LOOPS, GAPS & CONTRADICTION 3 PLE OBJECTS THAT FOSTER LEARNING

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PURPOSE OF THE TALK

1. Present **three very simple functionalities** of common information systems and explain how they can foster learning

2. Exemplify them with **PLEs** built in my lab

3. Derive some **design principles** to build new PLEs

➡ Background: **educational psychology**

1. INTRODUCTION

On Personal *Information* Environments
and Personal *Learning* Environments

PLEs FROM A TECHNICAL VIEWPOINT

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- Which tool to use for which activity?

- Which tool supports which part of the work-flow?

- How these tools can be **differentiated** and chosen?

(c) http://www.flickr.com/photos/briansolis/520051406/

PLEs FROM A PSYCHOLOGICAL VIEWPOINT

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- How do information-based tools **support learning**?

- Which feature of the interaction actually supports learning and teaching?

- Upon which **cognitive processes**?

- What these tools have **in common**?
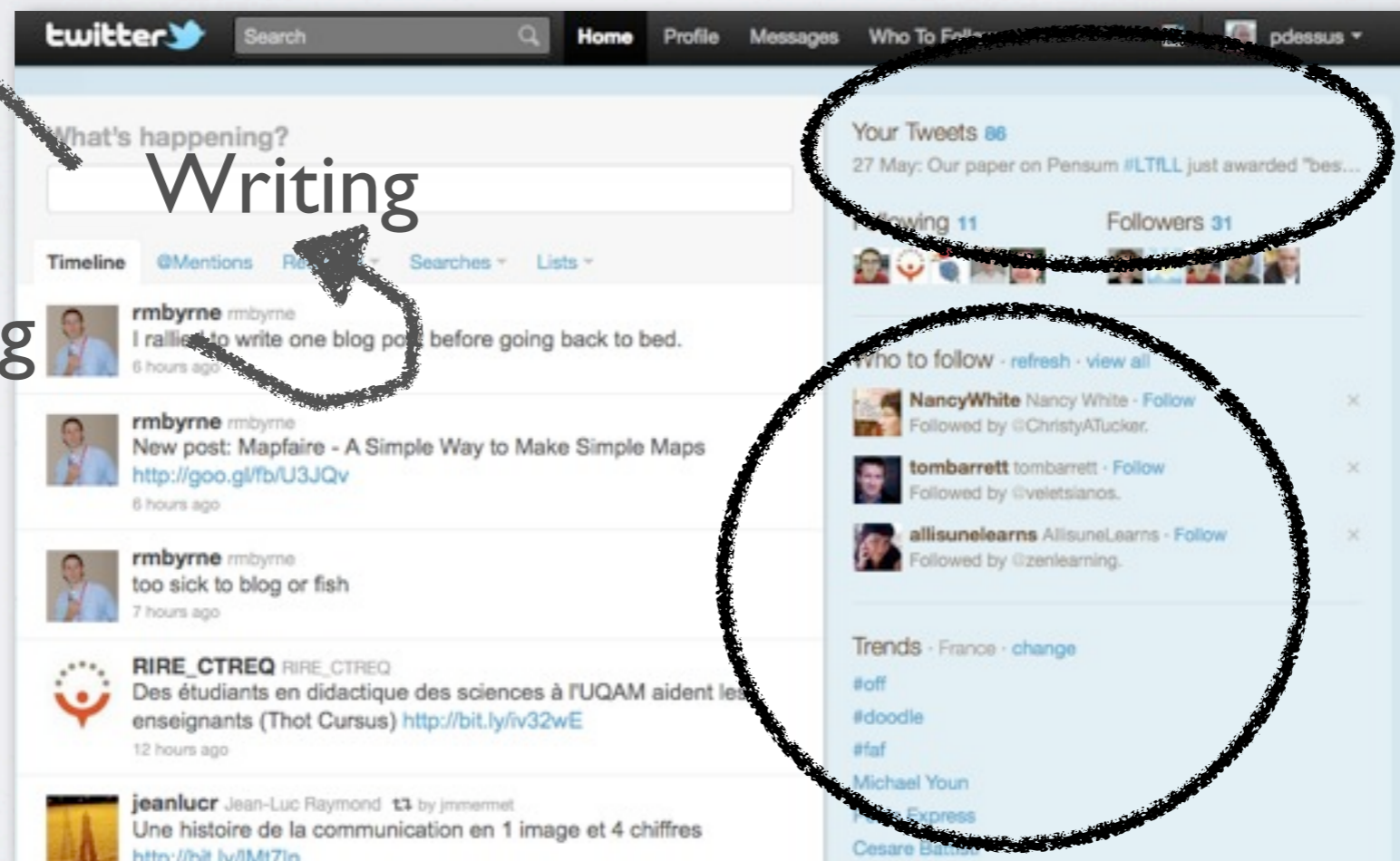
Puzzle made with
www.flash-gear.com/npuz/

⌐6 AN EXAMPLE: *TWITTER AS A PIE*

Twitter's activity loop and tools to guide us within
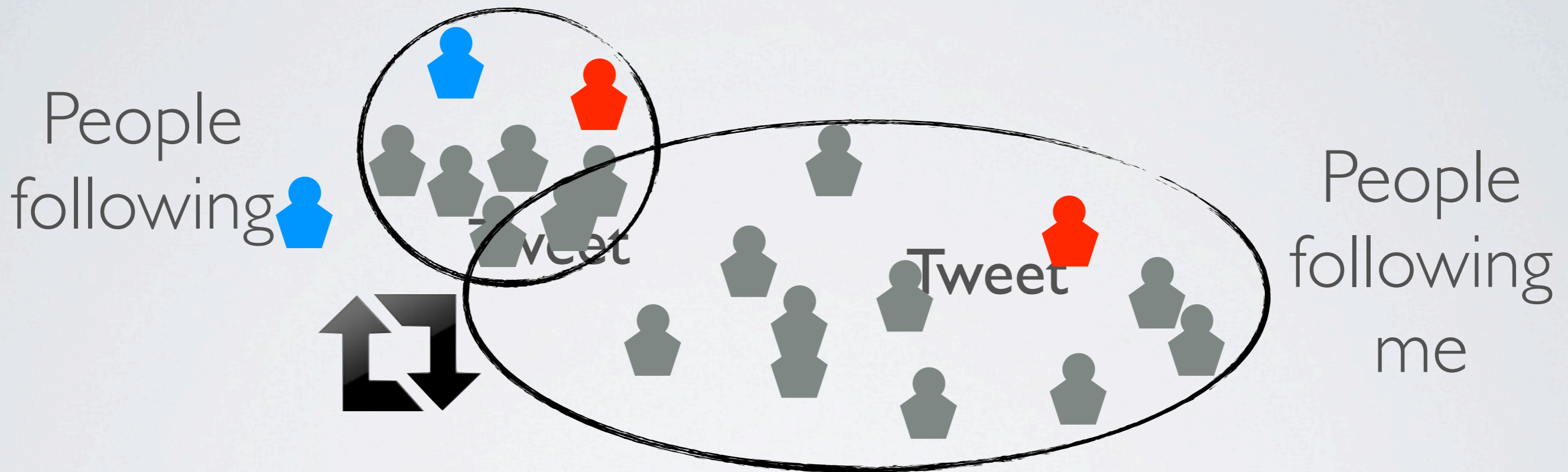
Possible read/write loop

Writing

Reading

What I've done?

What to do next?

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HOW TO REDUCE THE INFORMATION GAP?

People following

People following me

Tweet

Tweet

Am I merely **spreading** information or aiming at **reducing the gap** of information of my own community?

8 TO INFORM *VS* TO TEACH

Conner, 2005; Csibra & Gergely 2009

• Conner cites the case of indigenous to anthropologists transmission of knowledge (navigational learning in unknown seas or coasts): indigenous people weren't mere "**informants**" but actually "**teachers**"

- **manage situation**, enrich the learner activity (not so dangerous or easy, learning-prone)

- **feedback** on what is learned and remains to be learned

- shared attention and **intention detection** between learner/teacher

➡ Can we build PLEs that would play the role of "teacher" instead of this of mere "informant"?

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WHAT STILL LACKS TO *TWITTER* TO BE A PLE?

- Rich activities (read/write loop) already available, but...

  - lack of immediate or **quick feedback** on tweets (not only on people to follow)

  - lack of more **intensive interaction and shared attention** between people (idea discussion, argumentation, contradiction, etc.)

➡Exactly what we do through *Twitter* backchannelling, frequently used in educational settings

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CURRENT VIEWS OF PLEs

Johnson et al., 2011, pp. 30–1

"

PLEs are conceived as drawing on a variety of discrete tools, chosen by the learner,

• which can be **connected** or used in concert in a transparent way.

• [...] they would give students significant **control** over their education [...]

• [...] would encourage students to approach learning in ways best suited to their **individual needs** [...]

"

QUESTIONS RAISED BY THE DEFINITION

- **Connection and customization** raise the question of work-flow (does every combination of tools use allow learning?)

LOOP

- **Individual needs** suitability raises the question of how the needs are diagnosed and managed by the tool (which display, account?)

GAPS

- **Learner control** raises the question of the way to control the work-flow and feedback (which kind of control or contradiction)

CONTRA-DICTION

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SUMMARY:
PLEs ARE ENVIRONMENTS...

- ... that get learners involved in a **loop of activities with feedback...**

- ... that let learners scrutinize **gaps**

- ...and let learners and machine **contradict** each other...

➡ to help them build knowledge

II. LOOP, GAPS & CONTRADICTION

On Some Definitions and why these Objects Foster Learning

II. LOOP, GAPS & CONTRADICTION

On Some Definitions and why these Objects Foster Learning

14 TO LEARN IS BEING INVOLVED IN A TWOFOLD ACTIVITY LOOP

read

write   get distance

recall

rephrase

search   product...

retrieve

understand   be reflexive

get informed...

(c) http://www.flickr.com/photos/jamesbt/3299261881/ & http://www.flickr.com/photos/extraketchup/749315946/#/

SOME FEATURES OF LEARNING LOOPS

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Carver & Scheier 2011; Goetz 2011

• Free **involvement** in work (start/stop at every moment)

• Free **flow of activities** and switch between them

• **Feedback** can help (by machine and/or humans) to guide learner in the flow

➡ Foster **Self-Regulated Learning** (like cars' Instant Fuel Consumption displays help regulate drivers)

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TEACHING AND LEARNING IS FILLING GAPS...

- ... between learners (novices) and tutors/ teachers (experts)

- ... between peers vi

- ... between materia be learned

- ... between materia the ZPD

- etc.

Wild et al. 2010

G GAPS...

s) and tutors/

Press Esc to exit full screen mode.

Wild et al. 2010

CONTRADICTION AS FUEL FOR LEARNING

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Stahl 2006

- Essential part of many high-level learning processes: argumentation, problem solving

- When I'm wrong, no alternative view (possibly true) without contradiction (counter-argument)

- Help understand others' viewpoint (intention detection)

- Help build knowledge through debate

18 SUMMARY: LGC INTERACTIONS

Csibra & Gergely 2009; Pariser 2011; Stahl 2006; Vygotsky 1978

- Loop interacts with Gaps

  - ZPD, progressiveness of knowledge acquisition

- Loop interacts with Contradiction

  - awareness, attention direction, prevents from the "you loop"

- Gaps interact with Contradiction

  - fosters debate and argumentation, focus on evidence

III. SOME PLEs FROM MY LAB

On how to Illustrate LGC with some Local Productions

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LOOP

- All our systems embed a reading/writing loop...

- ...with some automated feedback in-between

21 *APEX 2.0 LOOPS 1/3* Dessus & Lemaire 2002; Zampa & Dessus forth.

Judgment of course text understanding assessor

Search texts

Write summaries

Apex
2.0>Reading

intelligent tutoring systems   Submit query

⊙ I think I could sum it up.   ○ I don't think I could.   Submit judgement

JACQUINOT-DELAUNEY Geneviève Réa Le tutorat : pièce maîtresse et pourtant parent pauvre des systèmes et dispositifs de formation à distance Même si le tutorat a existé et existe toujours indépendamment de cette modalité particulière de formation qu'est la formation à distance, il faut se demander pourquoi parle-t-on tellement du tuteur dans la formation à distance ? Tout de suite après, il convient de remarquer que si on en parle beaucoup, c'est pour ne rien en dire... ou presque. Dans un système ou un dispositif de formation ouverte

FAERBER Richard I Apprentissage collaboratif à distance : un exemple Une formation professionnelle à distance qui prend en compte à la fois les Technologies de l'Information et de la Communication et une meilleure compréhension des apprentissages, induit des comportements inédits dans la communauté éducative. Ce travail étudie les comportements d'un groupe d'étudiants et des enseignants dans le cadre d'un séminaire visant à acquérir des compétences pour le "travail collaboratif à distance" (Diplôme Universitaire UTICE). Les apprenants et les enseignants ont travaillé à l'aide du réseau Internet (campus virtuel de l'Université Louis

Tapez votre résumé du texte numéro 18 dans le champ ci-dessous et cliquez sur "évaluation"

Read texts, self-assess if understood

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RESUM'WEB LOOP 2/3

Mandin 2009, 201

Summarizing macrorules analyzer

22

Mandin 20

arizing macrorules analyzer

Résume le texte ci-dessous en 170 mots.

TEXTE À RÉSUMER

Ah, les premiers cheveux blancs, des rides au coin des yeux, des muscles qui ne suivent plus nos envies. Un mauvais rêve d'autant plus angoissant que nous savons que ce ne sont que les préliminaires. La sélection naturelle, normalement, fait tout pour fabriquer des individus aux tops, armés pour survivre aux conditions les plus extrêmes. Mais pourquoi a-t-elle conservé au cours de l'évolution un mécanisme qui rend les êtres vivants de plus en plus fragiles avec l'âge ? Cette sélection naturelle n'est d'ailleurs pas réservée à l'homme mais à la quasi-totalité des espèces.

phrase 5

La première idée qui nous vient, c'est que la vieillesse n'a été inventée que dans l'unique but de nous faire mourir. En effet, le vieillissement est inscrit au plus profond de nos gènes. Il fait qu'avec l'âge nos cellules s'usent, arrêtent de se diviser, de se réparer. A un moment donné, il n'y en a plus assez qui fonctionnent correctement pour faire tourner nos organes vitaux (le coeur, le cerveau et les poumons) et l'on meurt. Ainsi, on laisserait la place aux générations suivantes pour le plus grand bien de la planète.

Ce serait logique sinon imaginez que tous les êtres vivants mis au monde ne vieillissent plus et puissent vivre éternellement. En un rien de temps, notre bonne Terre serait envahie par se trop plein d'individus. Pire, tous ces individus épuiseraient complètement ses ressources naturelles. Sauf que dans la nature, en dehors de l'homme, la plupart des êtres vivants sont victimes bien avant d'un accident, des aléas du climat, d'un prédateur ou d'un microbe. Par exemple, c'est la sécheresse ou le gel qui vont tuer, le plus souvent, certains animaux ou végétaux.

Mais on pourrait se dire quand même que le vieillissement, en rendant les individus âgés plus fragiles, plus susceptibles d'être malades, permettrait d'éliminer

RÉSUMÉ

ce texte , parle du vieillissement de l'espece humaine , l'homme meurt pour laisser place à d'autres hommes . Si personne ne mourait , alors on utiliserait toute les ressources, le globe serait plein , plus de place pour la population. Les scientifiques , on cherc

PENSUM LOOP 3/3

Villiot-Leclercq et al. 2010

Course synthesis advisor

PENSUM LOOP 3/3

Villiot-Leclercq et al. 2010

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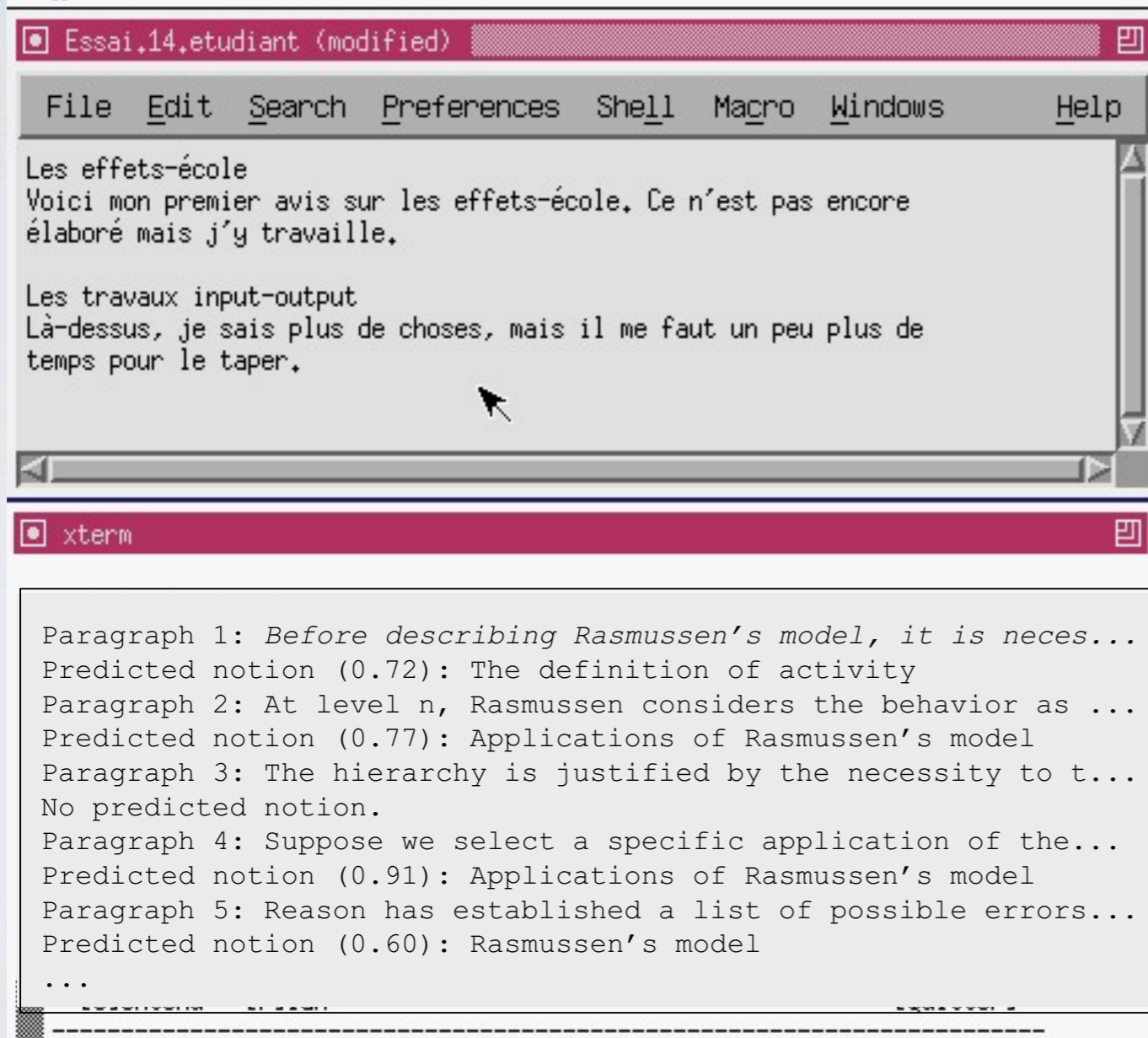Course synthesis advisor

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GAPS

- Gaps are everywhere. Focussing on them helps learning

  - within learner production (**cohesion** gaps)

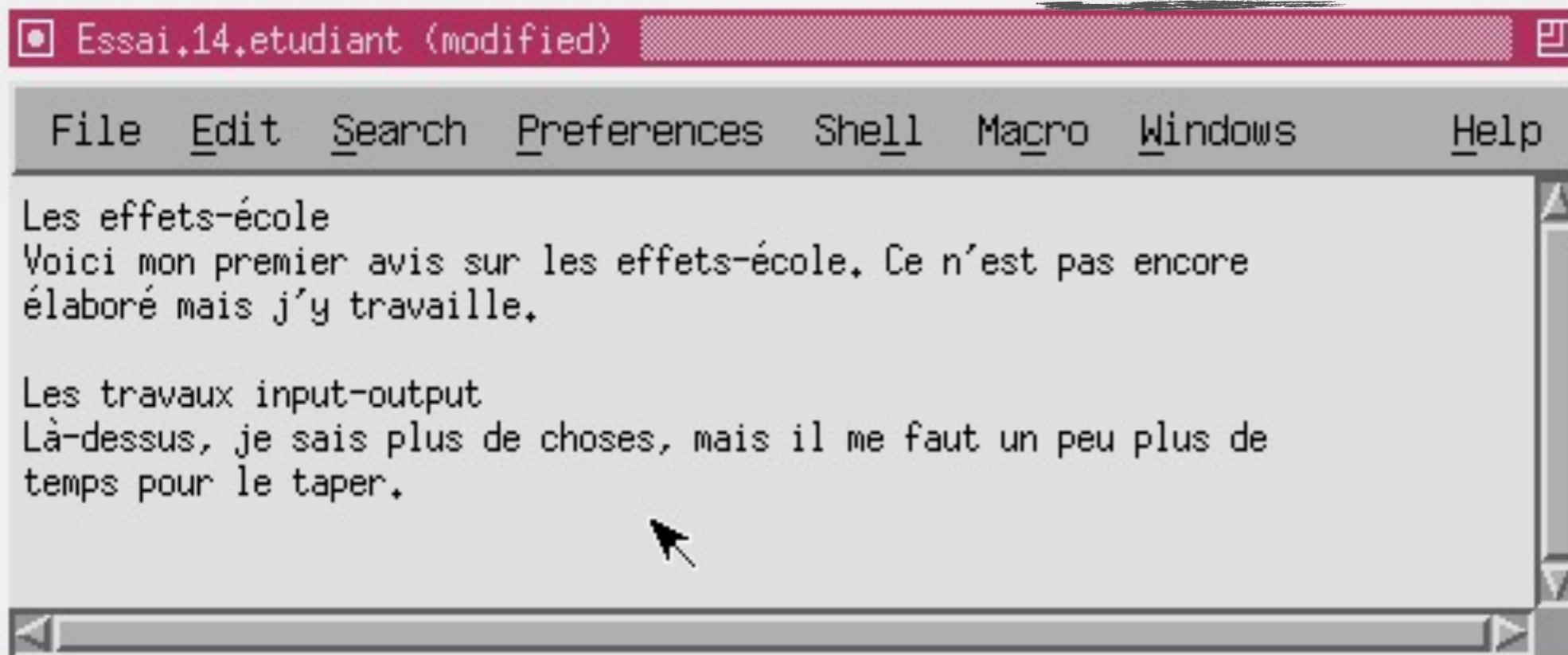 - between **actual** and **expected** production

  - across learners, etc.

APEX 1.0 GAP 1/2

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Gap between the **actual** and the **intended** course outline

```
Essai.14.etudiant (modified)

 File  Edit  Search  Preferences  Shell  Macro  Windows       Help

Les effets-école
Voici mon premier avis sur les effets-école. Ce n'est pas encore
élaboré mais j'y travaille.

Les travaux input-output
Là-dessus, je sais plus de choses, mais il me faut un peu plus de
temps pour le taper.
```

```
 xterm

Paragraph 1: Before describing Rasmussen's model, it is neces...
Predicted notion (0.72): The definition of activity
Paragraph 2: At level n, Rasmussen considers the behavior as ...
Predicted notion (0.77): Applications of Rasmussen's model
Paragraph 3: The hierarchy is justified by the necessity to t...
No predicted notion.
Paragraph 4: Suppose we select a specific application of the...
Predicted notion (0.91): Applications of Rasmussen's model
Paragraph 5: Reason has established a list of possible errors...
Predicted notion (0.60): Rasmussen's model
...
```

actual parag.
part of possible section...

Essai.14.etudiant (modified)

File   Edit   Search   Preferences   Shell   Macro   Windows   Help

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Là-dessus, je sais plus de choses, mais il me faut un peu plus de
temps pour le taper.

outline

xterm

```
Paragraph 1: Before describing Rasmussen's model, it is neces...
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Predicted notion (0.60): Rasmussen's model
...
```

actual par
part of p

26

PENSUM GAP 2/2

Cohesion gaps as possible **clues of misunderstanding**

Tapiero 2007

26
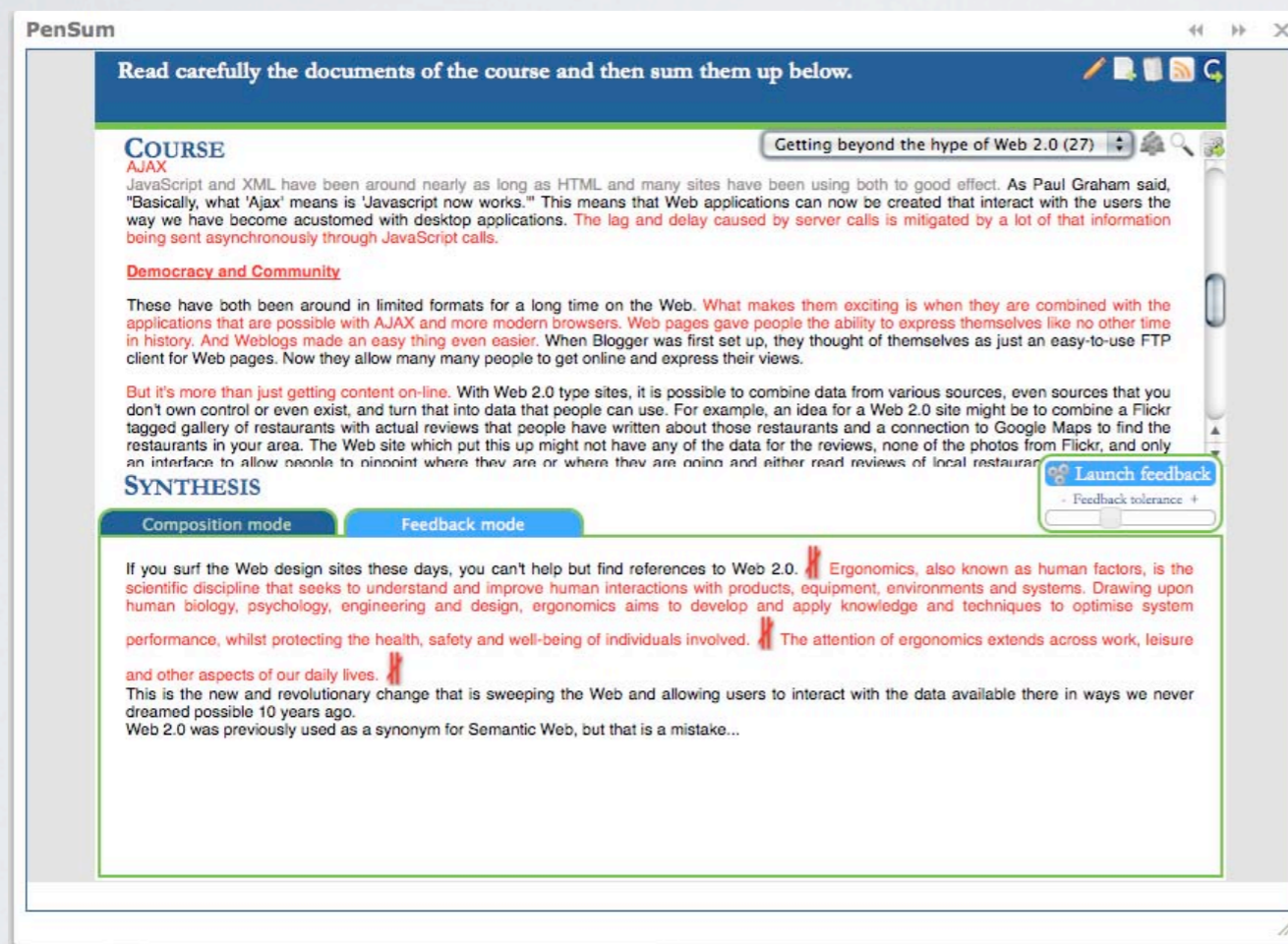
esion gaps as possible **clues of misunderstanding**

Tapiero 2007

Sum

Read carefully the documents of the course and then sum them up below.

COURSE

Getting beyond the hype of Web 2.0 (27)

AJAX

JavaScript and XML have been around nearly as long as HTML and many sites have been using both to good effect. As Paul Graham said, "Basically, what 'Ajax' means is 'Javascript now works.'" This means that Web applications can now be created that interact with the users the way we have become acustomed with desktop applications. The lag and delay caused by server calls is mitigated by a lot of that information being sent asynchronously through JavaScript calls.

Democracy and Community

These have both been around in limited formats for a long time on the Web. What makes them exciting is when they are combined with the applications that are possible with AJAX and more modern browsers. Web pages gave people the ability to express themselves like no other time in history. And Weblogs made an easy thing even easier. When Blogger was first set up, they thought of themselves as just an easy-to-use FTP client for Web pages. Now they allow many many people to get online and express their views.

But it's more than just getting content on-line. With Web 2.0 type sites, it is possible to combine data from various sources, even sources that you don't own control or even exist, and turn that into data that people can use. For example, an idea for a Web 2.0 site might be to combine a Flickr tagged gallery of restaurants with actual reviews that people have written about those restaurants and a connection to Google Maps to find the restaurants in your area. The Web site which put this up might not have any of the data for the reviews, none of the photos from Flickr, and only an interface to allow people to pinpoint where they are or where they are going and either read reviews of local restaurant.

SYNTHESIS

Launch feedback
- Feedback tolerance +

Composition mode   Feedback mode

If you surf the Web design sites these days, you can't help but find references to Web 2.0. Ergonomics, also known as human factors, is the scientific discipline that seeks to understand and improve human interactions with products, equipment, environments and systems. Drawing upon human biology, psychology, engineering and design, ergonomics aims to develop and apply knowledge and techniques to optimise system performance, whilst protecting the health, safety and well-being of individuals involved. The attention of ergonomics extends across work, leisure and other aspects of our daily lives.

This is the new and revolutionary change that is sweeping the Web and allowing users to interact with the data available there in ways we never dreamed possible 10 years ago.
Web 2.0 was previously used as a synonym for Semantic Web, but that is a mistake...

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WHEN A COMPUTER CONTRADICTS YOU

- ... and vice versa

28 # CONTRADICTION IN *APEX* 2.0 1/4

Judgment of understanding *vs* text coverage

Your summary

Les anciennes questions sont toujours d'actualité, du fait d'une nouvelle conjoncture (innovation technologique, contexte de formation où il est nécessaire de former d'importantes populations sans avoir beaucoup de formateurs ou avec moins de temps).

Assessment

You said you understood text 7 but it is not the case (sim=.47)

Evaluation

CONTRADICTION IN APEX 2.0 1/4

dgment of understanding vs text coverage

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Assessment

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the case (sim=.47)

Évaluation

CONTRADICTION IN *RESUM'WEB 2/4*

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CONTRADICTION IN

29

Tuteur - Windows Internet Explorer

http://resumweb.homeip.net/RWE/RWE.html ⌄ ↻ ✕ Google

⭐ ✧ 88 ▾ ✉ Courrier :: LTfLL : Re: dias m... 🐸 Tuteur ✕ 🏠 ▾ 🔝

Commentaires sur ton travail

Below are listed some problems in your summary:

•You said that Sentence # 2 of your summary is a Copy, but this sentence seems to stem from Sentence #10 of the Source Text, and you co
sentence as not so important. If you're right, wouldn't be more judicious to remove this sentence or to merge it to another one?

•Sentence #5 of the source text don't appear to be in the summary, even though you considered this sentence as one of the most importa

Cours   Résumer   Aide   Bilan   Déconnexion

Résumés validés : 0

Résumés restants : 10

30 CONTRADICTION IN *PENSUM* 3/4

Reject Feedback on inter-sentence cohesion

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Getting beyond the hype of Web 2.0 (27)

COURSE
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YNTHESIS

Launch feedback
- Feedback tolerance +

Composition mode | Feedback mode

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nd other aspects of our daily li   at
his is the new and revolutiona   **Refuse this feedback**   th the data available there in ways we never
reamed possible 10 years ago
Veb 2.0 was previously used a: Go back over your refusal of this feedback

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CONTRADICTION IN *PENSUM* 4/4

Reject Off-topic Feedback

Reject Off-topic Feedback

HOW FEEDBACK IS PRODUCED?

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Dessus 2009

DOMAIN CORPORA

STUDENT PRODUCTIONS

COURSE

3. Output

1. Context & Input

2. Kind of comparison

MUPPLE Lecture • I. PIEs vs. PLEs   II. LGC   III. Some PLEs   IV. Design steps

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HOW FEEDBACK IS PRODUCED?

Dessus 2009

3. Output

1. Context & Input

2. Kind of comparison

HOW FEEDBACK IS PRODUCED?

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Dessus 2009

Word/Doc and Doc/Doc
**LSA-Based
Comparisons**

3. Output

1. Context & Input

2. Kind of comparison

HOW FEEDBACK IS PRODUCED?

32

Dessus 2009

3. Output

Text selection/ production

Textual features assessment

Knowledge/ Understanding Assessment

metacognitive assessment

1.Context & Input

2. Kind of comparison

33 SUMMARY: OVERVIEW Dessus et al. 2011

	Loop	Gaps	Contradiction
Apex 1	Writing	Cohesion Summary *vs* course outline	None
Apex 2	Searching/ Reading/ Writing	Text to read next	From machine on understanding
Resum'Web	Reading/ Writing	None	From machine on summarizing processes
Pensum	Reading/ Writing	Cohesion Off-subject Pertinence	All gaps, from learner

IV. DESIGN PRINCIPLES & STEPS

On How to Design New PLEs

APPLYING NATURAL COGNITION PRINCIPLES

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Csibra & Gergely 2009

- The learning situation and knowledge to be learned are **taylored and organized** (but not constrained) so that learning can occur (Goldilocks principle)

- Allow **shared attention** to infer what the other does or thinks (aligned learners and teacher)

- Give **specific and just-in-time** feedback on getting things done

3 SIMPLE PRINCIPLES FOR DESIGNING PLEs

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Pariser 2011

• Let the activity be complex, not the interface -> **Loop**

• Inform learners on how the system works -> **Gaps**

• Feedback is never 100% valid and overpersonalized feedback can hinder learning -> **Contradiction**

DESIGN STEPS

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- Select the learning activities

- Choose the **activity loops** learners are engaged in and how (human & machine) feedback is delivered in-between

- For each learning activity

  - Choose the **gaps** learners have to be aware of and how to represent them on screen

  - Choose the **contradictions** (from humans & machine) to be emphasized, and the way they will be

V. CONCLUSION

Which Portal to which World?

Downes, 2007, 23

"

The "pedagogy" behind the PLE [...] is that it offers **a portal to the world** through which learners can explore and create, according to their own interests and directions [...].

"

NAVIGATION THROUGH THE WORLD

40

de Vries 2007 on Simondon

Tools

Instruments

FURTHER RESEARCH QUESTIONS

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- Study the interactions of the LGC objects and their **effects on learning**

- Generalization and test of LGC, notably with **social-related** tools

- The LGC design steps as an **Instructional Design** model

- Strengthen links with **natural pedagogy**: systems that teach

THANKS FOR YOUR ATTENTION!

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- **References** @ http://www.citeulike.org/user/pdessus/tag/mupple

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