

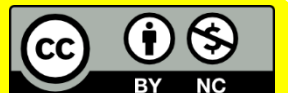
HOW TO DESIGN A TECHNOLOGY-ENRICHED LEARNING ENVIRONMENT TO FOSTER COLLABORATIVE LEARNING?

PLATE TECTONICS: A BLURRED LEARNING APPROACH

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USERS

5th & 6th graders

in total: 6 classgroups (about 130 pupils) that receive the same learning materials during the same period.

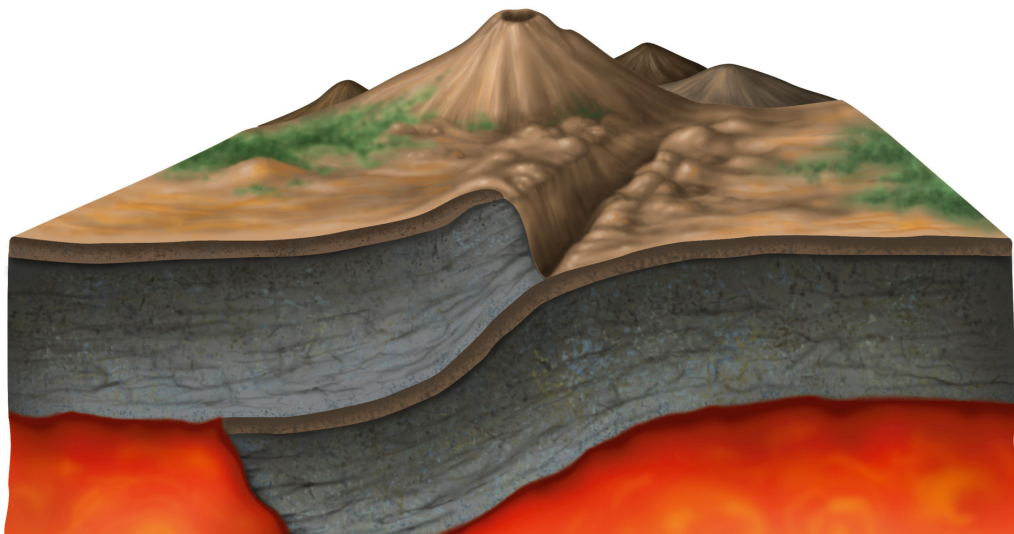


CONTENT: PLATE TECTONICS

Lesson 1: Structure of the earth

Lesson 2: Plate tectonics, volcanoes and earthquakes

Lesson 3: Learning by assignment



INSTRUCTIONAL DESIGN KEY COMPONENTS (1/3)

- **Blended/blurred learning:**
 - “what can be learned outside the classroom should be learned there.”
 - classroom sessions aim for deeper understanding, making adjustments, identify and clear misunderstanding & misconceptions, explore difficulties, interact with peers as to enrich the framework from which one is reasoning, thinking and acting.
- **Varied task practice** as key to strong anchoring of newly learned knowledge and skills
- **Personalized learning** (including instruction, tasks and feedback) for higher engagement and motivation

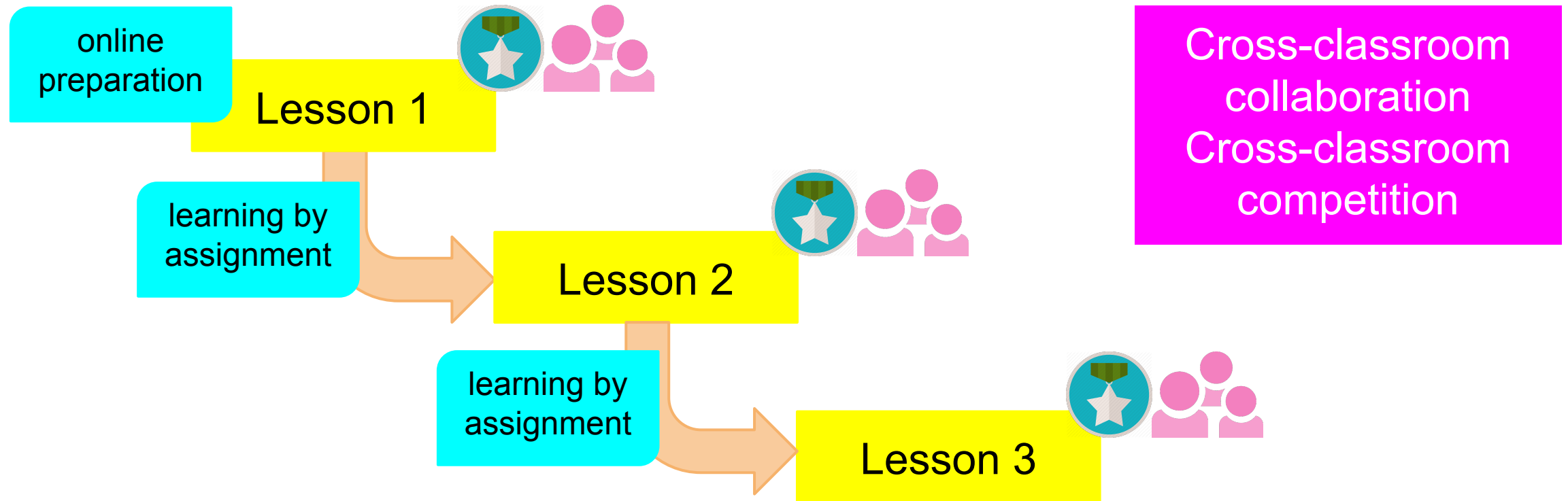
INSTRUCTIONAL DESIGN KEY COMPONENTS (2/3)

- **Gaming elements** for inter- and intrapersonal competition, social rewarding. Not necessarily for fun.
- **Team-based learning**: collaboration (F2F and distance, synchronous and asynchronous): without predefined group or member roles.
- **Learner control**: learner-paced within instructor-defined time slots (deadlines)
- **Decreasing support** as a learner's knowledge increases (4 components instructional design (4C/ID) model; van Merriënboer et al., 2002)
- Starting from Smartschool® - the school's CMS.

INSTRUCTIONAL DESIGN KEY COMPONENTS (3/3)

- Activation of **already available knowledge**
- **Just-in-time information** when the learner needs it (adaptive and system-controlled) / asks for it (adaptive but learner-controlled) as to avoid (cognitive) overload
- **Part-task practice** if required (on demand?)
- **Stimulating self-regulated learning**
- **Gamification & augmented reality**
- **Learning communities**

VISUALISATION



ONLINE PREPARATION

GOALS

INTRODUCE STUDENTS WITH CONTENT - ACTIVATE ALREADY AVAILABLE KNOWLEDGE (MERRILL, 2002) - PREPARE AND ENGAGE STUDENTS FOR CLASSROOM SESSION

1. Introduction of plate tectonics - watch video (1')

WORKED

EXAMPLE

2. Overview of disasters in the world due to moving plates - watch (parts of) video (6')

WORKED

EXAMPLE

3. Thought-proving question: "What is the reason behind the lack of earthquakes in Belgium?"

Give answer on Tricider (cross-classroom) - rate answers of peers - discuss

DISCUSSION



ONLINE PREPARATION

GOALS

INTRODUCE STUDENTS WITH CONTENT - ACTIVATE ALREADY AVAILABLE KNOWLEDGE (MERRILL, 2002) - PREPARE AND ENGAGE STUDENTS FOR CLASSROOM SESSION

4. Consultancy of additional resources (via existing platform Smartschool)
“using what is available - (re)create if needed and of added value”

SUPPORTIVE

- <http://www.planet-science.com/categories/under-11s/our-world/2011/10/amazing-earth.aspx>
- http://www.bbc.co.uk/schools/gcsebitesize/geography/natural_hazards/tectonic_plates_rev3.shtm
- <http://study.com/academy/lesson/composition-of-earths-internal-layers-crust-mantle-and-core.html#courseInfo>
- <https://www.learner.org/interactives/dynamicearth/structure.html>

5. Pupils can add additional materials + peer ratings of quality of materials

USER-GENERATED CONTENT - SHARED BETWEEN CLASSROOMS

LESSON 1 STRUCTURE OF THE EARTH

GOALS

WEBLECTURES ALLOW TO ALLOCATE TEACHER RESOURCES MORE EFFICIENTLY - IF A TEACHER GIVES THE SAME LESSON MULTIPLE TIMES, THEN ONE WEBLECTURE CAN BE OFFERED TO ALL GROUPS - TEACHER THEN ACTS AS A COACH TO FURTHER SUPPORT PUPILS IN QUALITATIVE PROCESSING OF THE LEARNING MATERIALS

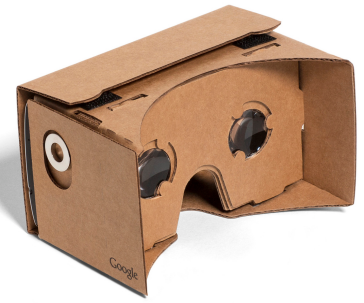
1. Watch weblecture about structure of the earth - teacher refers to handbook in weblecture
2. Pupils watch lecture - send questions via cross-class Padlet
3. In real-life class session:
 - a. teacher gives answers to questions
 - b. identifies (mis)conceptions
 - c. stimulates in-depth discussion of the topic
 - d. summary of discussion on Padlet (questions of other classes can be resolved which results in more free time for following class groups)
4. walk in a volcano by google card board and the volcano VR app

ANYTIME, ANYWHERE, ANYPLACE

LEARNING

APPLY KNOWLEDGE TO AUTHENTIC

EXAMPLE



LESSON 2 PLATE TECTONICS

GOALS

SKETCH HOW LEARNING MATERIALS WERE PROCESSED - IDENTIFY (MIS)CONCEPTIONS AND RESOLVE QUESTIONS
ENGAGE STUDENTS BY LETTING THEM SEARCH FOR OWN CASES
COLLABORATIVE LEARNING (IN-CLASS, CROSS-CLASS, (A)SYNCHRONOUS

1. Quiz about plates - BYOD - comparison of group (class) scores + intraclass competition - discussion of results
2. Presentation of different cases (teacher-led) or cases generated by pupils (via BYOD) - representative for all learning content (earth quake Japan - Hawaii - Tsunami - etc)
3. Team-based learning



LESSON 2 PLATE TECTONICS

GOALS

APPLY PREVIOUSLY LEARNED THEORETICAL PRINCIPLES TO NEW TOPIC
COLLABORATIVE WRITING - LEARNING - CO-CREATION
TRANSFER KNOWLEDGE TO NEW AREAS (IMPACT ON PEOPLE, NATURE, ECONOMY)

Team-based learning **task**

- Select case or search for own case (approved by teacher)
- Describe causes (which plate and direction)
- Timeline of events that were case-related?
- Describe consequences
- Describe impact on people, nature, economy?

LESSON 2 PLATE TECTONICS

GOALS

COLLABORATIVE WRITING - LEARNING - CO-CREATION

INFORMATION SKILLS (SUMMARIZING INFORMATION - CRITICAL APPRAISAL OF INFORMATION)

PRESENTATION SKILLS

Team-based learning **procedure**

- All groups: **realtime creation of text document** (titanpad - Google drive) - every text document covers one topic about plate tectonics
- Teacher provides **realtime feedback**
- Text document available for all groups (cross-class)
- Teacher assigns text document to new group of pupils
- This group **creates a presentation of the topic** (format of topic is free to choose - depends on group skills: persentation, microlecture, knowledge clip, interactive presentation, other)

LESSON 3 PRESENTATIONS & FEEDBACK

GOALS

PRESENTATION SKILLS

PROVIDING FEEDBACK - DEALING WITH FEEDBACK

INTEGRATION OF GROUP KNOWLEDGE AND SKILLS INTO PERSONAL MENTAL MODEL

Online evaluation / anonymous peer review

1. (Distance) peer feedback/assessment via online structured feedback form focusing on presentation skills and quality of presentation
2. Teacher generates results and sends to classroom screen (screen interactivity)
3. Expert feedback from teacher - discussion with group, also distance groups
4. Conclude with lessons learnt and far-transfer (user-generated conte



LESSON 3 FAR TRANSFER & CLOSURE

GOALS

FAR TRANSFER TO NEW CONTENT
DISCUSSION

Far transfer, reflection and take home message

1. Conclude with lessons learnt and far-transfer (user-generated content)
2. Let pupils discuss about the following question:
“Give your vision about the earth in the year 4000.
How will the continents relate to each other - create a group drawing of the earth in the year 4000”
3. Screen interactivity of own devices to share and discuss group drawings



NEXT STEPS

EVALUATION METHODS BY TEACHER

Measuring effectiveness:

- knowledge gains (pre post online quiz about plate tectonics)
- near transfer comparison (compare the exam scores with scores of last year)
- far transfer comparison: qualitative discussion with other teachers (skills like presenting, creating materials, etc.)



BRIDGING THE GAP

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Content language integrated learning & teaching

- Let pupils read a text document or watch videos in other language - support by language teacher
- Distance collaboration with pupils/classes in e.g. Haïti as to co-create learning content about consequences of earth quakes



WHY USING THIS
SCENARIO?

ADDED VALUE FOR TEACHER

- Based on **sound instructional design principles** (collaborative learning and self-regulated learning)
- Fosters **engagement and interest** of pupils
- **Co-creation** of learning materials (works inspiring for teachers)
- More **variations** in tasks, lessons (all groups have different results)
- Better allocation of teacher's resources via weblectures (more **efficient allocation of time**)
- Teacher has the space for more **in-depth discussion** of learning materials
- Teacher has the time to provide more **personalized instruction**

ADDED VALUE FOR PUPILS

- Development of skills that are needed in future worklife (collaboration, information processing, dealing with technology)
- Fosters engagement and interest of pupils
- Co-creation of learning materials - self-supporting and self-regulating learner
- More variations in tasks, lessons: varied task practice results in better performance
- More links with real-life examples and recent examples
- Studying time is reduced as time-on-task increases
- Teacher has the time to provide more personalized instruction



MINIMAL REQUIREMENTS

MINIMAL REQUIREMENTS

- Pupils bring their own device
- Network and security issues (at school, at home)
- Prior checks of compatibility of tools with OS (Windows, iOS)
- Prior checks of compatibility of tools with browsers
-



OTHER COURSES?

IMPLEMENTATION OPPORTUNITIES

- Blended approach can be implemented on other topics because:
 - Combination of online and offline communication
 - Individual and collaborative learning
 - Peer review
 - CLIL(T)
 - Gamification
- It is best to start with topics that have a visual content

SUPPORTING LITERATURE

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