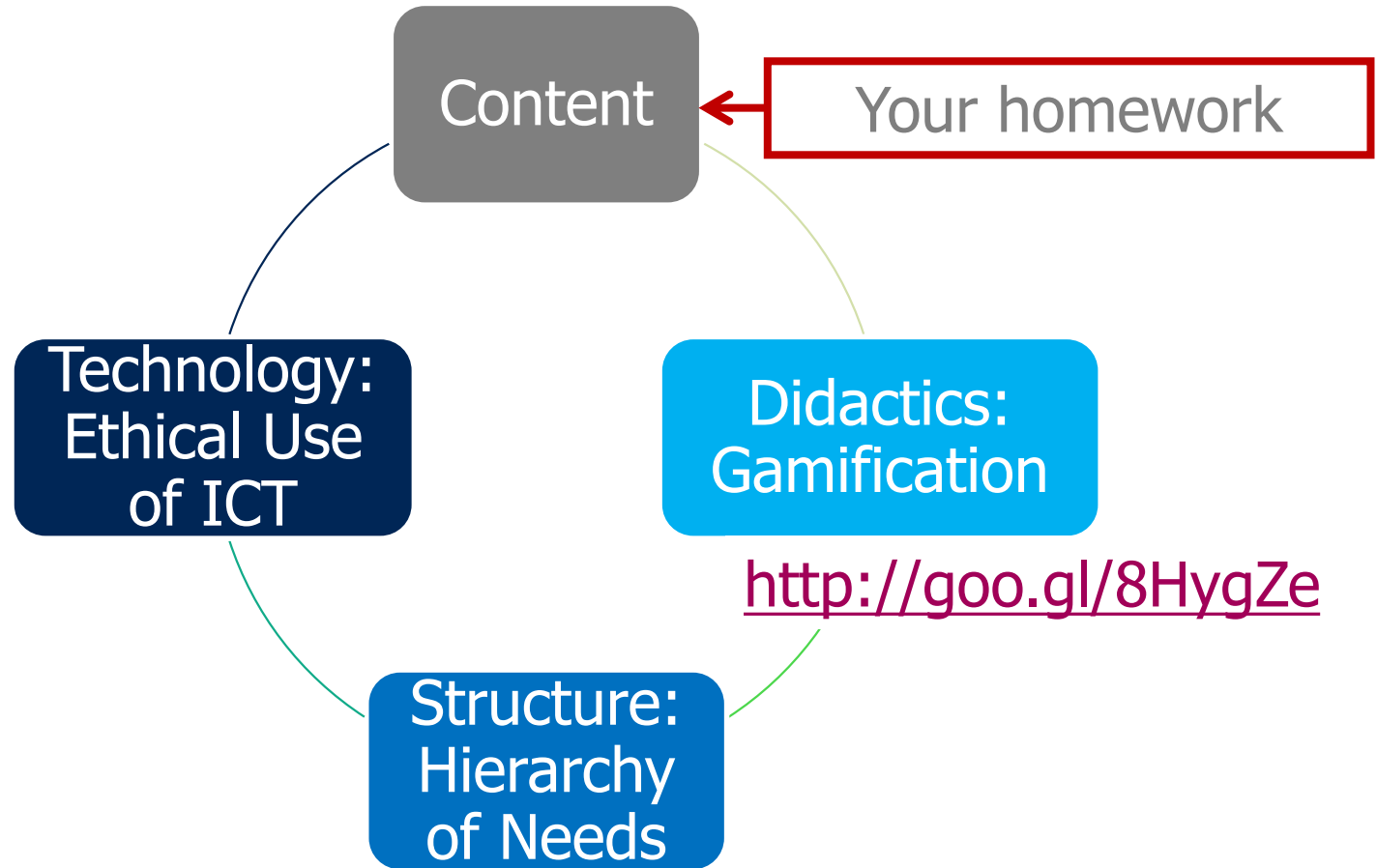
Empowered = Engaged

- Student in control of own progress
- Detailed feedback becomes possible
- Student advisor can give better advice

ICT challenges

- Effective and efficient platform (cloud)
- Automated tools (mining)
- Access to data (privacy and security)

On the Future of Higher Education: Gamification, The Pyramid of Needs, and ICT to the Rescue

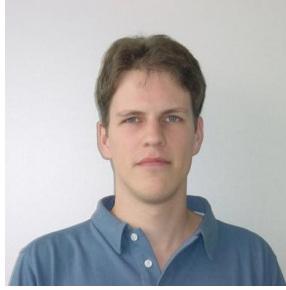


Thanks from our team.



Alexandru Iosup

Gamification
Researcher &
Professor



Otto Visser

Gamification
Engineer &
Professor



Ana Lucia
Varbanescu

Gamification
Professor



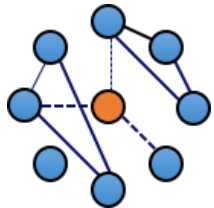
Tim Hegeman

Gamification
SA



Jesse Donkervliet

Gamification
SA



www.ds.ewi.tudelft.nl



<http://goo.gl/8HygZe>



<http://goo.gl/32xRgA>

There's No Free Lunch!

- Gamification takes time and energy
 - One week to consider gamification elements +
 - One day per lecture for adaptation +
 - Continuous adaptation +
 - Continuous assessment, e.g., end-lecture quiz +
 - Explaining a new system to students +
 - The nitty-gritty details
- Gamification takes personal effort
 - A new system has to conquer inertia
 - A new system has to conquer doubt
- **You are not alone, we are here to help!**



A: Wonderful Advances in Gaming, Last 10 Years: diverse **individual** challenges



A: Wonderful Advances in Gaming, Last 10 Years: diverse **social** challenges



References (Shortlist, brief info)

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Images used in this lecture courtesy of the Computer History Museum, Mountain View, California, USA, <http://www.computerhistory.org/> ; the German Museum of Technology (Deutsches Technikmuseum Berlin, Germany, <http://www.sdtb.de/Englisch.55.0.html> ; the Science Museum, London, UK, <http://www.sciencemuseum.org.uk/>; and many anonymous contributors via Google Images. Many thanks!