Building capacities for evolving geospatial needs in Myanmar

Innovating your curriculum

experiences from ITC

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ITC – Geoinformation Science and Earth Observation

University of Twente

ITC

UNIVERSITY OF TWENTE.

MIMU

Myanmar Information Management Unit

CONTENTS

- The ITC MSc curriculum
- Mix research and education
- Accreditation and quality control
- Student centered learning

ITC - FACULTY OF GEOINFORMATION SCIENCE AND EARTH OBSERVATION

Every year ~700 students from 55+ nationalities enroll in different types of education: 150 in our MSc M-GEO, the rest in short courses and e-learning courses

Nr 6 in world ranking on earth observation education

ITC's Mission
Capacity development through education and research

UNIVERSITY OF TWENTE.

ITC – MSC GEOINFORMATION SCIENCE AND EARTH OBSERVATION

www.itc.nl

Year 1

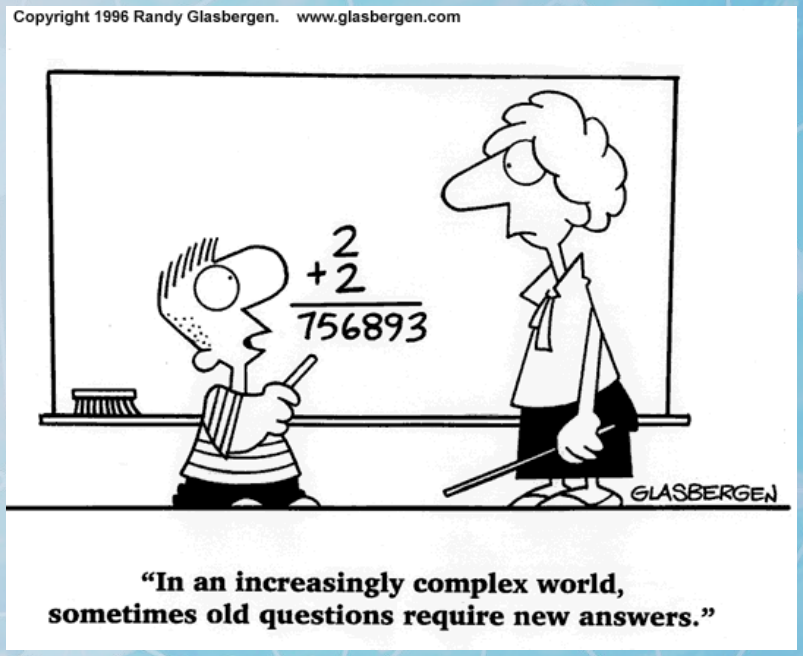
- Principles GIS and RS
- Domain specific
- Electives
- Project

- Geological remote sensing
- Food security and biodoversity
- Hazards and Disaster Risk Reduction
- Water management
- Urban/rural planning land admininitsrayion
- Geoinformatics

Year 2

- Electives
- Scientific proposal
- MSc Research
- Internship

Keep up to date



REASONS FOR INNOVATION OF THE CURRICULUM

Big stuff:

- Changing demands in society, industry (Sustainable Development Goals and Sendai Framework for Disaster Risk Reduction)
- Developments in science and methodology (keep up)
- Developments in data sources (new satellites, drones)

Common stuff:

- Ensure continued quality and accreditation
- New research gives staff new experience that is transformed in new education material
- New staff bringing in new knowledge/skills
- Change of education vision, try some new methods of education
- Finances

THIS IS OUR FUTURE!

Photograph by Pablo López Luz

2030 Projection: New Delhi will have a population of 50 million

Plastic soup in the ocean

THERE MUST BE CONSTANT INNOVATION OF THE CURRICULUM

- Because knowledge and skills advance
- Spatial sciences: because the data sources evolve (rapidly)
- You cannot only insert new data into old methods
  - In the past we made a flood susceptibility map with broad information layers derived form the DEM and landuse
  - Now we want an early warning system with a 3D flood model in a webGIS coupled to a SMS warning system, based on extremely accurate information
- Because spatial problems become more complex

HOW DO YOU KEEP UP TO DATE?

- Staff engages in research and projects!
  - "blue sky research" often in the form of PhD research funded by a national research council/scholarships, can be applied or fundamental
  - "Demand driven research" as in contract/consultancy work, e.g. calls from WorldBank etc.
- Engage your MSc students in these research projects for their MSc research. They can do valuable parts, gain project skills, learn how to translate a societal problem into a scientific problem, and vice versa.
- *A strong incentive for projects: budget cuts!*

RESEARCH DOES NOT HAVE TO BE EXPENSIVE

- You are all asking for free high quality data, else you cannot do research!

  " I too want a purple race car for my birthday"

- But everybody has to use the data that is there, if you want better, start collecting it!
- Example: a research into the effects of DEM quality on flood hazard and risk assessment costs nothing but time, everything for that is available online: the data, the models, the youtube instruction movies!

USE RESEARCH EXPERIENCE IN TEACHING

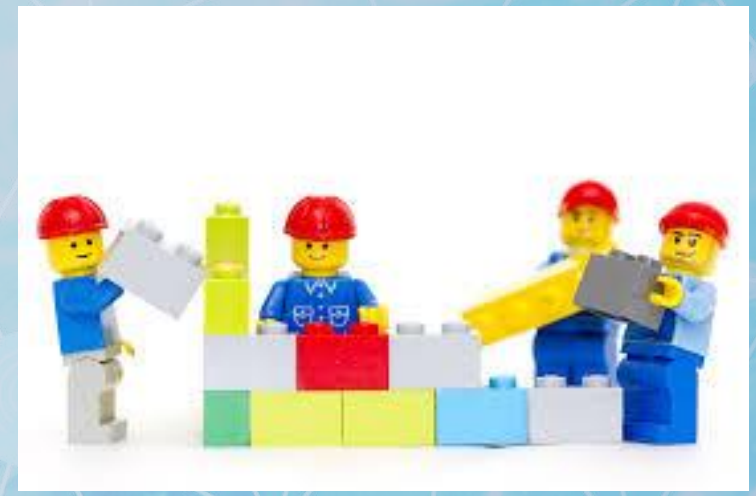
- If you have do a research project, use this as a practical or project module in the curriculum.
- Make sure students get imperfect data, let them find out the difficulties of 'real life'.
- The 'real life' project objectives are much better than the idealized GIS problems
- Give students the project description, let them discuss/develop a project proposal outline:
  - what data do you need versus what data is available?
  - Which models and methods would you use?
  - Do these models actually answer the questions ?
  - What gaps can you identify?

PITFALLS SPECIFIC TO GEOMATICS EDUCATION

- High resolution looks complex, and looks more real. Students step over the verification, the need for ground truth.
- The database easily becomes the reality. The staff should get out in the field, understand processes!
- Answers become software driven, not concept driven.
  - People make a flood susceptibility map by combining slope, aspect, curvature, wetness index, distance to the river, elevation, land use etc etc. Just because it is there.
- Any multi variate statistical method will do this for you. But why would aspect be related to flood, or curvature?
- This is especially true for machine learning methods, because everything becomes a black box, and the only check is some statistical goodness of fit measure, which is not “fit for purpose”.

The logical curriculum

Quality driven

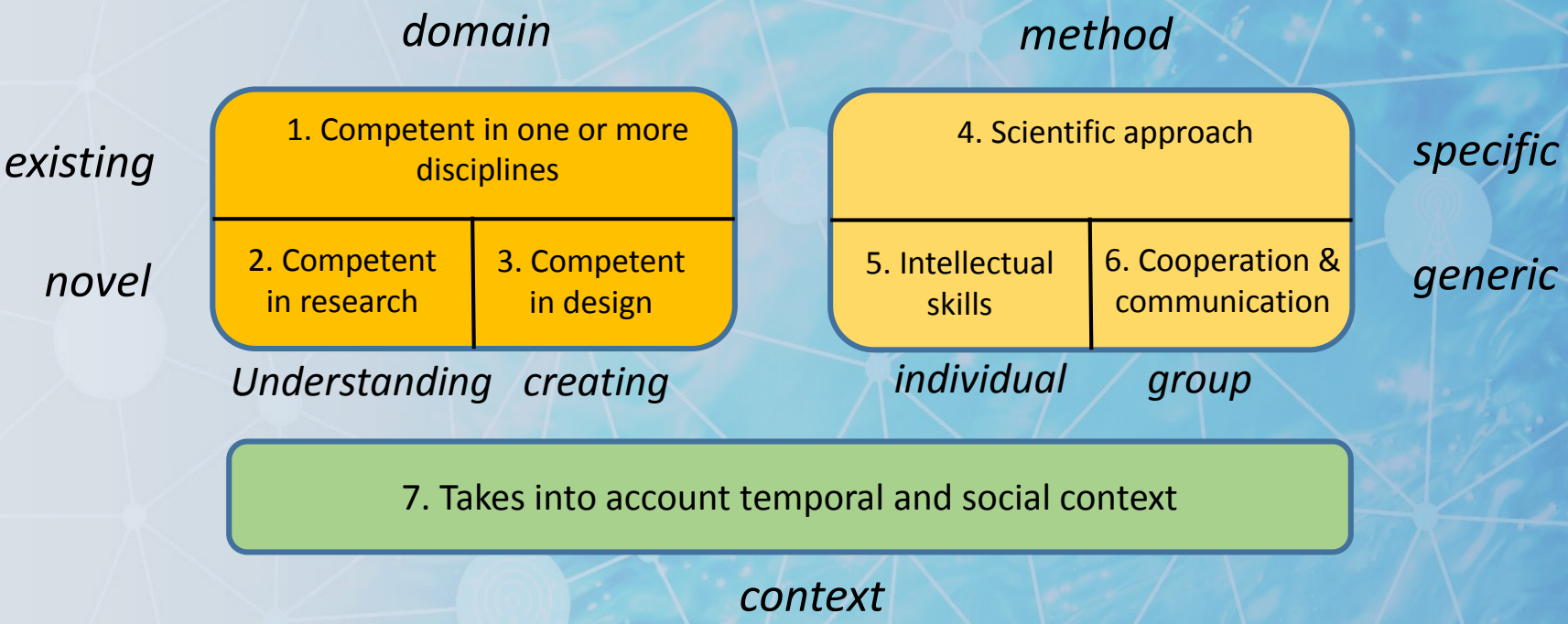


THE 3 MAIN QUESTIONS IN CURRICULUM

1. What are the learning outcomes of a programme
   - What are the knowledge, skills, attitude and that a student is supposed to have, and what is a master level?
   - Do these final qualifications meet with the expectation of the job market ?
2. How do you make sure that students can achieve these final qualifications
   - In which study elements ?
   - Is this logically organized ?
3. Testing: how do you prove the student reaches a Masters level
   - Testing knowledge, skills and competences, with defined levels
   - Exam regulations, internal quality control

FRAMEWORK TECHNICAL UNIVERSITIES NL

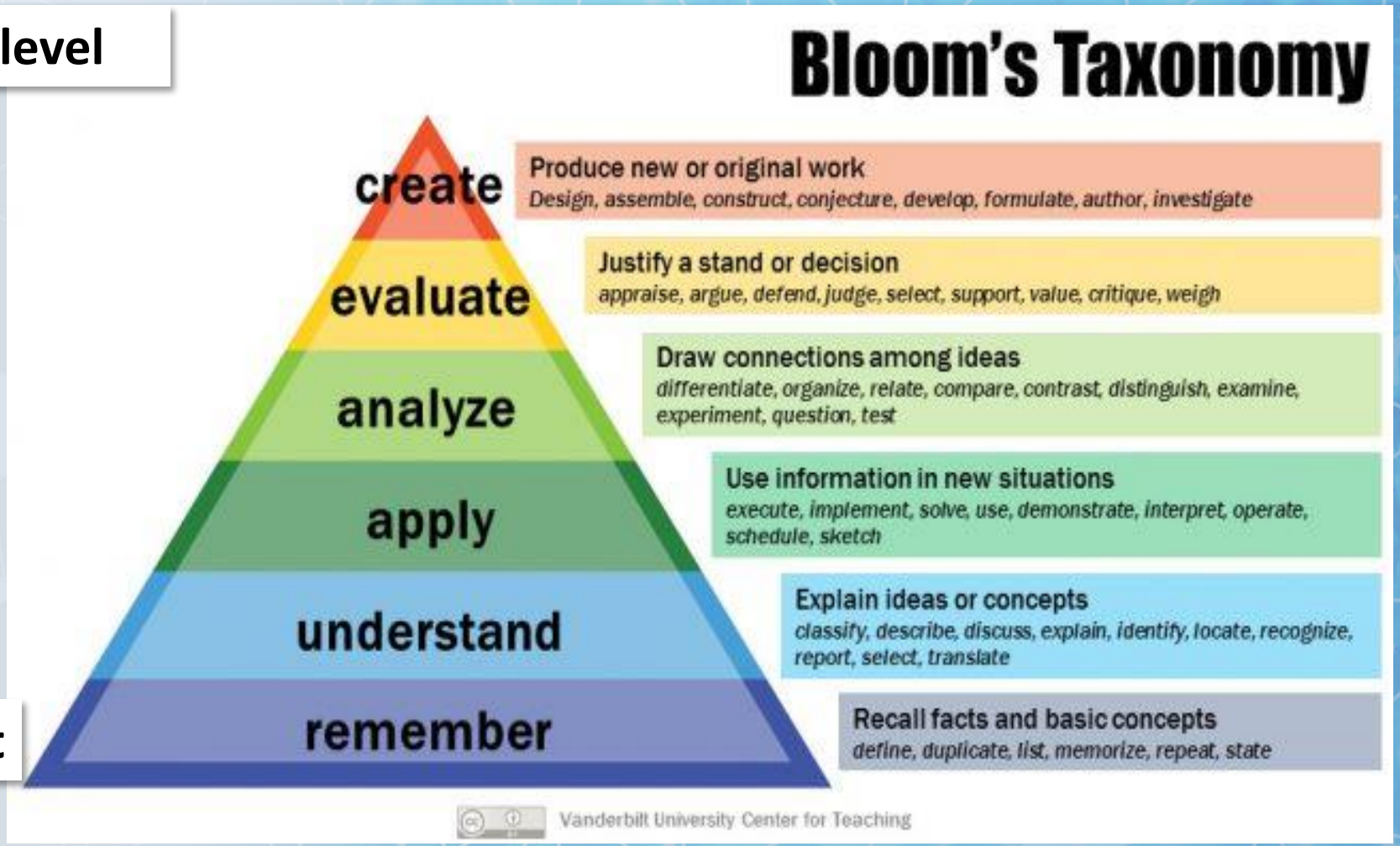
Meijer's criteria



Meijers, 2006

MSC LEVEL - USE BLOOM'S AND RUBRICS FOR TESTING

MSc level



start

Bloom et al., 1956

USE A RUBRICS MATRIX FOR TESTING

- A rubric matrix is a scoring guide that helps teachers evaluate student performance, based on a range of criteria.
- A rubric lists the criteria, or characteristics, that student work should exhibit and describes specific quality levels for those criteria (using Bloom's). *You do this for all study elements that are examined*
- Example for an element in research proposal testing

The proposal is based on peer reviewed literature. Work of others is critically evaluated and brought in connection to the aims of the research, not only cited. The overall research objective leads to a clear hypothesis.	The proposal is based on peer-reviewed literature. Literature is not only cited but highlights and summaries are presented. They logically follow from the background presented.	Literature review is mainly based on other MSC research, general method descriptions and textbooks and other non-specific peer-reviewed literature.
good	pass	fail

- Less ambiguity in testing and students know what they have to do

Student centered learning!

Talking is not teaching, listening is not learing

(is this okay?)

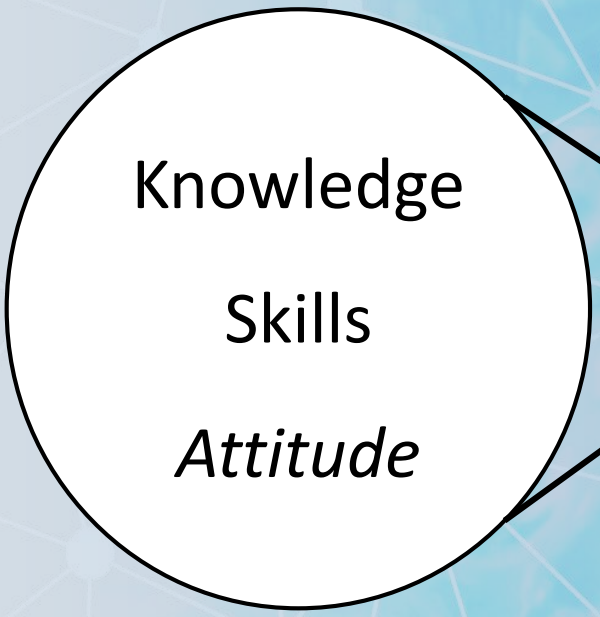
WHY STUDENT CENTERED LEARING?

- If students focus from the start on the technology, data and methods, they do not learn to ask scientific questions, there is no conceptual thinking to approach a problem
- If you give students a tool, they will immediately start using it because it gives a feeling of security, being busy, working hard.
- Students happily give the responsibility of an answer to a model or method, or to the professor.
  - The question is: " is this map correct? "
  - But it should be: "is my thinking/approach correct?"
- "If the only tool you give them is a hammer, they will see every problem as a nail "
  - Sometimes spatial sciences are just one step in a problem, you cannot solve everything with it

TEACHERS ARE SPECIALISTS

- It is normal for the scientific expert to think te leaerning comes form them, they are in control of the learning process
- We listen to classroom teaching, practice technology in mock problems, learn answers by heart to do exams
- Specialists do not understand why the students does not understand something
- You forget a lot suring the study:
  Knowledge/skills in year 1, are forgotten in year 2
  - especially the details that matter to the teacher/expert

IMPORTANT TO RECOGNIZE



Together these are competencies

What do you know
What can you do
Scientific principles

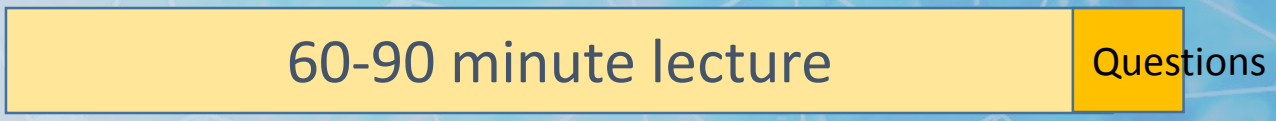
How do you perform
Good at self reflection
Feel safe to do peer review
What kind of person are you
Skilled at teamwork
Skilled at Communication
…

SOME METHODS TO IMPROVE LEARNING

- Flipped classroom – learn at home, use classroom to discuss
- Peer learning/peer review – students explain to each other
- Project based education – real life imperfect situation where students look for knowledge when they need it
- All this can be done in large classrooms, lecture halls!

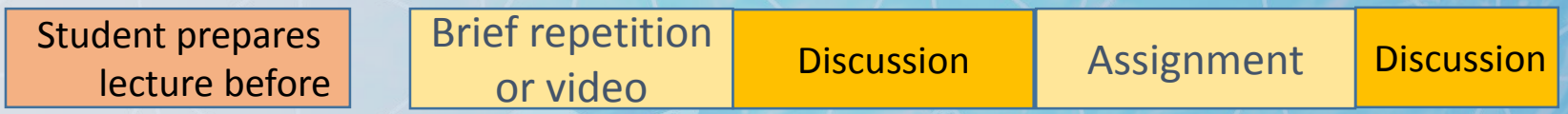
FLIPPED CLASSROOM

Traditional lecture



- Student: I have no questions because I fell asleep
- Teacher: there are no questions, they must have understood everything (I am great)

Blended learning: traditional classroom and online media



- Use online media for instructional videos, assignments are thought exercises: “an area is urbanizing rapidly, how would you analyze this change?”

PEER LEARNING

- Youtube: look up **Eric Mazur**, prof Physics at Harvard

1. Start with a brief lecture
2. Give a short assignment, with multiple choice answers a,b,c
3. Let students discuss for 10 minutes what the answer should be and why, then each individual gives an answer
4. Give the right answer, and ask the **students who understood, explain to students who didn't** why this answer is the right answer
5. Continue with lecture, for instance add details

Purpose: continuous testing of learning, internalisation

PROJECT BASED LEARNING

DEFINE THE PROJECT
FACT FINDING & OBJECTIVES

FIND KNOWLEDGE
- SPECIALIZED LECTURES (1 EC)
- TUTORIALS
- SKILL LEARNING LINE WORKSHOPS

FIND ANSWERS/SOLUTIONS
- MODELLING
- DATA GENERATION
- STAKEHOLDER VIEWS
- DESIGN INTERVENTIONS

REPORT
DISCUSSIONS WITH SPECIALISTS

WITHIN EACH PROJECT: GROUP WORK | INTERACTION WITH STAKEHOLDERS | INDUSTRY/CONSULTANTS | INTERNATIONAL CLASSROOM | PERSONAL DEVELOPMENT PORTFOLIO

- Testing:
  - written exams on knowledge
  - midterm review for advice
  - Individual oral exams at the end
  - project product (report and presentation)

Google for: look up **Spatial Engineering Twente University**

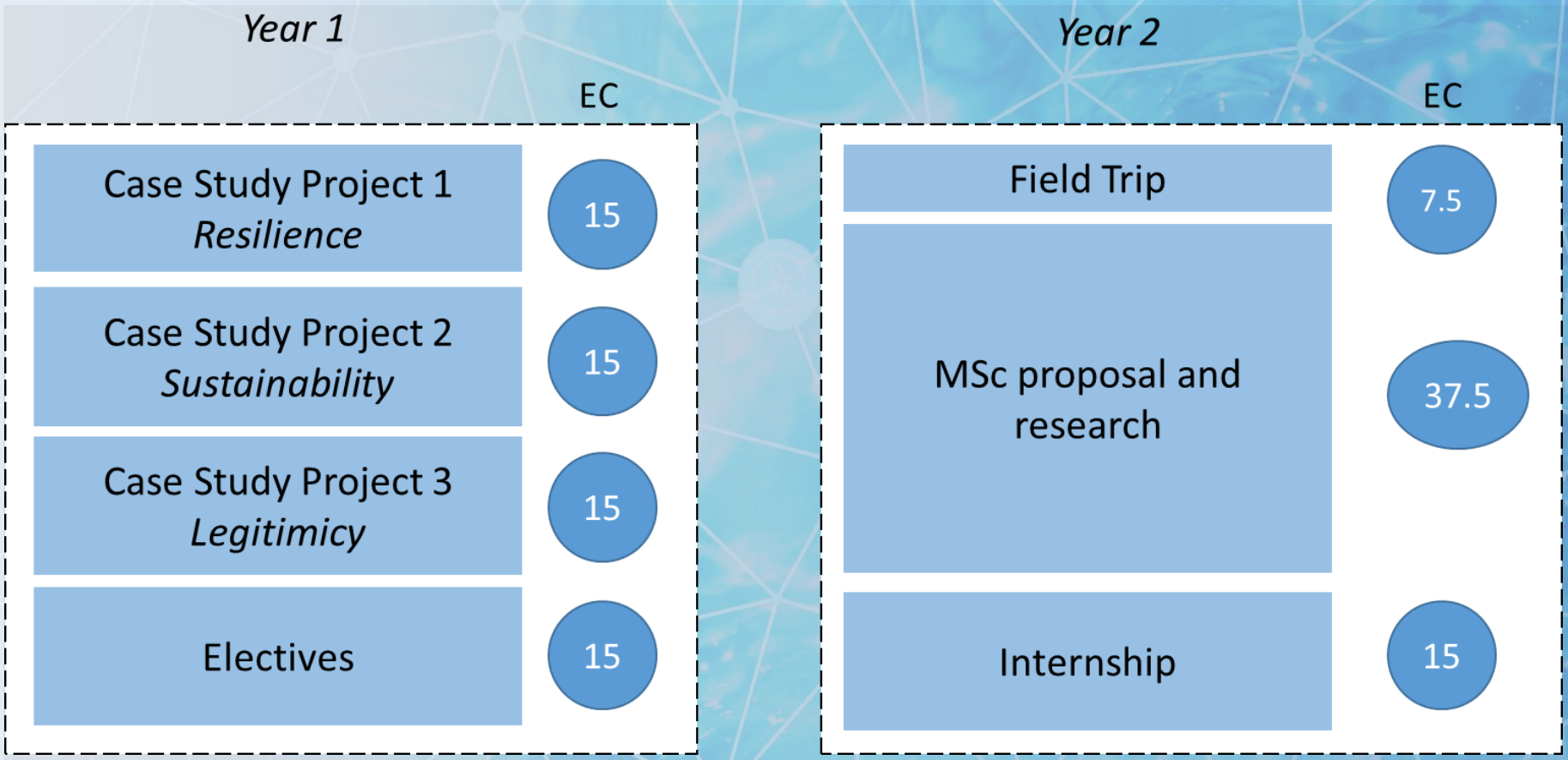
DIFFERENT STAFF ROLES

Project based teaching is not easy because it needs guidance

Different roles:

- **Tutors**: Students work in groups of 4-5, weekly meetings
- **Mentors**: discusses progress with student
- **Experts:** that deliver a specialist lectures and do exams

ITC – MSC SPATIAL ENGINEERING



CONCLUSIONS

- Do research!
- Use the logic of learning outcomes and quality control
- Use Bloom's and Rubrics to formalize testing

- Try out different forms of education to teach and test competences = knowledge/skills/attitude
- Evaluate with your students what works

- Browse online for many, many examples

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Thank you