Towards a methodological approach for designing learning environments: focus on task design

Jozef COLPAERT
University of Antwerp, Belgium

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Look who’s listening …

* Take your neighbour’s hand and close your eyes …

* Describe …
‘Difficult’ student
Teacher of French (1980 - 1986)
  Trips to Paris, Mont Ventoux, ‘Exercice des bras lourds’, video camera, les Régions de France, poetry ...
CALL developer (1986 - 2004)
  Successful applications versus less successful
Editor CALL Journal (2004 ... )
Prof. Instructional Design & Computer Assisted Language Learning (2004 - ...)
  Personal Goal Theory
Director LINGUAPOLIS (2004 - 2017)
Coordinator of ECHO (2018 - ...)

Look who’s talking ...
My memoirs

- The Inmates Are Running the Asylum
- One Flew over the Cuckoo’s Nest
- They Shoot Horses don’t they?
Overview

1. Seven questions
2. Educational Engineering
3. The ADDIE stages
4. Distributed Design
5. Task Design
Seven questions

1. Does technology have an effect on learning?
2. Are learner-centered approaches possible with the current teacher support?
3. Should pedagogical theories be applied in our teaching?
4. Should we imitate Good Practices?
5. Can educational artefacts be evaluated?
6. Is there enough knowledge available for improving education?
7. Do students/teachers know what they need and want?
Major problems/challenges

* Pressure
  * Key Performance Indicators (KPIs)
  * ‘Publish and Perish’ syndrome (Colpaert 2012)
* Pervasive but persuasive terminology
  * Blended learning, flipped classroom, digital natives, big data, 21st century skills, virtual learning...
* Perception of the role of ICT
  * increasing workload
  * reducing teaching staff (hours)?
Overview

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Education = “l’art du possible”

* by its very nature, education can and will never be perfect
* lack of time and resources often prevent us from duly implementing the required changes
* any change, even the most justifiable one, entails some kind of resistance, often from stakeholders we misjudge
* there is not enough knowledge available in terms of substantiated findings which would enable us to improve education, solve problems or design solutions in a systematic, methodological and justifiable way.
Engineering

* What is engineering exactly?
What is engineering?

Wikipedia: “Engineering is the discipline, skill, and profession of acquiring and applying scientific, economic, social, and practical knowledge, in order to design and build structures, machines, devices, systems, materials and processes.”
B.V. Koen. 1985. *Definition of the Engineering Method.* “By the engineering method I mean the strategy for causing the best change in a poorly understood or uncertain situation within the available resources.” (p.5)

- ➔ strategy to apply when not enough knowledge is available
- ➔ Educational Engineering = …
Educational Engineering

- about hypothesis building & validating
- staged: ADDIE
- real-world, holistic
- cyclic, iterative
- progressive lifecycles: intermediate loops
- focus on the process itself
Overview

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The ADDIE stages

- Analysis
- Design
  - Conceptualisation
  - Specification
  - Prototyping
- Development
- Implementation
- Evaluation
The ADDIE cycle

- Analysis
- Design
  - conceptualization
  - specification
  - prototyping
- Development
- Implementation
- Evaluation

Theory

Technology
### Analysis

<table>
<thead>
<tr>
<th>LOCAL ASPECTS</th>
<th>DIFFERENTIAL ASPECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner</td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td></td>
</tr>
<tr>
<td>Other actors</td>
<td></td>
</tr>
<tr>
<td>Learning model</td>
<td></td>
</tr>
<tr>
<td>Instruction model</td>
<td></td>
</tr>
<tr>
<td>Evaluation model</td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
</tr>
</tbody>
</table>

**normal** = cannot change  
**italic** = can change  
**bold** = must change  
**bold italic** = can and must change
* Conceptualization
* Specification
  * Pedagogical
  * Content-related
  * Architectural
  * Technological
* Prototyping
Design - conceptualization

* FOCUS GROUP
When I think about this course I think about the following problems ...
When I think about these problems I feel ...
I feel ... because I ...
The course should ...

abandoned
abused
accused
addicted
afraid
aggravated
aggressive
alone
angry
anguish
annoyed
anxious
apprehensive
argumentative
artificial
ashamed
assaulted
at a loss
at risk
atrocious
attacked
avoided
awful
awkward
bad
badgered
baffled
banned
beaten down
belittled
berated
betrayed
bitched at
bitter
bizzare
blacklisted
blackmailed
blamed
bleak
blown away
blur
bored
boring
bossed-around
bothered
bothersome
bounded
boxed-in
broken
bruised
brushed-off
bugged
bullied
bummed
bummed out
burdened
burdensome
burned
burned-out
caged in
careless
chaotic
chased
cheated
cheated on
chicken
claustrophobic
clinging
closed
cluless
clumsy
coaxed
codependent
coerced
cold
cold-hearted
combative
commanded
compared
competitive
compulsive
conceited
concerned
condescended to
confined
conflicted
confronted
confused
conned
consumed
contemplative
contempt
tentious
controlled
convicted
cornered
corralled
cowardly
crabby
cramped
cranky
crap
damaged
damned
dangerous
dark
dazed
dead
deceived
deep
defamed
defeated
defective
defenseless
defensive
defiant
deficient
deflated
degraded
dehumanized
dejected
delicate
deluded
demanding
demeaned
demented
demoralized
demotivated
dependent
depleted
depraved
depressed
deprieved
deserted
deserving of pain/punishment
desolate
despair
despairing
desperate
despicable
despised
destroyed
destructive
detached
detest
Examples of volitions

* I want ...

... Support, Direction, Situation, Reward on effort, Respect, Feel competent, Feel related, Feel autonomous, Fairness, Clarity, Usefulness, Enjoyment, Results, Self-realization, Feel confident, Feel calm ...

❖ ...or not ...
Design - conceptualisation

* Design starts with reconciling conflicting goals

* Concept = hypothetical construct which needs to be validated

* Validation = comparing expected outcome with actual outcome
Design - specification

* **Pedagogical specification:**
  * choose/make learning model
  * choose/make teaching model
  * choose/make evaluation model

* **Content specification**
  * Off-the-shelf
  * MOOCs
  * authentic materials
  * OER
  * co-construction

* **Architectural specification**
  * interactions > functionalities

* **Technological specification:**
  * define required functionalities first, then try to find a technology that matches these requirements
Examples

* Arcades Interactif
* Eurocatering
* DISCO
* TRUVO
* IRIS
* UdC
* Management & Organisation
* HRM
* University of Antwerp
* Learning environment should support

- relatedness
- autonomy
- competence

min → max

max → max

University of Antwerp
### Teacher PSS

<table>
<thead>
<tr>
<th>I want / need to …</th>
<th>SELF</th>
<th>PEER</th>
<th>COACHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inform myself</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communicate</td>
<td></td>
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<td></td>
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<tr>
<td>teach</td>
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<td></td>
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<td>evaluate</td>
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<tr>
<td>reflect</td>
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<td></td>
</tr>
<tr>
<td>contribute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plan / manage</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>obtain</td>
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<td>…</td>
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</tr>
</tbody>
</table>
### Student PSS

<table>
<thead>
<tr>
<th>I want / need to …</th>
<th>SELF</th>
<th>PEER</th>
<th>COACHED</th>
</tr>
</thead>
<tbody>
<tr>
<td>inform myself</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communicatie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>learn / study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>evaluate</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>reflect</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>contribute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plan / manage</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>obtain</td>
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<td>...</td>
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<td></td>
</tr>
</tbody>
</table>
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Distributed Design

* Five paradigm shifts:

  * The ecological paradigm shift
  * The process-oriented paradigm shift
  * The pull paradigm shift
  * The psychological paradigm shift
  * The task design process
No technology (in extenso educational artefact) carries an inherent, measurable and generalizable effect on learning.

- This effect can only come from the entire learning environment as a ecology.
- The learning environment = collection of interacting components
- The learning environment (LE)= to be created by design (virtual, optimal)<>
  the learning situation (LS) = what exists
- The learning environment = not only what
  - ... but also how-to
The eventual learning effect of the LE is proportional to the **designedness** of the LE.

Designedness = the extent to which it has been designed in a methodological and systematic way.

DD focuses on a common methodology but leads to polymorphous results.

Consequences for research and evaluation: it’s not about the product, it’s the process!
Why do planes fly?
Why do planes fly?
Push to pull paradigm shift

- Traditional approach: technology, and in extenso other educational artefacts, have an effect on learning, on the brain (push-model)

- A methodological design process creates a demand for / entails the need for specific educational artefacts (pull-model)

- Case of technology:
  - consequence of the design process = specification of needed functionalities
  - which technologies afford which functionalities?
Focus on personal goals is a more efficient way to achieve pedagogical goals


Between Self-Determination Theory and Dörnyei’s L2 model
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Task conceptualization model

They must:
- Targeted competences in terms of required knowledge, skills, insight and attitude

They want:
- Targeted requirements in terms of meaningfulness, usefulness & reward

They can:
- Targeted activities

They may:
- Targeted degree of autonomy

They will:
- Task concept

Previous task
- Pedagogical layer
  - Change or choose learning goal

Psychological layer
- Add or change motivating feature(s)

Activity layer
- Add or change activity type(s)

Autonomy layer
- Change degrees of freedom

New task
- Specifying task features & execution process

Analysis
- Learning goals
- Learner characteristics
  - Global, local, individual
- Context:
  - Affordances and limitations of context and available technology
- Learner autonomy

Specification
- Task features & execution process
<table>
<thead>
<tr>
<th></th>
<th>Knowledge</th>
<th>Skills</th>
<th>Insight</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject-matter</strong></td>
<td>geography</td>
<td>drawing</td>
<td>historical</td>
<td>identification, autonomy</td>
</tr>
<tr>
<td><strong>Linguistic</strong></td>
<td>grammar rules,</td>
<td>listening</td>
<td>language structure</td>
<td>interest</td>
</tr>
<tr>
<td></td>
<td>vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Communicative</strong></td>
<td></td>
<td>convince,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>negotiate</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intercultural</strong></td>
<td>other cultures</td>
<td></td>
<td></td>
<td>adopt an interested, constructive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>attitude</td>
</tr>
<tr>
<td><strong>Socio-linguistic</strong></td>
<td>language varieties</td>
<td>adapt register</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>and style</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital</strong></td>
<td>communication tools</td>
<td>make knowledge</td>
<td></td>
<td>solve problems based on insight</td>
</tr>
<tr>
<td></td>
<td>and games</td>
<td>clip</td>
<td></td>
<td>and knowledge</td>
</tr>
<tr>
<td><strong>...</strong></td>
<td></td>
<td></td>
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</tbody>
</table>
THEY WANT

* Two dimensions:

  * three levels:
    * global or universal: what we know learners worldwide want
    * local or context-dependent: what we know ‘our’ learners want
    * individual: what we know some learner want

  * three qualities:
    * acceptable: a task should be authentic, relevant and/or fit into the teacher’s approach
    * useful: a task should have a result for the learner, the learning environment or others
    * rewarding: a task should tackle universal needs (competence, relatedness, autonomy), personal goals (respect, support, …) or Ideal Self Images [advanced level]
## THEY WANT

<table>
<thead>
<tr>
<th>Quality / level</th>
<th>Universal</th>
<th>Local</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable (y/n)</td>
<td>Authenticity</td>
<td>Curriculum fit, fairness</td>
<td>Relevance</td>
</tr>
<tr>
<td>Useful (what?)</td>
<td>Result for others</td>
<td>Result for learning environment, co-learner teacher</td>
<td>Result for the learner</td>
</tr>
<tr>
<td>Rewarding (to what extent?)</td>
<td>Competence, autonomy relatedness</td>
<td>Personal Goals as common denominator</td>
<td>Ideal SELF</td>
</tr>
</tbody>
</table>
Choose one or more activity types for matching THEY MUST and THEY WANT:

- **TELL**: present yourselves, talk about ...
  - only information

- **INTERACT**: convince, negotiate, plead, sell, teach ...
  - targeted effect on the other (speech acts)

- **DO**: play game, do exercise, simulate...
  - additional collaborative activity other than communicating

- **MAKE**: build an artefact
  - concrete artefact as result
Task conceptualization model

**Previous task**
- **Pedagogical layer**: Change or choose learning goal
- **Psychological layer**: Add or change motivating feature(s)
- **Activity layer**: Add or change activity type(s)
- **Autonomy layer**: Change degrees of freedom

**New task**
- **THEY MUST**: targeted competences in terms of required knowledge, skills, insight and attitude
- **THEY WANT**: targeted requirements in terms of meaningfulness, usefulness & reward
- **THEY CAN**: targeted activities
- **THEY MAY**: targeted degree of autonomy

**ANALYSIS**
- Learning goals
- Learner characteristics: global, local, individual
- Context: affordances and limitations of context and available technology
- Learner autonomy

**SPECIFICATION**
- task features & execution process
Examples of artefacts include: abstract, advertisement, animation, app, audio, description, biography, blog, blog post, business plan, chart, checklist, comparison, course content, (fashion/architecture) design, diary, description, e-portfolio, Facebook group, film, flash cards, game, google street view, graph, illustration, interview, journal, joke, knowledge clip, label, list, media product, mind-map, mix, movie, plan, model, outline, painting, performance, poem, podcast, ppt, presentation, prezi, puzzle, reflection, remix, report, review, short story, simulation, song, speech, spreadsheet, summary, subtitles, survey, test, travel plan, video, vlog, virtual shop, vodcast, wiki, worksheet, quiz ...

Specification of MAKE activity: conceive, invent, devise, design, create, draw, blue-print, construct, build, (re)mix, prototype, build, record, post, cast, publish, produce, teach, sell, buy, curate...
Describe the expected acceptability, usefulness and reward for the chosen activity types:

<table>
<thead>
<tr>
<th></th>
<th>acceptable</th>
<th>useful</th>
<th>rewarding</th>
</tr>
</thead>
<tbody>
<tr>
<td>TELL</td>
<td></td>
<td></td>
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<tr>
<td>INTERACT</td>
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<td></td>
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<tr>
<td>DO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAKE</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
They may

- **Fixed Task**
  - tasks should be executed as such

- **Task With Degrees of Freedom**
  - learners can/should make some choices

- **Negotiated Task**
  - learners discuss the task among themselves, with the teacher or with the other class and suggest changes

- **Designed Task**
  - learners design a task themselves
New Course Design ID

* 7 short group assignments
* Intermediate feedback & final evaluation
* Changing group composition
* Remote path & FTF path
* Mixed group composition 50% FTF & 50% remote
* FTF & remote need each other
* ➔ demand for specific technologies

* Correlation final score & peer-evaluation?
Seven questions

1. Does technology have an effect on learning? **NO**
2. Are learner-centered approaches possible with the current teacher support? **NO**
3. Should pedagogical theories be applied in our teaching? **NO**
4. Should we imitate Good Practices? **NO**
5. Can educational artefacts be evaluated? **NO**
6. Is there enough knowledge available for improving education? **NO**
7. Do students/teachers know what they need and want? **NO**
But:

* Focus on the context (ecology)
* Focus on the design process
* Focus on subconscious volitions
* Focus on teacher support
* First specify needed functionalities, then choose:
  * Animation tools, Augmented Reality, Authoring of interactive activities, Collaborative writing, Curating Tools, Games, Learning tools, Meeting tools, MOOC-platforms, (Open) Office tools, Peer-evaluation tools, Classroom management tools, Presentation tools, Project tools, Simulations, Social media, Student Response Systems, Test authoring, Video sharing tools, Virtual worlds ...
Questions?

* Thank you!
* www.jozefcolpaert.net
* Jozef.colpaert@uantwerpen.be
* www.call2018.org