

# Knowledge Co-Construction by High School Students



- Knowledge Co-Construction
- Wiki supported
- High School Students:
- Experiment Spanning 5 Years
- Biology Curriculum Various Degrees and Curricula



# Contents



- Theoretical framework
- Pedagogical design
- Methods
- Selected findings - commented
- Conclusion





# Theoretical Framework

- Design Based Research
  - (Scardamalia, 2002)  
(Design-Based-Research Collective, 2003)
- Perspective :
  - Evolution *of the design* of a biology high school teaching and learning environment, wiki-supported.



# Theoretical Framework

- Inquiry Based Learning
- 1° Ask,
- 2° Investigate,
- 3° Create,
- 4° Discuss,
- 5° Reflect – Repeat cycle

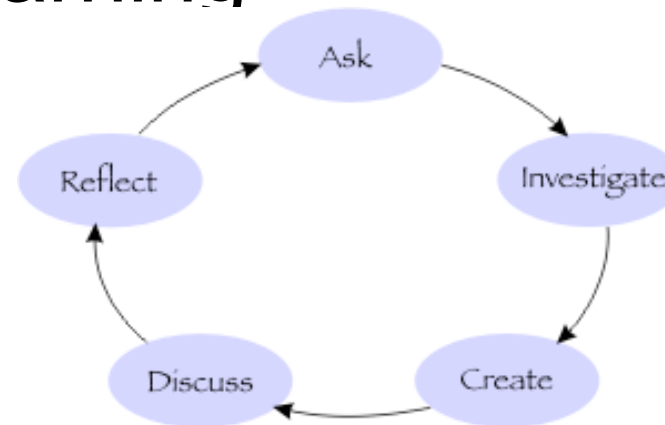


Fig 1 : The canonical Inquiry Based Learning cycle  
Source : The Inquiry Page <http://inquiry.uiuc.edu/>



# Theoretical Framework

- Writing-to-learn
  - Scardamalia & Bereiter, 1994,
- Computer-supported knowledge building communities
  - Schneider et al. 2003



# Pedagogical design



Phase one :

Question-stimulating, socio-cognitive conflicts (Astolfi, 1999)

Phase Two :

Answers are searched

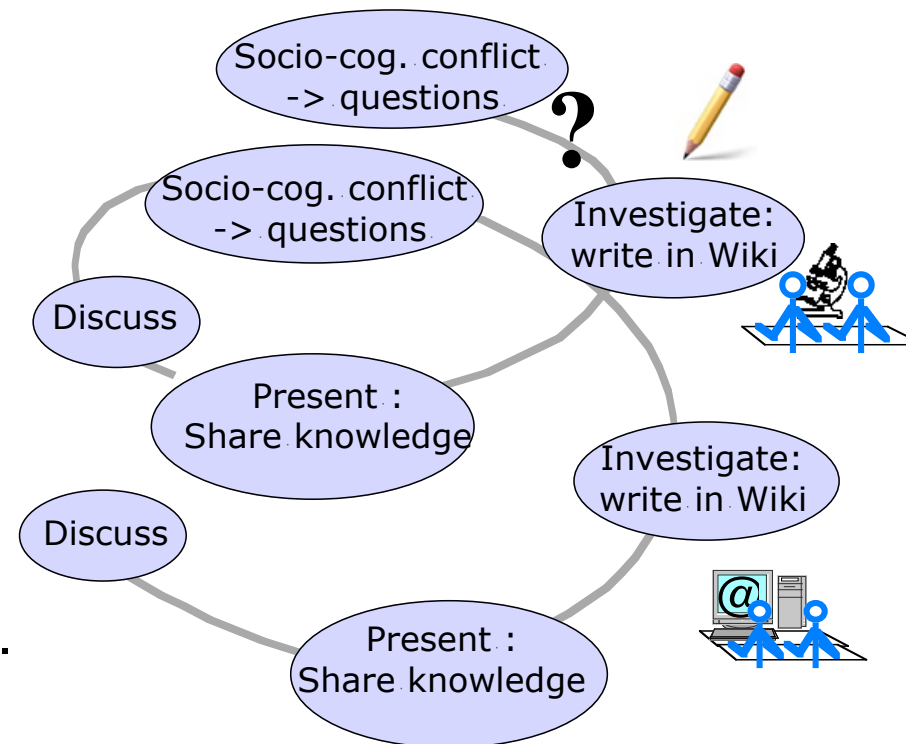
Phase Three :

Presentation, sharing of knowledge

Phase four :

Discussion New questions

Two iterations of this cycle  
generally achieved over 3 to 4 weeks.



# Pedagogical design



- Wiki : (Ward Cunningham 95)
  - A tool to support writing-to-learn
  - A reflexive practionner's tool
  - A research tool

## 3 main issues



- 1° Locus of ideas Student / Formal  
(Sandoval, 2004)
- 2° Locus control Student / Teacher  
(Sandoval, 2004)
- 3° Changing document status





# Methods : Data sources

- Wiki records
- Teacher Journal, co-mentor's Journals
- Student questionnaires





# Methods : 3 levels of analysis

- Stratigraphic level
- Year-long level
- Multi-year level





## Findings : 1° Locus of ideas Student / Formal

- **Stratigraphic : a sample**
- Question type : Descriptive (QD) / Conceptual (QC)

Stratigraphic :	Sample 1	Sample 2
Beginning version	QD 50% QC 50%	QD 67% QC 33%
Middle Version		QD 33% QC 67%
Final Version	QD 33% QC 67%	QD 30% QC 70%





## Findings : 1° Locus of ideas Student / Formal

- **Year-long : a sample**
- **Question type : Descriptive (QD) / Conceptual (QC)**

<b>Year-long : Oct.- Mar.</b>	<b>Sample 1</b>
<b>October</b>	QD 61% QC 39%
<b>March</b>	QD 33% QC 67%





## Findings : 1° Locus of ideas Student / Formal

- Multi-year evolution :
  - Focus Answers -> Questions
  - Focus on *student's* building of questions
  - Reliance on *writing-to-learn*
  - *The Textbook* -> Document-rich environment.





## Findings : 1° Locus of ideas Student / Formal

- Student's and teacher's nervousness about *correct answers*.
- NOS : Notion Of Science
  - Scientific knowledge transitional.
  - Discussion, contextualization.
  - Data-backing, referencing.

*“...ideas are accepted through their ability to stand up to or respond to criticism, rather than because they are authoritatively ratified.”* Sandoval & Daniszewski 2004



## Findings : 2° Locus control Student / teacher



- Student motivation vs. knowledge building
  - Student's sensitivity to tampering in their text.
  - Motivation = Control \* competence \* value
    - (Viau, SDT: Ryan&Deci, etc)
  - Territoriality of text

## Findings : 2° Locus control Student / teacher



- Student autonomy
  - Who chooses questions ?
- Students worried about knowledge sharing.
- Ex -students feed-back from university (medicine)





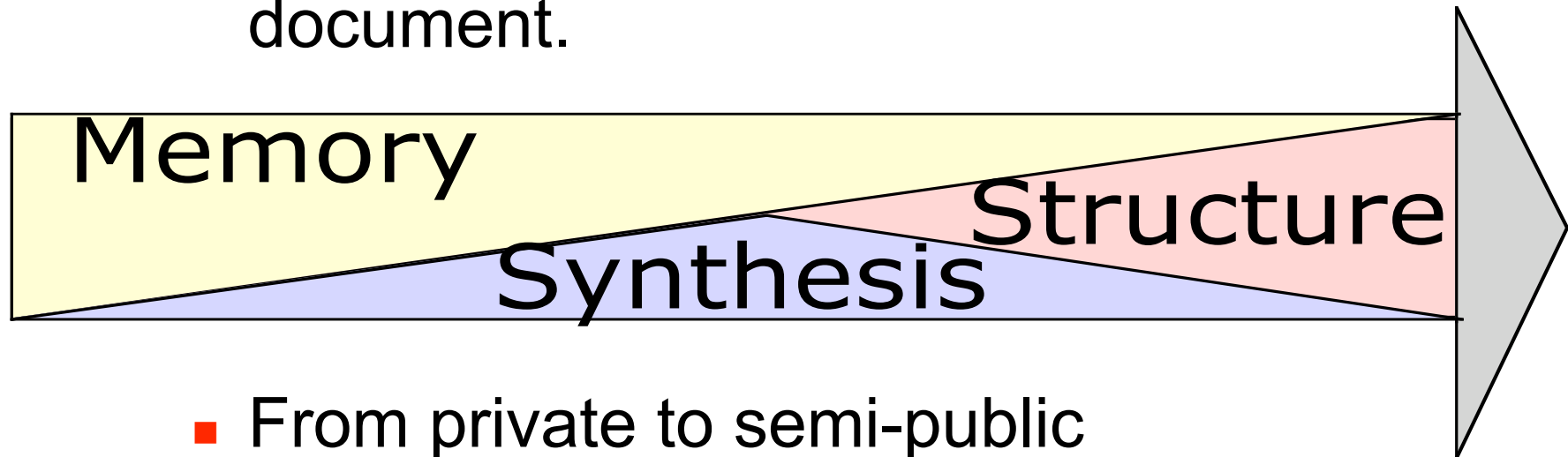
## Findings : 2° Locus control Student / teacher



- Role change Teacher -> Coach.
  - Confidence in
    - Student's competence to build knowledge
    - Power of the semantic field to structure questions.
- Student's competence vs teacher limits

## Findings : 3° Changing document status

- The Wiki *Stratigraphic* evolution
  - From scratchpad / memory to locus of knowledge building, exam' preparing document.



- From private to semi-public



## Findings : 3° Changing document status

- Process or product ?
  - The Wiki (multi-year) as part of a process or as the proud product of student's work. (Portfolio, PBL, or IBL ?)
- Presentation : sharing of knowledge or building of knowledge ?





## Findings : 3° Changing document status

- Teacher's public image
  - Major Pitfall : Does the document represents the student's knowledge building process or the teachers expertise ? (Horman 2005)



# Conclusions



- The power of questions !
  
- Evolution as a model for adapting design.
  - *Bricoleur* (Turkle, 1995)
    - Variants, transmission, selection -> adaptation = Evolution (S. J. Gould 1979)

# The End



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■ Thankyou  
for your attention !



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