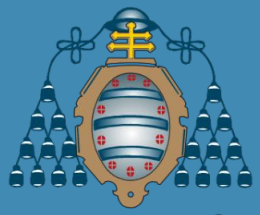
EXPERIENCES WITH FLIPPED LEARNING AND VIDEO VIGNETTES FOR FUTURE MATHEMATICS TEACHERS

LUIS J. RODRÍGUEZ-MUÑIZ & LAURA MUÑIZ-RODRÍGUEZ



UNIVERSIDAD DE OVIEDO

CONTEXT:

MASTER'S DEGREE IN TEACHER TRAINING IN SECONDARY EDUCATION

- Started in 2009/2010
- Organized in specialities (Maths, Physics & Chemistry, Biology & Geology, etc.)
- 12/15 students in Mathematics speciality
- Courses:
  - Additional Discipline-Specific training: in 4 blocks (Analysis, Geometry, Algebra, Statistics & Probability)
  - Learning and Teaching of mathematics
- Students' background:
  - Mathematics (50%)
  - Engineering & Architecture:
    - Industrial
    - Mining
    - Civil / Building
  - Physics
  - Economy and Business

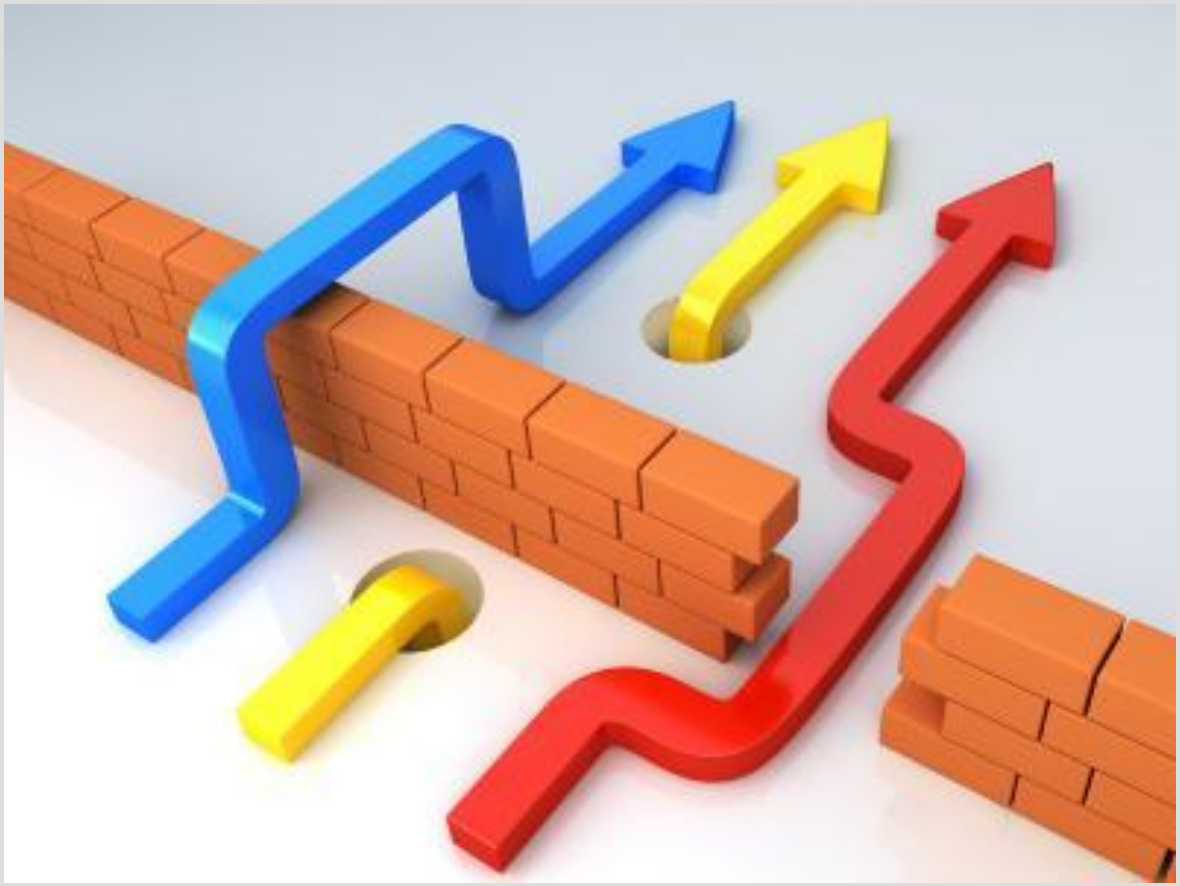
Lack of background at Secondary Education

Instrumental training at University

Memoristic learning, based on applying formulae

Last block of the course

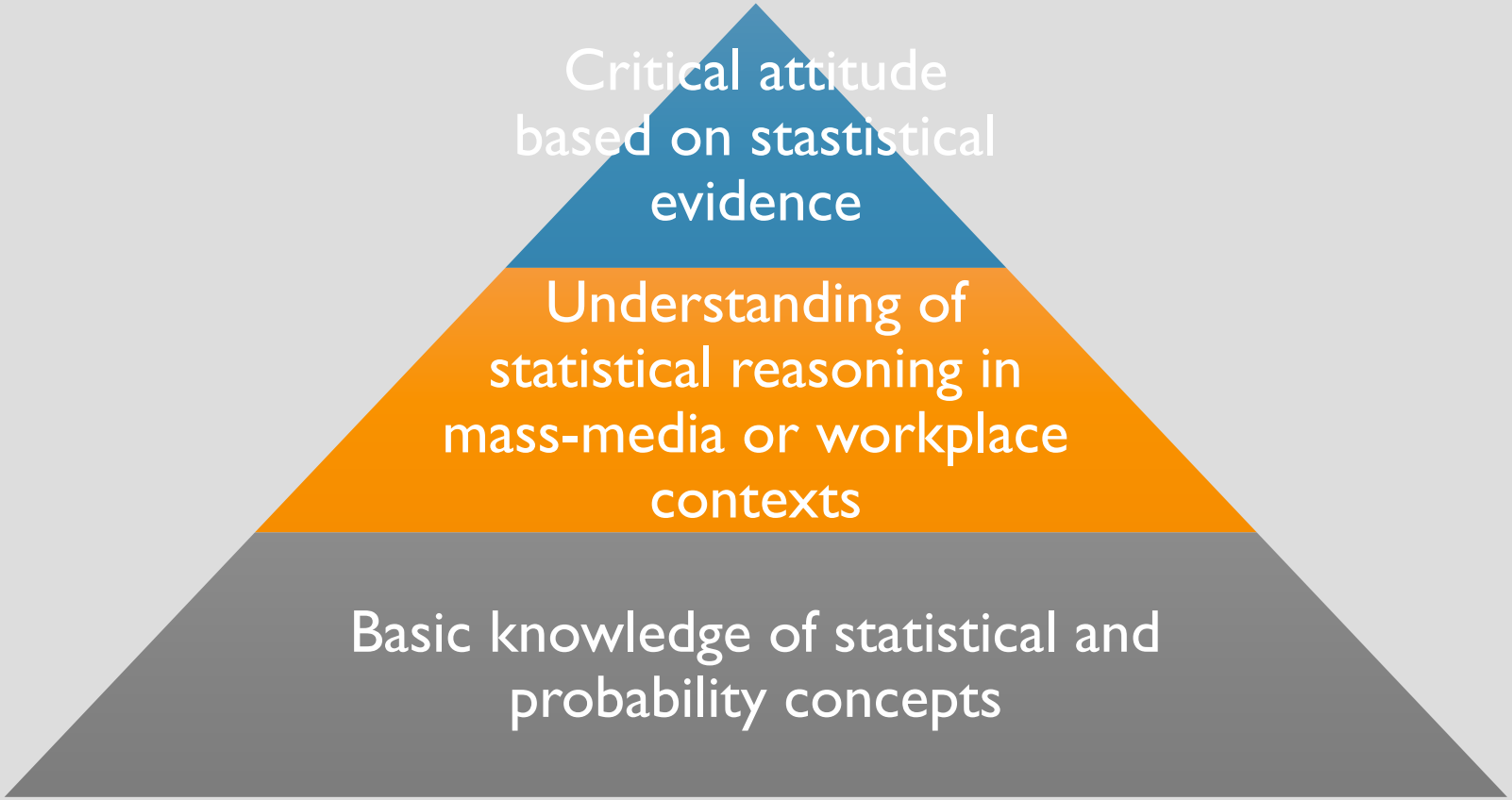
Need of discussing the curricular contents in the course



STATISTICS & MATHEMATICS (COBB & MOORE, 1997)

- *"Statistics is a methodological discipline. It exists not for itself but rather to offer to other fields of study a coherent set of ideas and tools for dealing with data"*
- "*Like mathematicians, data analysts also look for patterns, but ultimately, in data analysis, whether the patterns have meaning, and whether they have any value, depends on how the threads of those patterns interweave with the complementary threads of the story line. In data analysis, context provides meaning.*"

LEVELS OF STATISTICAL LITERACY (WATSON, 1997)



GAISE (2007): **GUIDELINES FOR ASSESSMENT AND INSTRUCTION IN STATISTICS EDUCATION**

Need and relevance of data and context

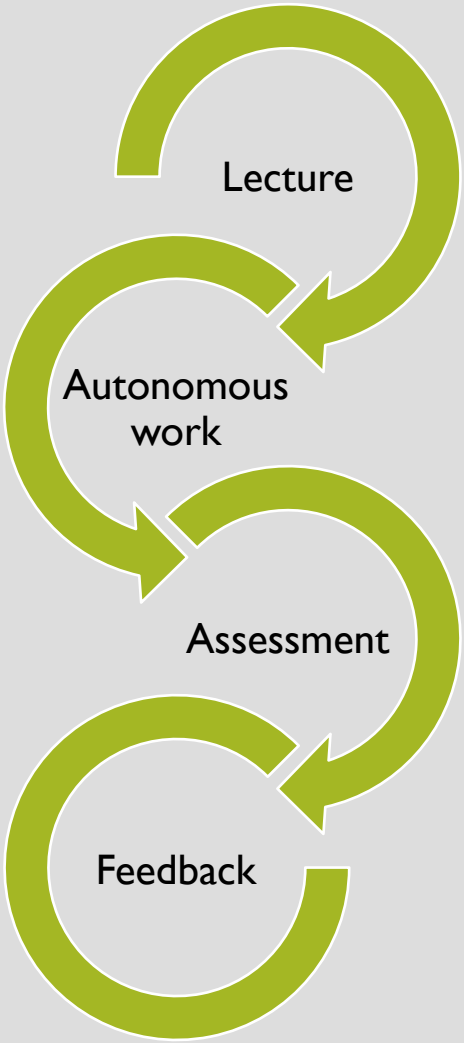
Omnipresence of variability, in different sources (essence of Statistics as a discipline)

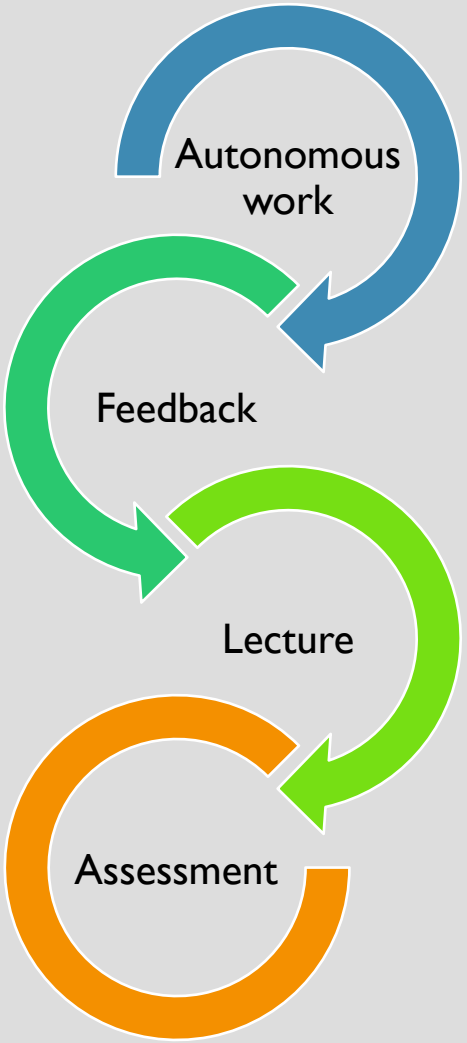
Quantification and explanation of variability (notions of randomness, probability distributions, spread measures, exploratory analysis, etc.)

Increasing role of probability and other parts of mathematics, parallelly to the increase in levels of understanding

FLIPPED CLASSROOM

BERGMANN & SAMS (2007, 2011)





I did it and it worked…

EVIDENCES IN EDUCATIONAL LITERATURE

Increases students' engagement

Better or equal students' performance

Promotes self-regulation

Increases students' classroom participation

Improves motivation and perception of self-efficacy

Improves results when blended: inquiries and feedback

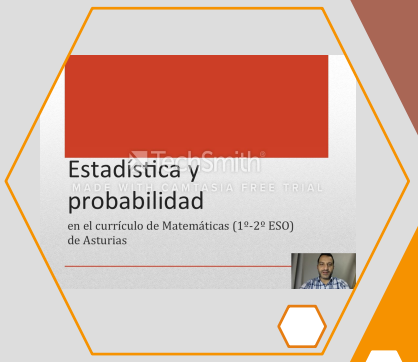
LEARNING OUTCOME

To know the curricular contents of Mathematics and Statistics in Secondary Education and High School

Content

Aula **Invertida**
Flipped Classroom

Tools



Format

MINISTERIO
DE EDUCACIÓN
Y FORMACIÓN PROFESIONAL

Support

moodle

Recording 5 clips about curriculum in Statistics & Probability in Secondary

Editing with Kaltura

Uploading to a private channel on YouTube

Asking students to watch the clips before the lectures

FAIL

Editing clips with Edpuzzle

Embedding multiple-choice and open-ended questions

Asking for weaknesses, uncertainties, support needs, doubts, etc.

Counting students' work and answers as a part of the course mark

Uploading to Edpuzzle channel

success

QUESTIONNAIRE TO STUDENTS

- No one had used flipped learning in the bachelor degree
- Almost all (except one) consider it an appropriate methodology for this course. One student considers it is appropriate but not for this course.
- 80% of students declare the methodology increased their interest for the course.
- 50% of students think clips are better with embedded questions. 30% would prefer other type of questions. Only 10% would prefer a clip without questions.
- 40% of students think clips are too long.
- 90% of students think flipped learning is valid for the master degree.
- Global score: 4 up to 5 points.

HAS THIS METHODOLOGY IMPROVED YOUR EXPECTATIONS ABOUT THE COURSE?

I think it's a right, different and dynamic way for teaching, but the mistakes in questions on clips were overrated.
My experience with the course improved.
I think it can be improved by solving similar problems in previous lectures.
It is better because when we go to the class, the professor knows our difficulties.
It improved my experience, because after the clips we could work the difficult issues in the class. There were some general mistakes and misunderstandings that became unveiled after the clips.
I find it very useful when we are asked to express our doubts and, then, we deal with them in the class.
Yes, since in the latter classes we deal specifically with the weak points, and that was very useful.

HOW WOULD YOU IMPROVE THIS METHODOLOGY FOR FUTURE YEARS??

Using it for more practical topics.
It has been ok like this
More details about the scores in the questions
There was one clip was too long and dense. The rest had a proper duration.
I think this is an interesting methodology, but more for the University rather than for secondary education. The longer clips were too boring.
I think it would be helpful specifying the required length in the open-ended answers, and providing better feedback to wrong answers.
Less text in the clips

WEAKNESSES:

Technologically dependent

Heavy work (at the beginning)

Too long, dense clips

THREATS:

Continuous improvement in the clips

Lot of "competence" on the web

Increase in the number of students

STRENGHS:

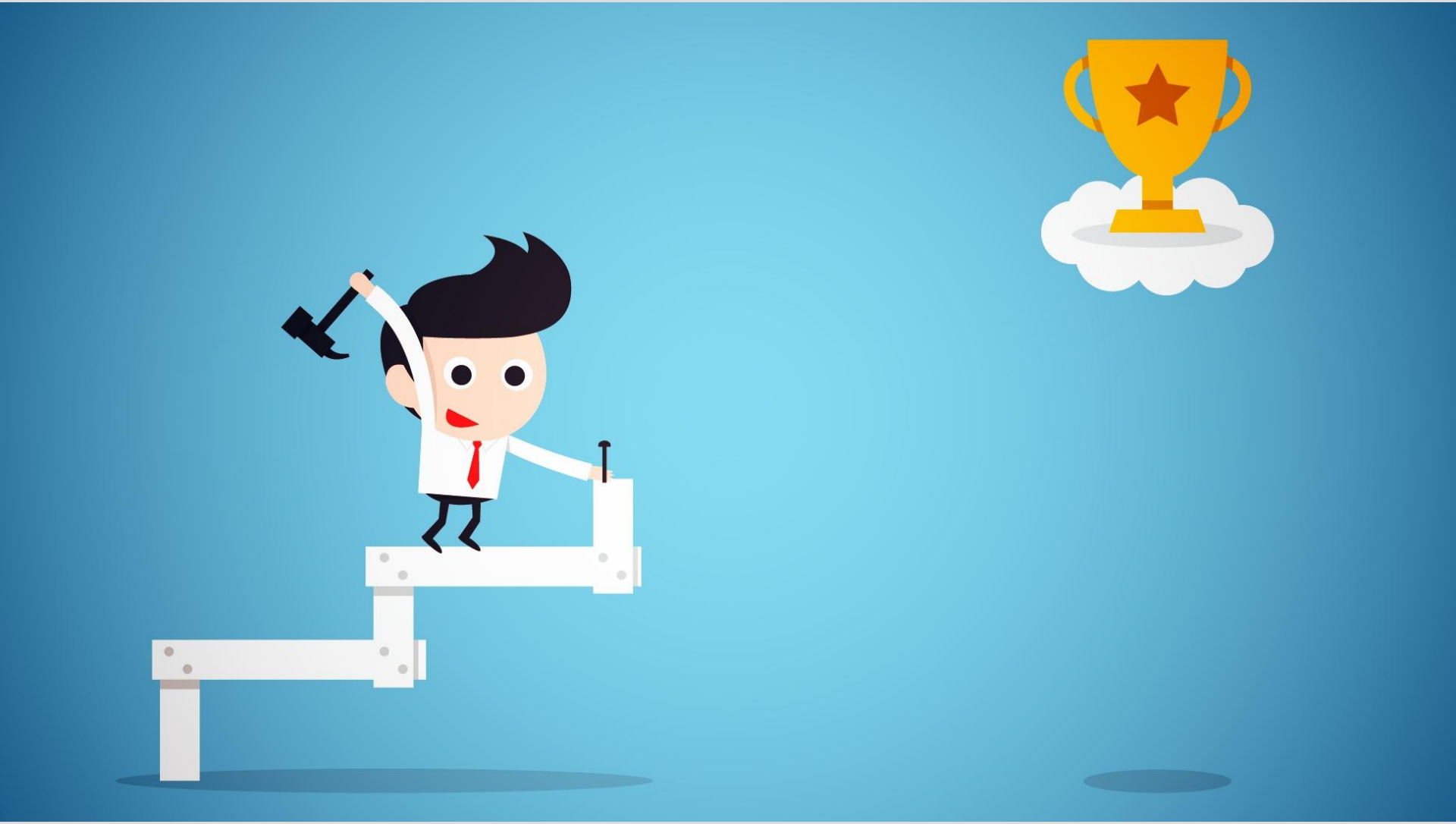
Feedback

Better knowledge of your students

Reflecting about Statistics & Probability, differences with mathematics

OPPORTUNITIES:

Adequate software (OBS and OpenShot)

Combination with auxiliary tools (Geogebra, R, Excel, applets, etc.)

Increase of the students' engagement