# Finding a research subject in educational technology

## (version 1.0, 1/4/05 )

**Code: thesis-subject**

**Daniel K. Schneider, TECFA, University of Geneva**



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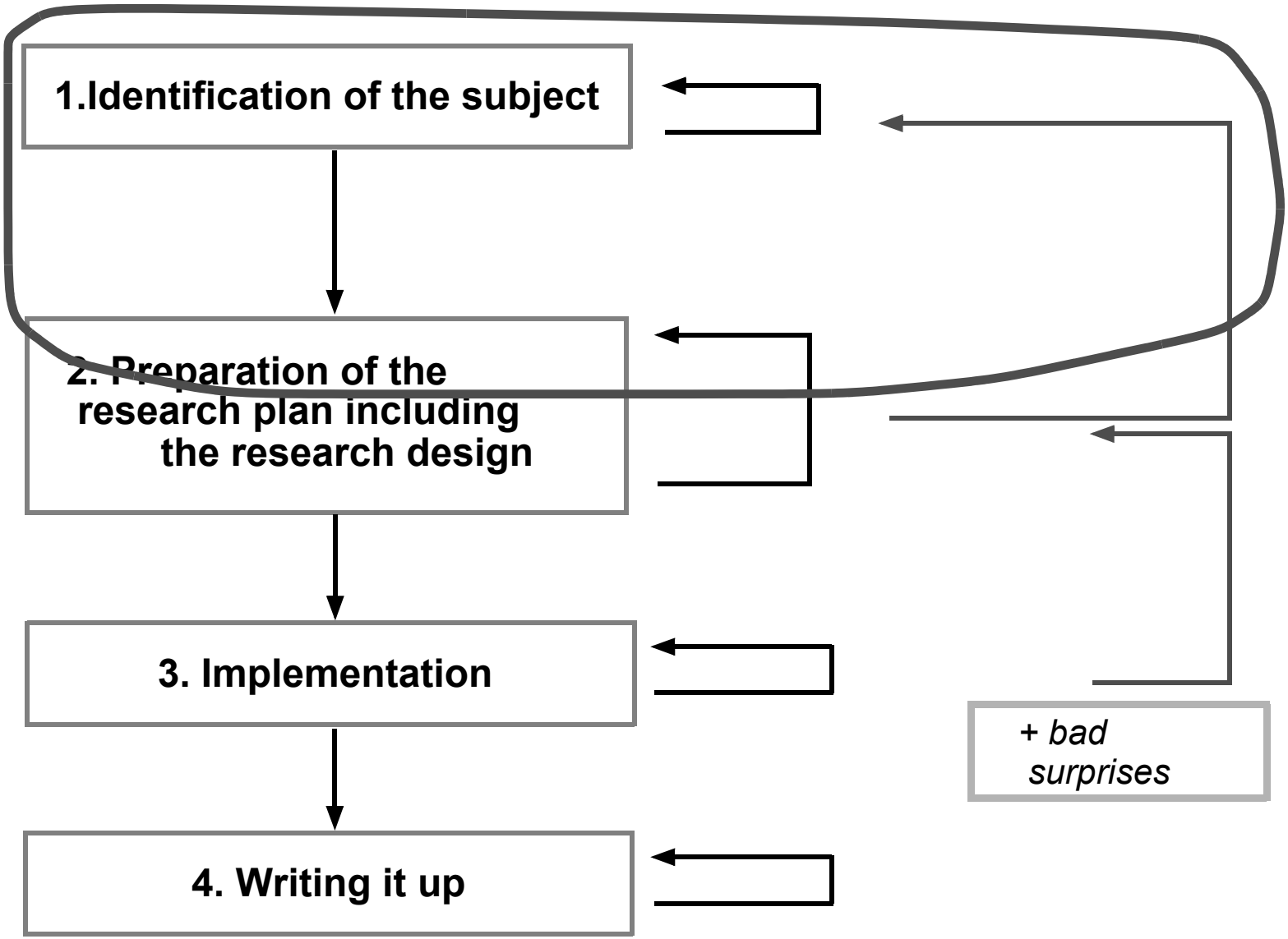
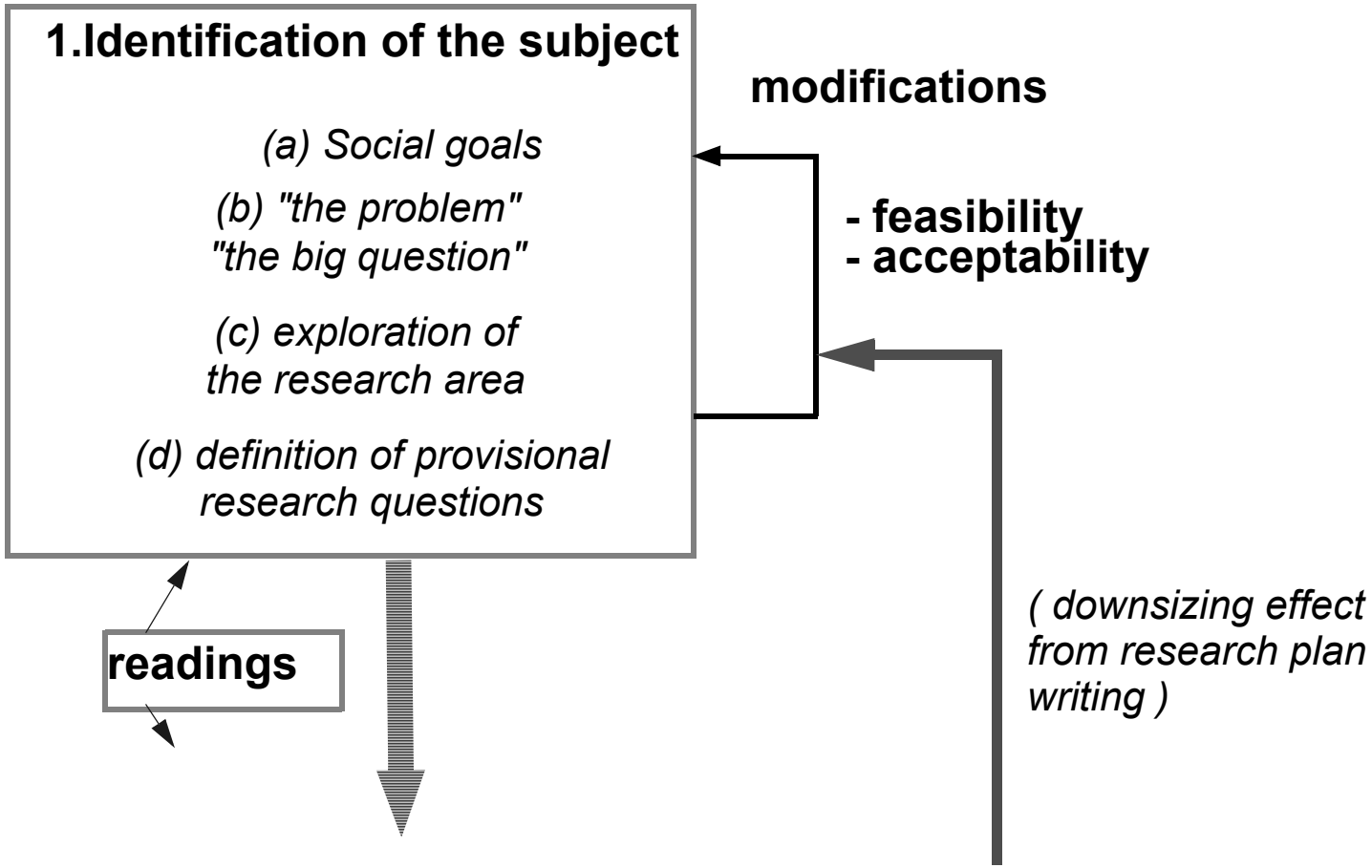
# 1. Choice of a research subject



# 1.1 Identification of the subject: important elements




- You need to loop through this several times when you start writing your research plan !

# 1.2 The identification process

## The most important phases

1. Identify a few topics / subjects and make a "short list"
2. Make explicit each potential subject
   - see: 3. “Identification of the central problem” [6]
3. Discuss with your professors
4. Explore the subjects (new short list)
   - see: 5. “Readings and ideas” [12]
5. Make a draft of the research plan and negotiate
   - see: 4. “Anticipation of the research plan” [10]
6. Make it official
   - (consult your local procedure)
7. .....

# 2. Identification of social goals

Learn something, institutional constraints, fun, ....

1. What should your job be in 3-4 years ?
   - A thesis is part of your "profile", a "visit card"
   - A thesis will teach you a lot, what do you wish to learn ?
2. And your employer ?
   - Is he interested in your master thesis
   - can you marry academic work with the goals of your organization ?
3. What would you consider to be real "fun" ?
   - are you intrinsically motivated ?

# 3. Identification of the central problem

- A research subject is not just a topic !!
- It must be of some academic interest
  for example: explain a phenomenon, identify processes, provide scientific arguments for an expertise, prove cognitive ergonomics of some software, demonstrate pedagogic effectiveness, invent new design rules, ...

## 3.1 The "big question"

- does not necessarily match the title of your project (which just can announce a topic)

La “grande question”

- is a summary of your research question
- .... may also imply practical goals

**Exemple 3-1: E-learning**

Bad: “E-learning” in vocational teacher training

Good (a): ***Efficiency*** of e-learning in ...

Good (b): ***Perception*** of e-learning ....

Maybe: ***Analysis of e-learning*** in ...

(all these variants need further precision)

## 3.2 Objectives and research questions

- Even if you did manage to phrase a good "big question", your intentions will be too vague
- Therefore you must take your big question apart
  - in the form of research questions and/or hypothesis
- You ***absolutely must make all your objectives explicit***
  (else you are looking for conflicts and other problems).
- You then must formulate ***research questions*** that cover your objectives
  - Formulate working hypotheses if you can and if it's appropriate.
  - You also may formulate scientific hypothesis (based on theoretical argumentation)
  - It is much easier to deal with hypothesis than with more open research questions ....
- Finding the right research questions / hypothesis is an ***iterative*** process.
  - Usually you only get them right after having written a draft of the literature review !!
  - Therefore, don't start field research, development etc. before you have done some theory !

# Exemple 3-2: Etude pilote sur la mise en oeuvre et les perceptions des TIC

(Luis Gonzalez, DESS thesis 2004)

Main goal: "Understand the factors that favor teacher's use of ICT"

- The author first defines 8 factors and then also postulates a few relationships among them
  - The 8 factors were found through literature review.
- Below we quote from the thesis (and not the research plan):

<< Sachant qu'une faible proportion d'enseignants utilise le matériel informatique dans leur pratique, je me suis demandé s'il était possible d'identifier des facteurs favorisant l'intégration des TIC. >>

<< Mon hypothèse principale postule l'existence d'une corrélation entre les facteurs suivants et la mise en œuvre des TIC par les enseignants :

- Le type support offert par le cadre institutionnel
- Leurs compétences pédagogiques
- Leurs compétences techniques
- La formation reçue, que se soit la formation de base ou la formation continue
- Leur sentiment d'auto-efficacité
- Leur perception des technologies
- Leur perception de l'usage pédagogique des TIC
- Leur rationalisation et digitalisation pédagogique

>>

## Exemple 3-3: Engineering project: a system to support inquiry-based learning (IBL)

Quote: "L'objectif de ce module est de donner une structure basique adaptable, aux enseignants qui désirent offrir une activité d'apprentissage par investigation à leurs élèves. Ils peuvent ainsi aisément créer des supports informatisés pour des activités pédagogiques de ce type."

The goals of this research have been defined implicitly by deriving the specification of the software module from a known inquiry framework:

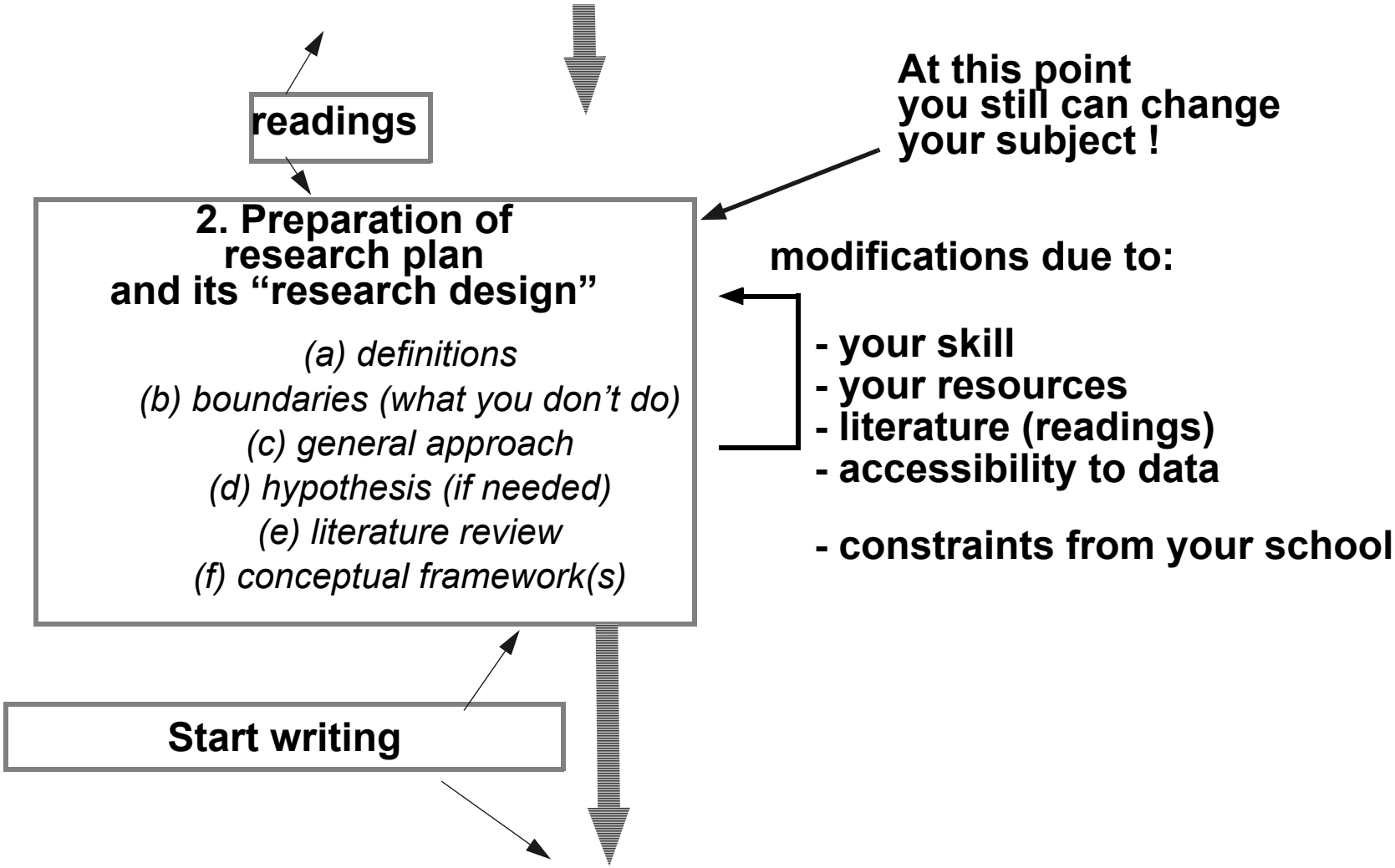
- L'enseignant peut ainsi créer un type de fiche qui correspond à l'activité qu'il a en tête, [....]
- Cette fiche donne une structure qui permettra aux apprenants de répondre à des questions [...] (étape 1 : Questionner).
- L'enseignant soumet l'activité aux apprenants qui peuvent créer une instance de la fiche type afin de faire l'exercice. [...]. Dès lors, ils recherchent les informations susceptibles de les aider à remplir les différents éléments de la fiche (étape 2 :Questionner), [...]
- Une fois les informations trouvées, l'apprenant rempli son instance de fiche, [...] (étape 3 : Créer),
- puis, au moyen de la visualisation des instances des autres apprenants et de la possibilité des commenter, il peut débattre avec les différentes personnes ayant fait la même fiche que lui (étape 4 : Discuter). [....] Enfin, il soumet son instance de fiche au professeur et/ou à l'expert associé à l'activité.
- La 5e étape du modèle (Réfléchir) peut être incluse dans l'activité de différentes manières, [...]

## This master thesis clearly lacked precise research questions

- the big questions was: how should we design a system for IBL support (and can I do it ?)
- the driving operational questions were a specification based on a popular IBL model
- but it was accepted that this development would lay the basis for further research, since such a tool did not exist before
- ( only preliminary usability testing was required from the thesis advisor )

# 4. Anticipation of the research plan

## Here is an idea



# The research plan = what + why:

| | | |
|---|---|---|
| **What ?** | A good question ! (problématique) | • “So what” ? "What knowledge do we gain" |
| | **A (or more) good conceptual frame-work(s) that...** | • links your research to a larger identified issue,<br>• structures your phenomenon<br>• links your project to a body of existing knowledge<br>• ... is preferably available as a nice drawing |
| **How?** | **Consider that your research plan should be ...** | • systematic: show that you will study your "big question" and related research questions (and nothing else!)<br>• academic: identify your main approache(s) and major techniques you will use.<br>• somewhat flexible (make sure that you identify priorities also)<br>• In some designs it is required that show details regarding how you plan to answer your questions. |
| | **Be realistic ! Prove that you have ...** | • the time to do it ?<br>• access to data ?<br>• the ability to do it (or to learn how to do it) ? |
| **A whole !** | **Integration !** | • A coherent whole !<br>• All your intentions are made explicit.<br>• Your research questions cover your essential planned work. |

# 5. Readings and ideas

## 5.1 Who/what can help you finding a good subject

1. Examples (other thesis in the same area)
2. Academic articles
3. Interviews with academic experts
4. Interviews with domain experts
5. Your librarian, your library, on-line journals
6. http://scholar.google.com

## Remarks

- Your research topic will be vague in the beginning
- Be sure to talk to other persons than just your advisor
- Engage discussion with a written ***list of precise questions***
  - and make sure that all questions have been covered at the end of your meeting
  - don't ask by mail, ask for an appointment (unless the teacher tells you otherwise)
- Don't just think, start producing at some point

## 5.2 Initial readings

1. start with 2-3 ***articles/standard works*** and that contain a survey of your topic or a related area.
   - ask experts, use the library, use scholar.google.com, use on-line journals
2. if you can't find anything:
   - hunt for articles that cover subjects with similar structural properties (e.g. concerning the approach, the "way to look at things", etc.)
   - start to occupy "islands" (and enlarge with "circles")
3. look for further publications
   - follow-up leads from you 2-3 initial articles
   - go through specialized indexes
   - systematically browse through specialized journals
4. Go through the ***Internet pages of well know researchers in your field***
   - do not trust randomly found things (e.g. indirect quotes) on the Internet
   - hunt down the home pages (a lot of researchers publish at least a few papers on their site)
5. etc.

☞ **Don't read too much ! Stop when:**

1. the same information comes back,
2. you found a good central framework, the analysis grids for your concepts, experimental designs that provide you with a good example, etc. (details depend on your approach),
3. you can relate your research questions to published work.

## 5.3 Exploitation of literature and draft of the theory part

- Don’t write “summary memos”, it takes to much time (IMHO)

**Here is an advice:**

1. Read texts "diagonally", and just mark the most relevant concepts, theories, models, hypothesis, etc.
2. Make a matrix of the most important concept

| | Concepts | | | | |
|---|---|---|---|---|---|
| **Articles** | **A** | **B** | **C** | **D** | **....** |
| **1** | | x | x | | |
| **2** | x | | x | x | |
| **...** | | | | | x |

- you may add some small comments

3. Sort concepts
   - mark the most important ones
   - look at relations
   - throw away the ones you won’t need (the theory part must support the empirical part, nothing else)
4. Write a draft
   - Be synthetic and be critical (!)
   - Do not align one mini-summary after each other (i.e. order by concepts and not authors !)
   - End up with a conclusion that argues in favor of a central framework, that identifies major dimensions (elements) and corresponding analysis grids
   - Look again at your research questions (revise them or add/remove things from your draft)

# 5.4 Idea generation

## A. brainstorming

☞ **is done in several stages:**

1. Write ***rapidly*** keywords (what you want investigate, know, etc.) on paper
2. Take this list and do it again for each point
3. Sort/clean and go to the next steps

## B. Organize your ideas

☞ **make drawings, that contain major elements and relationships**

- you may use mind mapping software, but don't not overdo it !
- ... mind mapping may generate too much complexity

## C. The outline

☞ **Outlines are useful for your research plan, difficult chapters like the theory part, to:**

- organize your ideas,
- produce a detailed plan of work to do (e.g. work packages),
- order your ideas in a linear way (your thesis will be linear).

**Have something to write on you (always)!**

- good ideas sometimes pop out of nothing at odd times, and you should not forget them.

# 6. Summary of some exploration activities

**Discussions**

- Talk to field experts, academic experts (in particular potential advisors)
- Also contact your "victims"

**Political feasibility**

- Make sure that you will find "subjects", that organizations will cooperate, etc.

**Theoretical feasibility**

- Have got a good enough overview ?
- E.g. theoretical frameworks, analysis grids, propositions (hypothesis)

**Methodological feasibility**

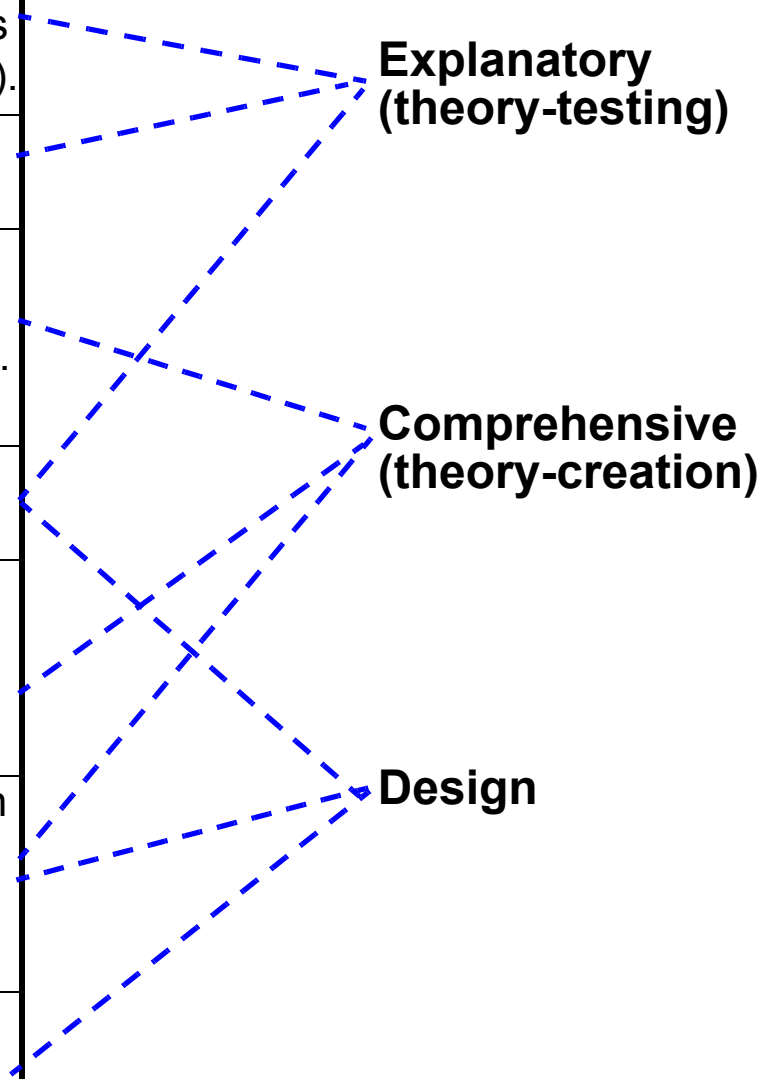
- Did you make a list of the concepts found in your research questions ?
- Do you have initial definitions for them ?
- Do you believe that you can measure each empirical concept ?
- Do you have an idea how to analyze relationships (to answer your research questions) ?

**Budgetary feasibility**

- Time is your enemy
- keep your subject as small as possible (but make sure that you address an academic question ..)

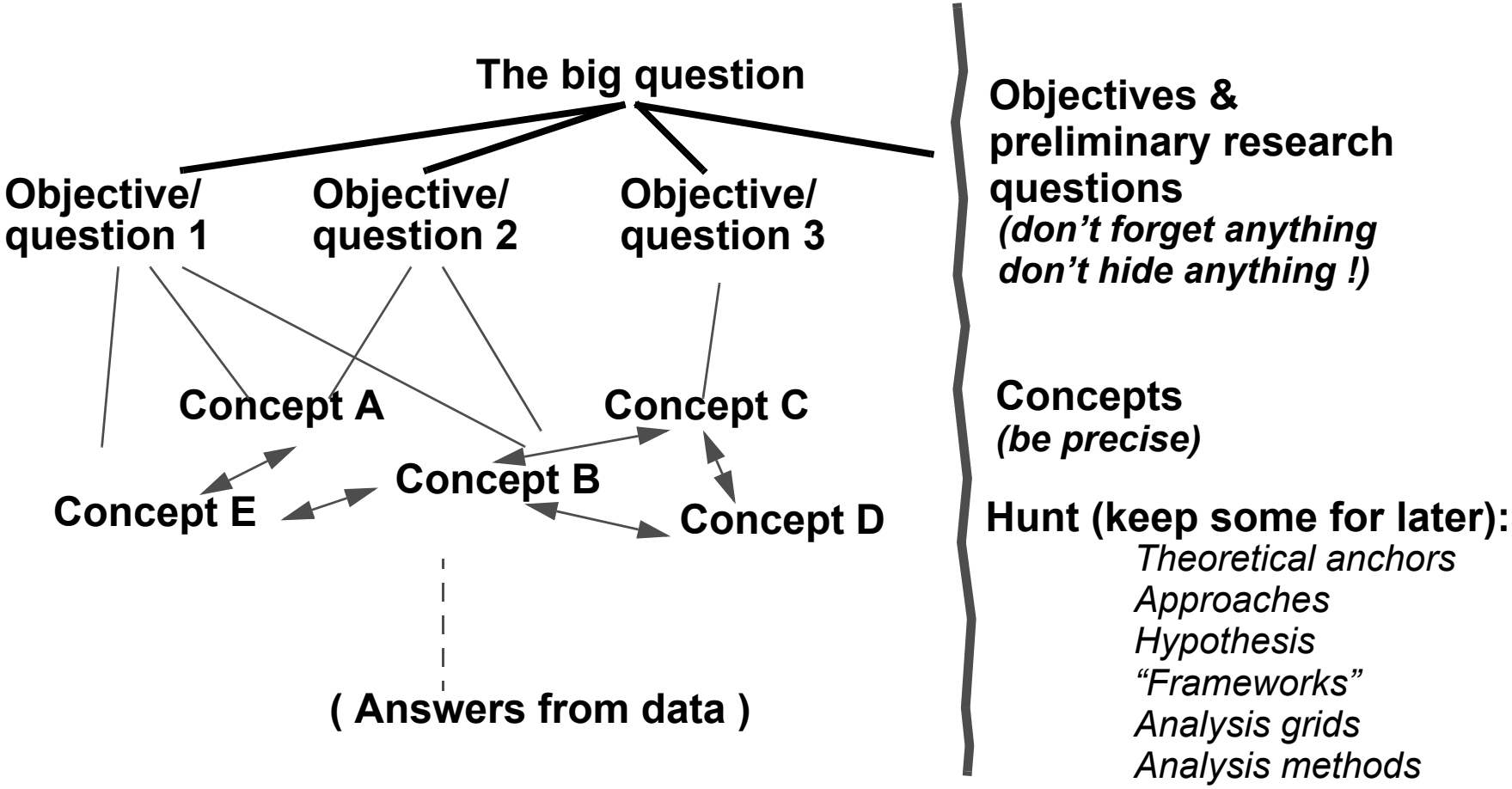
# 6.1 Try to identify a general thrust for your research

| Some possibilities for a master thesis: |
|---|
| • ***Experimental designs*** that study ***how humans behave under certain conditions*** (e.g. "Under what conditions does a multimedia animation have a positive effect on learning ?"). |
| • ***Quasi-experimental*** studies (e.g. ***test*** if one instructional design is better then an other). |
| • ***Sociological studies*** (e.g. the introduction of ICT to school systems and/or organizations, study of certain population's ***attitudes and behaviors*** towards ICT or an ICT initiative, e.g. teachers). |
| • Economic studies (e.g. ***Return on investment*** at the organizational or the national level) |
| • ***Ethnographic*** or clinical studies of human subjects, i.e. ***in-context behavior*** (e.g. usability studies of software, work place analysis to study informal learning, problem-solving behavior related to the use of ICT etc.) |
| • Development of ***innovative instructional designs*** (either in real world settings or exploratory studies). All kinds of settings: Formal/informal, distance/blended/classroom, workplace e-learning, just-on-the-spot learning, ... |
| • ***Technical development*** of a system or exploration of new technologies (and that explore/introduce ***new ideas (pre-theories)*** profitable to education and learning) |

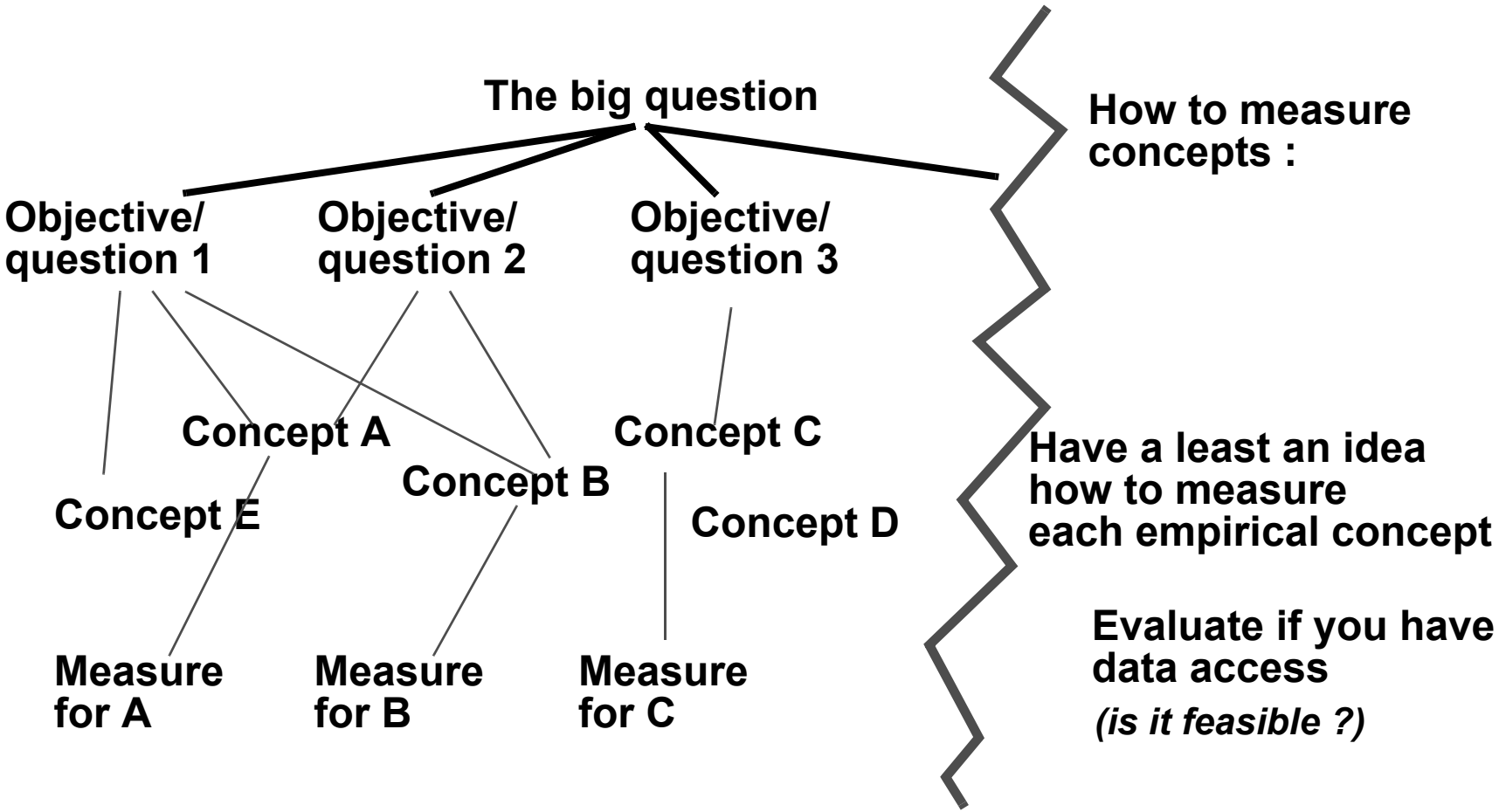


# 6.2 Think hard about the concepts you use

## The theoretical face



# The empirical face




- See modules on research design if you don't understand this (and come back later)