MOOCs and electrical engineering/ computer engineering/ computer science

by
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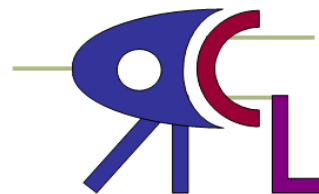Email: lshannon@ensc.sfu.ca
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Reconfigurable Computing Lab

People have different views on MOOCs

The truth is they are neither…

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Remember, there are different levels of learning

BLOOM'S TAXONOMY - LEARNING IN ACTION

1 knowledge
select, label, identify, locate, recite, state, recognize, list, name, define, describe, memorize

Media/activities: radio, newspapers, magazines, television, text readings, films; events, people, recordings, videos, plays, filmstrips

2 comprehension
match, restate, paraphrase, rewrite, give examples, express, illustrate, explain, defend, distinguish, summarize, interrelate, interpret, extend

Media/activities: recording, speech, drama, photograph, cartoon, diagram, story, own statement; implication from idea, conclusion, model, analogy, casual relations, outline, compare, summary

3 application
organize, generalize, dramatize, prepare, produce, choose, sketch, apply, solve, draw, show, paint

Media/activities: drama, list, painting, sculpture, jewelry, poetry; follow an outline, illustration, solution, question, diagram, map, project, forecast, diagram

4 analysis
differentiate, subdivide, infer, survey, select, prioritize, compare, analyze, classify, point out, distinguish, categorize

Media/activities: questionnaire, word defined, argument, statement, identified, propaganda, conclusion, checked; survey, syllogism, graph, breakdown, report

5 synthesis
compose, originate, hypothesize, develop, design, combine, construct, produce, plan, create, invent, organize

Media/activities: play, experiment, hypothesis, alternative action, formulation, book; set of standards, article, game, invention, song, report, machine, set of rules

6 evaluation
judge, relate, weight, criticize, support, evaluate, consider, critique, recommend, summarize, appraise, compare

Media/activities: conclusion, self-evaluation, recommendation, valuing, survey, court trial; standard compared, standard established, discussion, assessment

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Bloom's Taxonomy highlights

The different levels of learning

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation

Bloom's Taxonomy highlights

The lower levels:

1. Knowledge: Remembering Information

2. Comprehension: Explaining the meaning of information

3. Application: Using abstractions in concrete situations

These are not hard to achieve with MOOCs

Bloom's Taxonomy highlights

The higher levels:

4. Analysis: Breaking down a whole into component parts.

5. Synthesis: Putting parts together to form a new integrated whole.

6. Evaluation: Judging different potential solutions to a problem; identifying their strengths and weaknesses
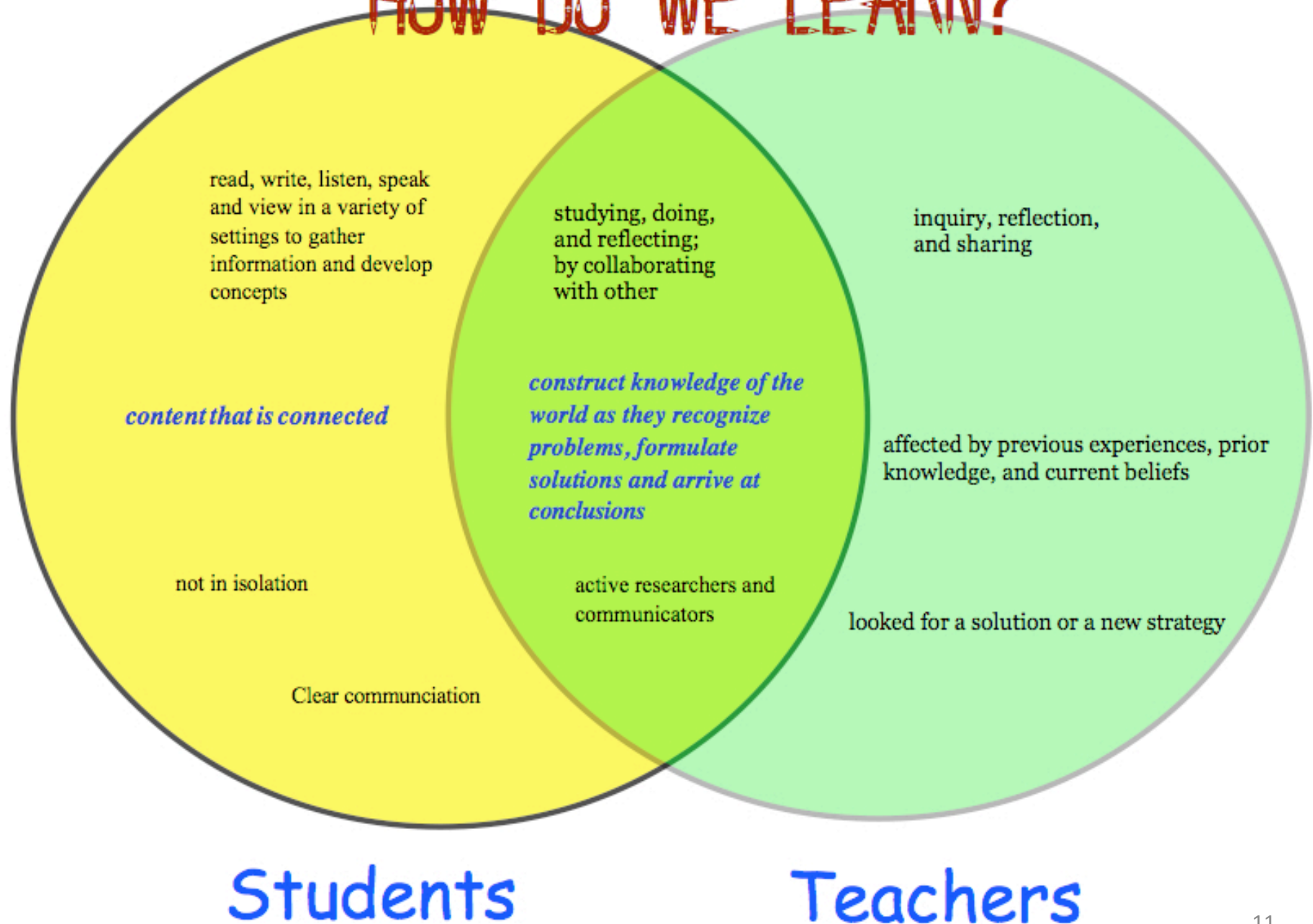
This is harder to achieve with MOOCS.

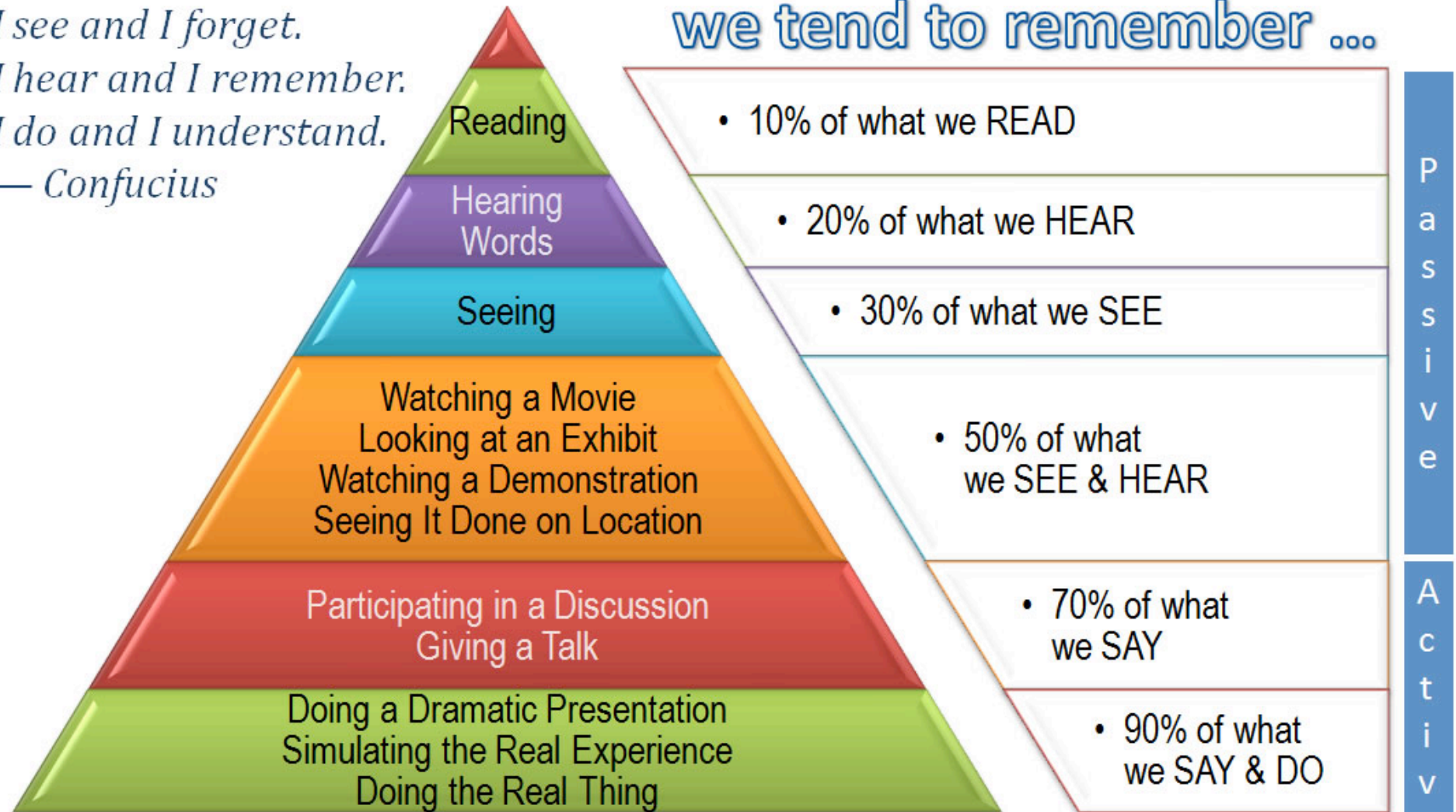- In fact, one might question if it is even possible

How we learn

How we learn

HOW DO WE LEARN?

Students

read, write, listen, speak and view in a variety of settings to gather information and develop concepts

content that is connected

not in isolation

Clear communciation

(overlap)

studying, doing, and reflecting; by collaborating with other

construct knowledge of the world as they recognize problems, formulate solutions and arrive at conclusions

active researchers and communicators

Teachers

inquiry, reflection, and sharing

affected by previous experiences, prior knowledge, and current beliefs

looked for a solution or a new strategy

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The Cone of Learning

I see and I forget.
I hear and I remember.
I do and I understand.
— Confucius

After 2 weeks, we tend to remember ...

Reading

Hearing Words

Seeing

Watching a Movie
Looking at an Exhibit
Watching a Demonstration
Seeing It Done on Location

Participating in a Discussion
Giving a Talk

Doing a Dramatic Presentation
Simulating the Real Experience
Doing the Real Thing

- 10% of what we READ
- 20% of what we HEAR
- 30% of what we SEE
- 50% of what we SEE & HEAR
- 70% of what we SAY
- 90% of what we SAY & DO

Passive

Active

Source: Edgar Dale (1969)

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Engineers & Computer Scientists

The majority of engineers/computer scientists are application based learners

As such, MOOCs won't appeal to the majority of our learners insuring a high quality of learning or retention of material.

Not a good choice for fundamental skill development.

There are also problems with MOOCs and accreditation of profession programs

For example: Engineering is an accredited program in Canada

Alternate use for MOOCs

MOOCs provide an opportunity for:

- Additional learning resources

- Online tutorials

- Content reinforcement

- Skills extension

- Other opportunities

Final notes

MOOCs provide a great learning opportunity

We can incorporate materials/learning ideas from MOOCs into normal course offerings:

- Additional learning resources

- Online tutorials

- Crowd sourced support/solution.

- Peer Review