

# Teaching and learning: an overview

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# Pedagogy

- Since V century BC in western culture there were people wondering about what to teach to young citizens and about the better way to teach.
- Some of these were philosophers and tried to base the theory of *teaching* on a theory of *learning* (how a human being learn? how ideas have birth inside the mind? How they relate one another to build structures of thought?)
- The birth of modern pedagogy is normally fixed with the works of czech Jan Komensky (who called himself Comenius) in XVIII century
  - writing textbook in the mother language of students (not in Latin)
  - inserting pictures in them
  - teach gradually from simple to complex
- all these ideas were proposed for the first time by Comenius

# Pedagogy

- In the last two century there was a lot of work on relationships between pedagogy and psychology:
  - the more we know about the way the mind works
  - the more we can try to support learning with teaching
- Learning and the learner are put in the centre of the stage
- More attention was given to to non-cognitive aspects like emotion, culture, environment...

# Three main streams in XX century

- Behaviourism: ?
- Cognitivism: ?
- Constructivism: ?

# Three main streams in XX century

- **Behaviourism (Skinner)**: we should refuse introspection and fantasy on what goes on inside our brain; mind reacts to stimuli; we can teach the good answer
- **Cognitivism (Neisser)**: mind is a (modular) system that deals with information, like computers do; we can build model of the mind and try to test them with experiments; some of the capacities of the mind are innate and cannot be taught (Chomsky)
- **Constructivism (Piaget)**: there is no isomorphism between mind and reality; we create our concepts ourselves (alone, or within a social context); teaching is just supporting this process

# Teaching and society/1

- What should be taught to children is tightly related with the model of citizen upon which our society is built
- Romans were concerned mostly with "more maiorum", i.e. the transmission of traditional values, respect for ancestors, importance of the state; education is given to citizens by "magisters", which are often slaves.
- In the Middle Age a citizen was a soul momentarily hosted in a body; he is on this earth to earn heaven (if his thoughts and acts were moral enough); education is mostly a moral and religious one, given by parents
- Renaissance and Enlightenment centuries put the rights of the single individual at the centre: arts and science begun to gain more space in education
- XIXth century was the time of industries; citizens were workers, who needed only to be able to use the machines, or to be used by them

# Teaching and society/2

- Which are the values of today western society? Who is the citizen ? What is s/he expected to know?
- Is there any difference among countries? Is Italy different from Germany or USA o China?
- Is there any difference among towns and villages, nord and south, high classes and low classes, men and women?
- Try to answer...

# Teaching to teachers

- In the last years the conception of how teachers should be prepared to teach has changed repeatedly; in these days there is in Italy a public debate on how the Ministry of Education should select future teachers
- In some cases, there is an educational path specially reserved to teachers (from secondary school to university)
- In other cases, the teaching competences could be added as the final step of any standard learning path
- Still in some cases there is a lack of attention: nobody teaches to future teachers how to teach...



# Knowledge

- Some people find the pedagogy has too much place in nowadays discussion about education.
- They think that the point is to ensure that future teachers have a full and extended knowledge of the subject matter.
- Some of these persons are indeed teachers themselves.
- Probably when teaching they are simply repeating what their teachers did when they were students in turn.
- But to repeat something because it was successful in the past is not always a good strategy: we are different from our parents, and our sons are different from us

# Differences

- Is there a difference between humanities and "tough" sciences (STEM) with respect to this problem?
- Is there a difference between teaching to children and teaching to young adults, or to adults or to elderly people? Which one?
- Is it enough to know all about a subject matter to teach it?
- In our context, do you think it is enough to know *all* about CS to teach Computer Science?
- Try to answer...

# The Nuremberg funnel



# Learning

- Probably not.
- As the Constructivists put it, knowledge doesn't flow from the teacher's mind to the student's one, who in turn may become a teacher and pass on the token (a funny example of recursion!)
- Students are different from teachers, and each of them is special
- Knowledge has to be built by everyone in his/her particular way (this is why learning is a resource consuming process...)
- Teachers *support* students while they learn, ensuring that the learning process proceed in the best possible way.

# How?

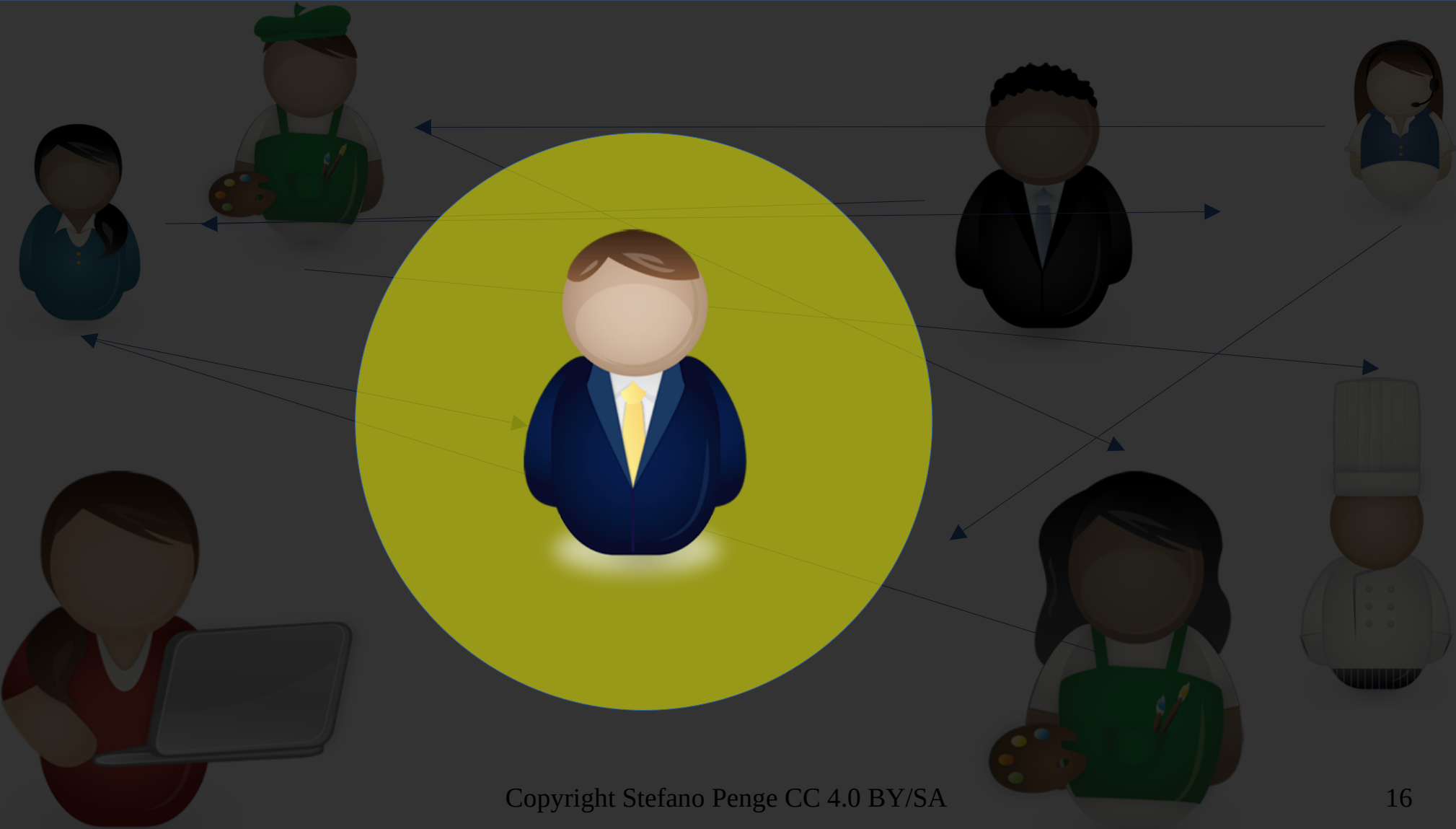
- People don't learn only in schools; but schools are the only place where someone *cares* about the way people learn
- A (good) teacher should ensure that students (ALL students) are gathering control over an environment with their own pace (not too fast, not too slow, without holes, without heaps)
- This is where assessment and evaluation can help

# Assessment

- To assess is to support learners measuring where they are with respect to where they were and to where they were supposed to be
- To assess is not a moral task (punish or reward) but is part of education itself
- To assess is not to measure what is hidden inside the mind but to control the acceleration of learning

# Method

- Students learn at their own rhythm and with their own cognitive style
  - Someone needs to have the big picture before going deeper
  - Someone else prefers to face a new content/problem step by step starting from an example
- Pretending that one method fits for all is a pedagogical error
- Declaring that there is not place for methods and teachers and that they should only "do their best" is also a mistake





# Groups

- Students normally learn together (even in a pandemic year...)
- As human beings, we can learn from anyone, even if s/he is not a teacher
- Groups are a good way to enhance *horizontal* teaching and learning
- Groups are a good way to share knowledge in a team and increase the speed in getting a scope

# Groups

- Teacher should control (not: decide) the way students interact among them
  - certain students are natural leaders;
  - other students tend to rest apart and to leave the leaders stay under the limelight
- Teachers are not only involved in teaching *to* individuals, but also *to* groups
- How can a teacher support group learning? Helping ...
  - to choose participants, changing rules
  - to give different roles, all with the same value
  - to monitor that no one stay in a corner while someone else is doing all the job

# Gender /1

- Why a teacher should bother him/herself about the gender of the students?
- Imagine an exercise:
  - "Design a game where knights fight one against the other"
  - "...or a football game"
  - "...or a FPS (first person shooting game)"



# Gender /2

- Are you sure that girls and boys will engage themselves in the exercise in the same way, with the same energy, same concentration?
- Is the capacity to identify oneself with the main character relevant to complete the exercise in the due time?
- What if boys should be confronted with an exercise of another type, completely different, which is normally associated to girls and to female activities (try to imagine one...)?

# Preferences/1

- Every teacher has her/his own preferences: on authors, on historic periods, on theorems, on gender, on languages (!)
- Even if they try to hide these preferences (and it isn't the case all the time), they come out and influence students
- How can teachers teach matters they *don't* love?
- How should teachers teach matters they love without modelling students to their image?

# Preferences/2

- Every student has her/his own preferences: on authors, on historic periods, on gender, on languages (!)
- Even if nobody ask them, they come out and influence the way they learn
- Students will love the same languages their teachers love?
- How can students learn matters they *don't* love?