Assessment for learning

Henna Asikainen
Centre for university teaching and learning (HYPE)
Who am I?

Henna Asikainen, PhD, docent
Senior lecturer in University pedagogy, HYPE
Viikki campus, Helsinki university


Research interests: Quality of learning and teaching, assessment for learning, student well-being
Why is assessment important?
How it affects learning?
What are different aims of assessment?

Importance of assessment criteria
Examples about the development of assessment
Aims for today

- Recognising the importance and the role of assessment in learning
- Recognising different objectives of assessment in higher education
  - Understanding the importance of assessment criteria
  - Getting tools to improve assessment in your own teaching
How is students’ final grade related to their quality of learning? (Asikainen et al., 2014)

- Interview study part of a bigger project
- Students participated in a mass lecture courses with a final exam.
- Students (24) were interviewed after the course

AIM:
- How students describe their learning in the course?
- How the descriptions are related to their grade?
Examles from an interview study

exploring students’ descriptions of their learning compared to their grade

“Well, the subject matter was very interesting to me. And then I had prior knowledge about these matters and, at the same time or before the lectures, I attended the lab class, and it was nice to combine the theory and practice, thinking this was the thing we did in the lab that I did not quite understand then, but now I understand how it really works. I think I learned well in the course. I know I will forget some difficult terms for the methods, but I have understood the important matters.”
I did not really summon anything or read anything before the exam, and then I mostly just went through the previous questions and looked for answers to them, and then, when there was not much time left, I just tried to memorise them by heart. When you just try to memorise, the things do not really stay in your memory that long if you have not understood them. I kind of tried to understand, but the notes from the lectures do not really help you understand if you do not remember what the lecturer said. Then again, I did not get the book or anything.

Well, at least I learned one example, that was perhaps related to the subject matter; it was the last thing that was taught, so that’s why I remember it or maybe not. I don’t know more than I knew before. Well, maybe something, but I no longer remember how these things work.
How to explain this?
Assessment culture

• Assessment often is not aligned with learning outcomes and teaching methods (Postareff, Virtanen & Lindblom-Yläne, 2012)
  – assessment is a separate element

• Assessment culture is still very teacher-led and traditional (Asikainen et al., 2014a; Halinen et al., 2013)
• Assessment does not necessarily support deeper level learning (Asikainen et al., 2014a)
• Assessment practices create a hidden curriculum (piilopetussuunnitelma) (backwash effect of assessment) (Biggs, 2003)
If you want to change student learning then change the methods of assessment

(Brown, Bull & Pendlebury, 1997)

Students can escape effects of bad teaching but they can’t escape effects of bad assessment

(David Boud, 1995)
What kind of assessment supports life-long learning?

Assessment has a big role in student learning and studying.

Assessment should be aligned with learning objectives and teaching methods → Constructive alignment

(Biggs & Tang, 2007)
Aligned assessment
(Biggs, 2003)

Constructive alignment in teaching = basis for quality learning (Biggs, 2003)

1) Assessment should be aligned with the intended learning outcomes and teaching methods
   - Assessment often is not aligned with learning outcomes and teaching methods (Postareff, Virtanen & Lindblom-Ylänne, 2012)
   - Teachers do not necessarily have skills for reliable assessment (Postareff et al., 2012)
**Aligned assessment**
(Biggs, 2003; Biggs & Tang, 2007)

Students active, deep level learning is central

Assessment should support deep level learning and also give students feedback about their learning
(Crisp, 2012; Falchikov, 2005; Kearney, 2013; Virtanen et al., 2016)
Focus the assessment on intended learning outcomes

- How to assess the competence?

(mm. Biggs & Tang, 2007; Gibbs, 2006)
What level of understanding is assessed?

Bloom’s Taxonomy

by Patricia Armstrong, Assistant Director, Center for Teaching

https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
What we have learned so far

• Assessment has a great role in learning
• Assessment should support students active learning and development and give feedback to students
• Assessment should be aligned with intended learning outcomes
• When planning assessment, you should consider what level of knowledge is assessed
WHY IS ASSESSMENT SO IMPORTANT?

In your own teaching: **IS ALIGNMENT PRESENT?**

Does assessment in your course reflect the performance written in the learning outcomes?

Does the assessment reflect and support deep-level learning?

What level of learning is assessed?
Aims of assessment
Four aims for assessment

Diagnostic assessment

Formative assessment

Summative assessment

Integrative assessment

(Crisp, 2012; kts. Virtanen ym. 2016)
Aims of assessment in higher education

1) Summative assessment
- Aim is to assess how well students have learned what they were supposed to learn
- Assessment of the end result

2) Formative assessment
- Assessing during the learning process
- Developmental assessment – aim to give feedback about learning to the student and the teacher

(Crisp, 2012)
Aims of assessment in higher education

3) Diagnostic assessment
   • Before the learning process
   • Assessment of prior knowledge and starting level
   • Helps students to understand to what prior knowledge the leaning builds on

4) Integrative assessment
   • Assessment practices primarily designed to enhance future learning
   • Supporting Life-long learning

   (Crisp, 2012)
SELF- and PEER ASSESSMENT: Involving and engaging students in the assessment practices and learning

One on the most important objectives of higher education is to develop students’ ability to assess and evaluate their own performance and learning (Boud et al., 2018; Virtanen et al., 2016)

Self-and peer assessment promote metacognition, self-efficacy, deeper learning

Understanding criteria

- Supports deeper understanding
- Promotes assessment skills
- Supports group working skills
- Promotes reflection skills and recognising own knowledge and skills
- Can focus on the process or product

- **Clear criteria are important** (Falchikov, 2006; Tai et al., 2018)
Some examples in digital assessment
Digital environments can serve as platforms for various tasks including

• the solving of complex problems that require the locating information from a variety of sources
• creating instructional videos on various topics
• team assignments
• collaborative writing processes
• research tasks and projects
Diagnostic assessment

- Moodle exams
  - You can see the level of knowledge beforehand
  - Also good for giving automatic feedback
- Activation in lectures (Flinga, Presemo etc.)
- Different pre-assignments
  - Mindmaps, written assignments…
Formative assessment

- Different assignments with Moodle exam which give feedback to students
  - During teaching
  - Help students to assess their competence
- Feedback is important before the end result
  - Peer assessment tool
  - Feedback tool
- Self assessment based on criteria
Summative assessment

- Moodle exams which measure remembering or simple things you can google are not necessarily good for summative assessment.
- Exams which support application and assessment of knowledge and the material can be available are better online.
- There are numerous other ways for summative assessment (videos, projects, group work, oral exams, mindmaps, written assignments…)
- Also self- and peer assessment.
<table>
<thead>
<tr>
<th>Drug</th>
<th>Efficacy (response rate) OR (95% CI)</th>
<th>Acceptability (dropout rate) OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bupropion</td>
<td>0.93 (0.77-1.11)</td>
<td>1.12 (0.92-1.36)</td>
</tr>
<tr>
<td>Citalopram</td>
<td>0.91 (0.76-1.08)</td>
<td>1.11 (0.91-1.37)</td>
</tr>
<tr>
<td>Duloxetine</td>
<td>1.01 (0.81-1.27)</td>
<td>0.84 (0.64-1.10)</td>
</tr>
<tr>
<td>Escitalopram</td>
<td>0.76 (0.65-0.89)*</td>
<td>1.19 (0.99-1.44)</td>
</tr>
<tr>
<td>Fluvoxamine</td>
<td>1.02 (0.81-1.30)</td>
<td>0.82 (0.62-1.07)</td>
</tr>
<tr>
<td>Milnacipran</td>
<td>0.99 (0.74-1.31)</td>
<td>0.97 (0.69-1.32)</td>
</tr>
<tr>
<td>Mirtazapine</td>
<td>0.73 (0.60-0.88)*</td>
<td>0.97 (0.77-1.21)</td>
</tr>
<tr>
<td>Paroxetine</td>
<td>0.98 (0.86-1.12)</td>
<td>0.91 (0.79-1.05)</td>
</tr>
<tr>
<td>Reboxetine</td>
<td>1.48 (1.16-1.90)*</td>
<td>0.70 (0.53-0.92)*</td>
</tr>
<tr>
<td>Sertraline</td>
<td>0.80 (0.69-0.93)*</td>
<td>1.14 (0.96-1.36)</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>0.78 (0.68-0.90)*</td>
<td>0.94 (0.81-1.09)</td>
</tr>
</tbody>
</table>

OR=odds ratio. CI=credibility interval. *p<0.05. For efficacy, OR higher than 1 favours fluoxetine. For acceptability, OR lower than 1 favours fluoxetine.

Table 4: Efficacy and acceptability using fluoxetine as reference compound

Yllä olevan taulukon perusteella, mikä seuraavista antidepressiiveistä on tehokkain?

Valitse yksi:
- a. Duloksetiini
- b. Mirtatsapiini
- c. Reboksetiini
- d. Sitalopraami
Metaboliseen oireyhtymään (MBO) liittyvät insuliiniresistenssi, hyperlipidemia ja verenpaineen kohoaminen. Tyypillisesti MBO-potilas on myös ylipainoinen. Keski-ikäinen, selvästi ylipainoinen mies tulee apteekiin ja kertoo saaneensa uudet e-reseptit sokeri- ja rasva-arvojen sekä korkean verenpaineen korjaamiseksi. Mikä seuraavista lääkitysvaihtoehdoista on tyypillinen ja suositeltavin ylipainoiselle MBO-potilaalle?

Valitse yksi:

- a. metformiini + rosuvastatiini + losartaani
- b. aspartinsuliini + rosuvastatiini + losartaani
- c. metformiini + betsafibraatti + bisoprololi
- d. glipitsidi + rosuvastatiini + bisoprololi
Think about assessment in your course? Are the different aims present? Who assesses?

<table>
<thead>
<tr>
<th></th>
<th>Diagnostic</th>
<th>Formative</th>
<th>Summative</th>
<th>Integrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessment criteria and examples of assessment development
Reliable assessment

• Validity of assessment
  • Assessment of what is supposed to be assessed
  • How well grades describe the level of the learning outcomes (Sadler, 2009)
  • Assessment should measure the central knowledge which is based on the intended learning outcomes (Birenbaum, 1996; Sadler, 2009)

• Reliability of assessment
  • Assessment should be the same despite of the situation and who is assessing (Sadler, 2009)
  • Assessment which is fully objective is often impossible, because subjectivity is always present
Teachers and students views about assessment (Räisänen et al., 2016)

1. What kind of experiences teacher and students have about the reliability and fairness of assessment?

2. How do these experiences differ between teacher and the students?

Data: teacher (5) and student interviews (24), exam questions and responses

• Stimulated recall – interviews
Problem with the validity: The exam questions did not always measure what they were supposed to measure

- **Teacher**: "You should see it in the grades, but it not visible in this exam, because if you answer these questions, you just have to know what has been said in the lecture to get a good grade"

- **Teacher**: "You can see that just by memorising the material you get a five, you do not need to combine or think about the content"

- **Student**: "I actually havent compared these concepts so much. It was apparently enough to just write about these both seperately."
Assessment criteria were not clear

- **Student:** ”this one assignment, I only got one and a half points from it. It has one big mistake in the middle. I kind of feel like I have the points for this that I wrote before the mistake. Everything that I wrote after the mistake I feel like has not been taken into account.”
- **Teacher:** ”I can say one thing, These papers have not been read at the same time. She should have gotten a better grade. Oh my god…”
Assessment criteria

- Clarity and transparency important!
  - Students often find the assessment criteria unclear (Räisänen et al., 2016)
  - Teachers’ and students’ conceptions of the criteria differ (Räisänen et al., 2016)

- Assessment criteria support student learning
  - Awareness about assessment criteria and the assessment process improve student learning (Price & O’Donovan, 2006).

- Clear assessment criteria also helps the teacher to assess students performance

- Transparency → reliability
Examples of assessment criteria
Environmental Sciences – assessment of group project

The aim was to build a justified solution to one environmental problem
<table>
<thead>
<tr>
<th>Grade</th>
<th>1</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy</td>
<td>at least 10 scientific articles are used</td>
<td>at least 15 scientific articles are used</td>
<td>at least 20 scientific articles are used</td>
</tr>
<tr>
<td>The problem</td>
<td>The main problem and its main aspects are described</td>
<td>The main problem and its main aspects are described using concepts of natural and social sciences. Also aspects that have influenced its formation and existence are considered.</td>
<td>The main problem and its main aspects are described using concepts of natural and social sciences. Also aspects that have influenced its formation and existence are considered. Its impact to other sustainability problems are described.</td>
</tr>
<tr>
<td>Solution to the problem</td>
<td>The groups solution to the problem is unclear</td>
<td>The groups gives a justified solution to the problem</td>
<td>A group solution is given and it is properly justified</td>
</tr>
<tr>
<td>Formation of the solution</td>
<td>The solution to the problem is based on one or two perspectives</td>
<td>The solution based on central, research-based aspects of sustainability science and takes into account different disciplines.</td>
<td>The solution is based on different research-based and multidisciplinary aspects central to sustainability science and their impact and value in solving the problem is critically evaluated.</td>
</tr>
<tr>
<td>Implementation of the solution</td>
<td>The implementation and impact of the solution is taken into account</td>
<td>The implementation and impact of the solution is assessed from economical, social and ecological perspectives.</td>
<td>The implementation and impact of the solution is assessed from economical, social and ecological perspectives. The challenges of the implementation are assessed.</td>
</tr>
</tbody>
</table>
### Peer evaluation of group work - university pedagogy course

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion pertaining to course content</td>
<td>The discussions analyse the topic critically and constructively. The discussions insightfully integrate participants’ own experiences from teaching and learning. If the conversation moves to irrelevant themes, it is promptly guided back to topic.</td>
</tr>
<tr>
<td>Setting and accomplishing the group’s goals</td>
<td>The group has a common goal that takes into account individual goals of members, as well. The group work style and workflow is such that all learning goals are accomplished well and, if need be, the goals have been revised during the course work.</td>
</tr>
<tr>
<td>Participation, taking responsibility, interaction, and group community &amp; rapport</td>
<td>Everyone actively participates into discussions and other work group work tasks. Each member of the group has taken a clearly defined responsibility of the group work, while giving room for other members’ ideas and work input. The responsibilities within the group have been divided equally and justly. The group community and rapport encourages learning and working towards the goals. Possible conflicts are processed and the group learns from them together.</td>
</tr>
<tr>
<td>Results of group work activity</td>
<td>The group has significantly improved the group members’ quality of learning during this course.</td>
</tr>
</tbody>
</table>
## Self-assessment matrix

<table>
<thead>
<tr>
<th>Problems associated with the use of aquatic ecosystems</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I remember that in the use of aquatic ecosystems there are both quantitative and qualitative problems and I am capable of giving an example of both</td>
<td>I am able to describe reasons of quantitative and qualitative problems</td>
<td>I understand why it is very challenging to correct the existing problems both from the view of natural and social sciences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eutrophication</td>
<td>I am able to define eutrophication</td>
<td>I am able to describe the main effects of eutrophication</td>
<td>I understand why it is very difficult to turn eutrophied lakes towards the pre-eutrophication state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restoration</td>
<td>I understand that restoration efforts can have both positive and negative effects</td>
<td>I am able to describe both positive and negative aspects of restoration</td>
<td>I understand that restoration of aquatic ecosystems requires knowledge both on limnological and societal aspects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What have we learned

• Assessments should be reliable
• Assessment should focus on the level of performance
• Assessment should be similar despite the situation and who is assessing
• Assessment should be based on clear criteria

ANY THOUGHTS? QUESTIONS?
Examples of development of assessment
Example of a development of peer assessment (Asikainen, Virtanen, Postareff, 2014)

A Bachelor level mass lecture course in Gene technology
The final exam was peer assessed
- Each student assessed two exams anonymously
- Students were given detailed assessment criteria
- The exam was developed to measure different level of knowledge
- The teacher was present and students could ask him
Peer assessment of the final exams (Asikainen et al., 2014)

Students grades matched very well with the teachers
\((r = 0.83, p < 0.001)\).

90 % of the students experienced the assessment very positively

**Open ended answers:** peer assessment supported my learning, I got feedback about my learning, helped to understand what kind of knowledge was required, assessment situation was a learning experience, helped to assess one’s own knowledge and competence

→ Supported the aims for life-long learning

**SUMMATIVE & INTEGRATIVE ASSESSMENT**
Problem here was the heterogenic students in the course (minor and major students)

**Digital prior knowledge test in Moodle**

- Gives feedback about performance and suggests areas of biology one should read about/go though before the course if the prior knowledge is not what is expected (level of upper secondary school)

- Results showed that this prior knowledge test helped especially the minor students to learn
DISA (digital self-assessment) team

Juuso Nieminen
Johanna Rämö
Jokke Häsa
Viivi Virtanen
Henna Asikainen
Development of summative self-assessment in mathematics
(Niemenen, Asikainen, Rämö, 2019)
How students approaches to learning, self-efficacy and performance differ in formative and summative assessment groups?
RESEARCH DESIGN

7 weeks

Summative SSA group (N = 152)

Formative SSA group (N = 147)

Student-centered learning environment; formative SSA tasks

Self-grading

Course exam

Survey (N = 299)

Interviews (N = 41)
Results

- In the summative self-assessment groups, students applied **more deep approaches to learning** and had higher self-efficacy
  - Surface approach to learning was **less applied** in the SSA group
  - No differences in performance
  - Very deep approach to learning was overrepresented in the SSA group

- In addition: Self-assessment was valid
# Oppimistavoitematriisi

## Lineaarialgebra ja matriisilaskenta I

© Jokke Häätä, Johanna Rämö, Helsingin yliopisto

<table>
<thead>
<tr>
<th>Esitiedot</th>
<th>Arvosanaan 1–2 riittävät taidot</th>
<th>Arvosanaan 3–4 riittävät taidot</th>
<th>Arvosanaan 5 riittävät taidot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yhtälöryhmät (YR)</strong></td>
<td>Osaan ratkaista ensimmäisen asteen yhtälöitä ja yhtälöpareja</td>
<td>Osaan muokata yhtälöryhmää vastaavan matrisin alkiersivitoimituksilla redusoiduksi porrasmatriisiksi</td>
<td>Tunnen lineaarisen yhtälöryhmän ratkaisujen lukumäärän liittyvät rajoitukset</td>
</tr>
<tr>
<td></td>
<td>Osaan päättää yhtälöryhmän ratkaisut redusoidusta porrasmatriisista</td>
<td>Osaan määrittää ratkaisujen lukumäärän suoraan porrasmatriisista</td>
<td>Osaan käyttää yhtälöryhmää käytännön ongelmien mallintamiseen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Osaan kirjoittaa lineaarisen yhtälöryhmän matriisiyhtälön ( A\vec{x} = \vec{b} )</td>
<td>Tunnen yhtälönratkaisun periaatteen ja tiedän, että alkiersivitoimitukset säilyttävät yhtälöryhmien yhtäpitävyyden</td>
</tr>
<tr>
<td><strong>Vektoriavaruudet (VA)</strong></td>
<td>Osaan laskea tason vektoreita yhteen ja kertoa niiität luvuilla</td>
<td>Tunnen vektorin määritelmän lukujonona ja osaan havainnollistaa tason vektoreita pisteinä tai suuntajanoina</td>
<td>Osaan kirjoittaa vektoreiden virittämän aivaruuuden joukko-merkintää käyttäen ja luette kyseisen joukon alkioita</td>
</tr>
<tr>
<td></td>
<td>Osaan laskea yhteen ja vähentää sekä kertoa skalaareilla avaruuden</td>
<td>Tiedän, miltä avaruuden ( \mathbb{R}^3 ) alivaruuDET näyttävät</td>
<td>Osaan muodostaa vektorien virittämälle alivaruuuddle kannan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Osaan selvittää vektorien virittämän alivaruuuden dimension</td>
</tr>
<tr>
<td>Matematiikan lukeminen ja kirjoittaminen (LK)</td>
<td>Käytän vastauksissani kurssin merkintöjä</td>
<td>Kirjoitan vastauksiini kokonaisia ja ymmärrettäviä lauseita, joista ulkopuolinen lukijakin saa selvän</td>
<td>Kirjoitan ratkaisuja, jotka sisältävät vain olennaisen, ja käytän matemaattisia symboleita vain tarvittaessa</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Tunnen eron määritelmän, lauseen ja esimerkin välillä</td>
<td>Määrittelen todistuksissa käytämänä muuttujat</td>
<td>Osaan laatia todistuksia väitteille, jotka koskevat abstrakteja tai yleisiä objekteja</td>
<td></td>
</tr>
<tr>
<td>Ymmärrän, että matematiikkaa luksiessa ei voi heti ymmärtää kaikkea, vaan on usein palattava takaisin tai hypätävä vaikeiden kohtien yli</td>
<td>Osaan tarkistaa, että jokin konkreettinen objekti toteuttaa annetun määritelmän</td>
<td>Pyrin ymmärtämään todistuksia ja käytän kynää ja paperia hankalien välivaiheiden selvittämiseksi</td>
<td></td>
</tr>
<tr>
<td>Osaan käyttää selittävää lukutapaa määritelmien tai todistusten ymmärtämiseksi</td>
<td>Osaan ilmaista tarvitsevani apua</td>
<td>Kykenen ylläpitämään matemaattista keskustelua, joka hyödyttää molempia osapuolia</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Matemaattinen keskustelu (KE)</th>
<th>Puhun matemaattisista aiheista toisille</th>
<th>Käyn matemaattisia keskustelua, joissa ilmisen omia ajatuksiani ja kuuntelen toisen ideoida</th>
<th>Kykenen ylläpitämään matemaattista keskustelua, joka hyödyttää molempia osapuolia</th>
</tr>
</thead>
</table>
Similar experiences in environmental sciences, plan sciences

Deep approach to learning increases
Surface approach to learning decreases
Students experience the self-assessment as supporting their learning
“Finally studying for myself and not for the exam”

When compared with performance in assignments and self-assessment, they are very much in line

FINNISH STUDENTS DO NOT CHEAT
• Peer and self-assessment have many benefits to students learning

• Any thought? Comments?
References

References


- Halinen, K., Ruohoniemi, M., Katajavuori, N. & Virtanen, V. *Life science teachers’ discourse on assessment: a valuable insight into the variable conceptions of assessment in higher education*. *Journal of Biological Education*. 48, 1, s. 16-22


- Postareff, Katajavuori, Lindblom-Ylänne and Trigwell 2008 Consonance and dissonance in descriptions of teaching of university teachers *Studies in Higher Education* 33,1,49–61


References


ABC-cards
Learning through acquisition is what learners are doing when they listen to a lecture or podcast, read from books or websites, and watch demos or videos.

**Challenge: How to activate and engage students?**

- Split content into chunks, merge tests and assignments with materials, request reflection.
- Create layers of learning...

Adapted from UCL ABC Learning Design
Available at http://blogs.ucl.ac.uk/abc-ld
<table>
<thead>
<tr>
<th>CONTACT TEACHING</th>
<th>ONLINE TEACHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Reading books and articles</td>
<td>□ Reading multimedia and digital materials, including internet sites, e-books, etc.</td>
</tr>
<tr>
<td>□ Listening to lectures in contact teaching</td>
<td>□ Listening to audio recordings, podcasts</td>
</tr>
<tr>
<td>□ Following demonstrations</td>
<td>□ Following online lectures and broadcasts</td>
</tr>
<tr>
<td></td>
<td>□ Watching animations and videos (e.g. tutorials, clips, screencasts, interviews, documentaries)</td>
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**TOOLS:**

- Journals, ebooks
- Moodle, e.g. Page, Files, Book, embedded videos
- Blogs, wikis
- Video or audio archive (UniTube, YouTube, Vimeo)
- Online databases
Learning through production is the way the students consolidate and demonstrate what they have learned by articulating their current conceptual understanding and how they use it in practice.

*Mini tests, calculation assignments, diagram, presentation, …*

*Challenge: Assessment if text? Peer review?* --> *Asynchronicity*

Adapted from UCL ABC Learning Design. Available at http://blogs.ucl.ac.uk/abc-ld
## Production

### Contact Teaching
- Essays
- Reports and learning diaries
- Presentations
- Models of designs
- Exams, tests, and quizzes
- Portfolios
- Performances (plays, speeches, music)
- Graphic novels
- Mindmaps

### Online Teaching
- Multimedia (video, audio, animation, pictures)
- Slideshows
- Digital models of designs, 3D-printing
- Blog-writing
- Digital portfolio
- Online pages and materials
- Online tests, exams, and quizzes
- Augmented- and virtual reality materials
- Digital mindmaps
- Code

### Tools:
- Moodle
- Blogs and wikis
- Eportfolios
- Flinga, Presemo
- Unitube recording studio or lecture hall
- Augmented reality tools (HP Reveal etc.)
- MS Office programs
- Video editing software (iMovie, Movie Maker)
- Prezi, Explain everything app
Social construction of knowledge builds on investigations, discussions, and group work. Collaboration is essentially about taking part in the process of knowledge building itself.

*Learning through collaboration may include, e.g. discussion, practice, and production.*

– Collaborative production, e.g. glossary, database, discussion activity…

Adapted from UCL ABC Learning Design Available at http://blogs.ucl.ac.uk/abc-ld
COLLABORATION

CONTACT TEACHING

- Discussions in class
- Commenting others’ work; peer review
- Group work
- Production of materials together
- Team-Based Learning

ONLINE TEACHING

- Online discussions, wikis, chat; also commenting and producing group work through online communication
- Commenting on others’ work or peer reviewing through online communication
- Producing digital materials and documents together, into e.g. a wiki, blog, audio recording, or video, augmented reality

TOOLS:

- Moodle, including Discussion Forums Workshop, Vocabulary, Wiki
- Blogs
- OneDrive (e.g. Word Online)
- Movie Maker, iMovie; Vimeo, Youtube
- Web meeting (Adobe Connect, Skype for Business, Lifesize)
- Eportfolios
Learning through discussion requires the learner to articulate their ideas and questions, as well as to challenge and respond to the ideas and questions from the teacher and from their peers.

*Discussions are inherently connected to the concept of social construction of knowledge.*
– Prominent in cMOOCs, less in xMOOCs.
--> Asynchronicity vs. synchronicity

Adapted from UCL ABC Learning Design
Available at http://blogs.ucl.ac.uk/abc-ld
DISCUSSIONS

CONTACT TEACHING

☐ Seminars
☐ Small group discussions
☐ Book clubs
☐ Interactive lectures
☐ Collaborative “jigsaw” discussion activity
☐ “Learning cafés”
☐ Assigning roles in discussions (e.g. De Bono’s Six Thinking Hats)
☐ Synchronicity

ONLINE TEACHING

☐ Online seminars and conferences
☐ Online discussion forums and groups: e.g. “jigsaw” activity
☐ Assigning roles in online discussions
☐ Synchronicity/asynchronicity

TOOLS:
☐ Moodle e.g. discussion forums
☐ Blogs and wikis
☐ Social media: e.g. Yammer, WhatsApp
☐ Adobe Connect, Skype for Business
☐ Teams
LEARNING THROUGH INQUIRY

Learning through investigation and inquiry guides the learner to explore, compare, critique and apply the texts, documents and resources that incorporate the concepts and ideas being taught. Inquiry tasks emphasize argumentation skills and an understanding of the objectives of the task.

Comparing, reporting, Case-Based tasks, branching scenarios, etc. (H5P), clever task setting (layers)

Adapted from UCL ABC Learning Design
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## INVESTIGATION

### CONTACT TEACHING

- Using text-based study guides
- Source critique, strategic reading skills
- Analysing ideas and information in a range of (printed) materials and sources
- Using conventional methods for finding and analysing ideas: library, handouts, blackboard
- Comparing texts
- Commenting on others’ work in class / in a seminar
- Searching information and ideas, as well as connecting, applying, and evaluating information
- Case-Based Learning, research activities

### ONLINE TEACHING

- Using online advice and guidance
- Source critique, strategic multimedia reading skills
- Analysing ideas and information in a range of digital sources
- Using digital tools to collect and analyse data
- Processing documentation on an online tool or a shared folder
- Comparing digital texts
- Using digital tools for searching, connecting, applying, and evaluating information and ideas

### TOOLS:

- E-libraries, databases, search engines, journals
- OneDrive
- Blogs, wikis
- Academia.edu, Researchgate
Typical practice consists of authentic tasks, context-driven learning, and experiential learning. These may include e.g. internships, writing and presenting a conference poster, labs, field work.

The role of feedback is an important part of learning through practice. Note that feedback may be intrinsic or extrinsic.

**MOOCs: discussions related to solving authentic problems, virtual visits, interview materials, 3D pictures...**
## Practice

### Contact Teaching
- Practice exercises
- Lab practice
- Field trips
- Practicing academic and research skills
- Practicum, internships
- Real client requests
- Collaboration with work life
- Face-to-face role play activities
- Case-Based Learning

*Note: These can be conveniently tied together in a sequence with production tasks.*

### Online Teaching
- Using models
- Simulations
- Virtual labs and field trips
- Online role play activities
- Augmented reality
- Practicing online research and academic skills
- Learning environments with branching pathways

**TOOLS:**
- Moodle lesson, H5P
- Adobe Storyline
- HP Reveal
- Eportfolio
- Virtual patient or case scenarios