LAST COMES FIRST
Scientific Spring Meeting KNVM & NVMM Els de Hullu elsdehullu16@gmail.com

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Fred’s aim: bridge the gap and make evidence-based philosophies practical for educators
Heuristics to move from what works in theory to what works in practice

Evidence-based heuristics are

- cost-effective
- Instrumental
- congruent
Example: The Immune system

Teach or lecture about the immune system; e.g. the different types of cells and their functions.

Learners work on practical and/or subtasks; e.g. label different kinds of cells in a blood sample.

Learners engage with tasks in which they apply new theory (higher order tasks); e.g. discuss vaccination against HPV.
Merrill: instruction is problem-centred

First heuristic: **Reverse heuristic**, whole task first *(Last comes first)*
Second heuristic

Present ‘whole task’ first, then **Remove and Build**

Add support or provide subtasks as needed – which makes differentiation possible.

Where to find appropriate whole tasks?
### Perspectives in (Micro)Biology

<table>
<thead>
<tr>
<th>Name</th>
<th>Main question</th>
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<tbody>
<tr>
<td>Comparative</td>
<td>How can it be classified?</td>
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<tr>
<td>Mechanistic</td>
<td>How does it work?</td>
</tr>
<tr>
<td>Medical</td>
<td>What can go wrong and how to treat?</td>
</tr>
<tr>
<td>Technological</td>
<td>How can you put it to use?</td>
</tr>
<tr>
<td>Ethical</td>
<td>What are you allowed to do with it?</td>
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<tr>
<td>Personal</td>
<td>How does it impact on you?</td>
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<tr>
<td>Care</td>
<td>How to take care of it?</td>
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<tr>
<td>Also: Causative, Functional, Environmental, Developmental, Evolutionary</td>
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Example of technological perspective in use.

The immune system consists of many subsystems which cooperate, each subsystem fulfils one or more functions.

One characteristic of biological systems is that these function in such a way as to have the fewest disadvantages for survival and reproduction.

Hence: how to (re-)design the immune system is a design problem.

Ask learners to design an immune system
Further reading

- Uitdagend vakonderwijs voor alle leerlingen, VALUE model


- https://www.youtube.com/watch?v=Dsb_U2EEGhI
Thank you and goodbye!