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The self Domain in Science as a means of critical thinking development

Carloalberto Petti PhD

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Background

- **Bioscience is *de-facto* based on research principles**
- **Hands on experimental bases**
- **Plethora of experiences**
- **And yet..**
- **Research-minded students are few and far in between**

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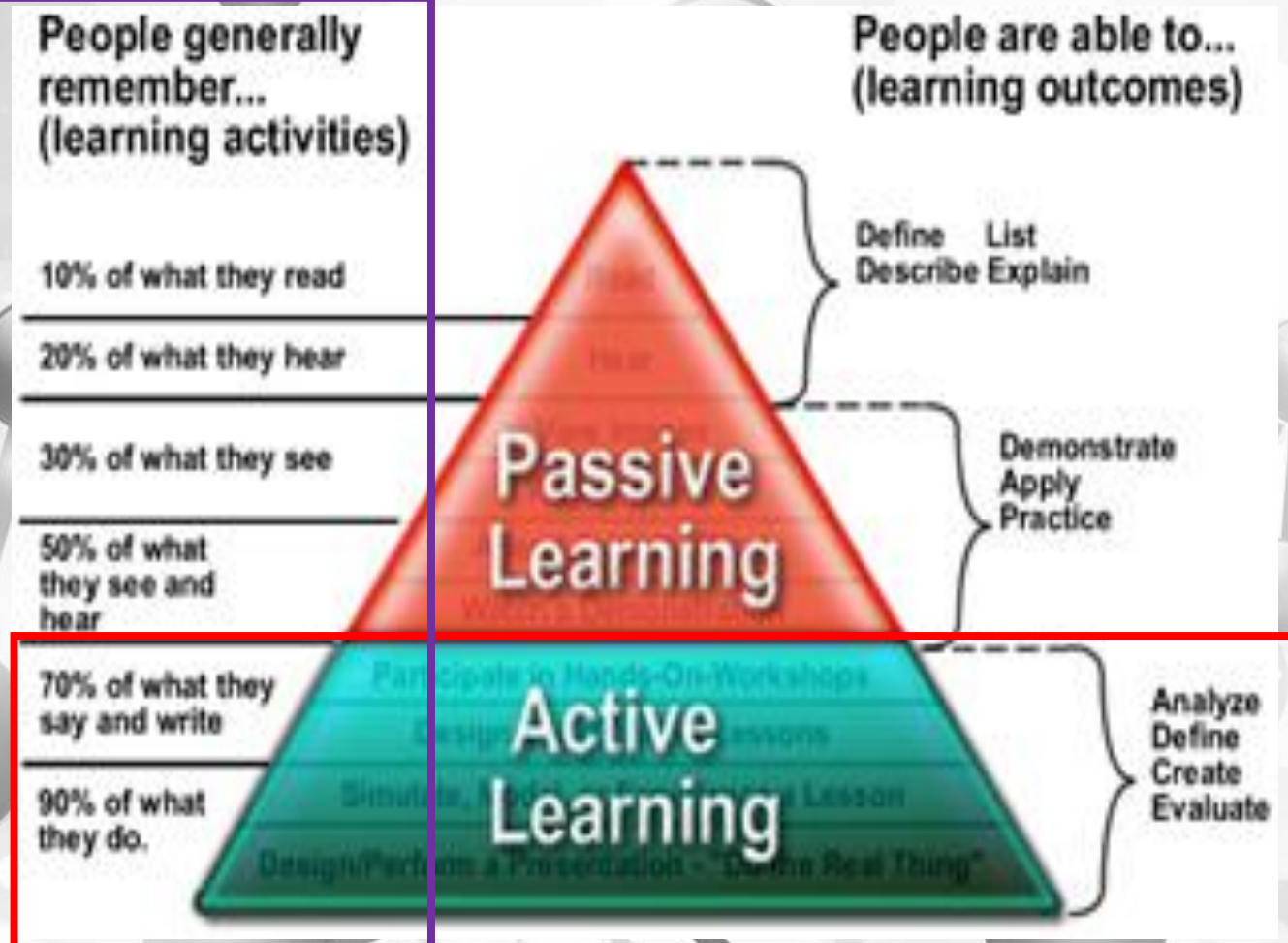
Re-thinking Bioscience projects Y3……

- **Previous Formulation**
  - **Exit ordinary degree: wet lab project**
  - **Exit honours degree: Literature based project**
    - **Project postponed to the 4th year**



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Questionable.....

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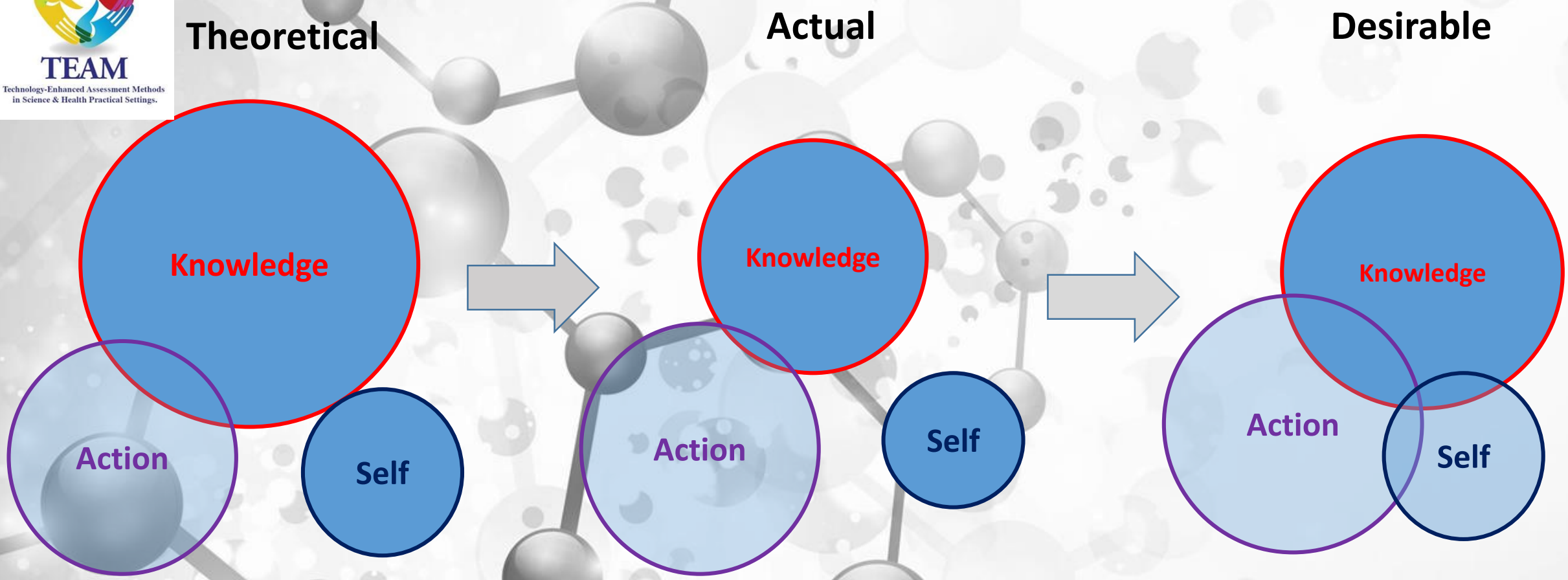

Barnett *et al.*, 2001;
Barnett and Coate, 2005
Barnett, 2007

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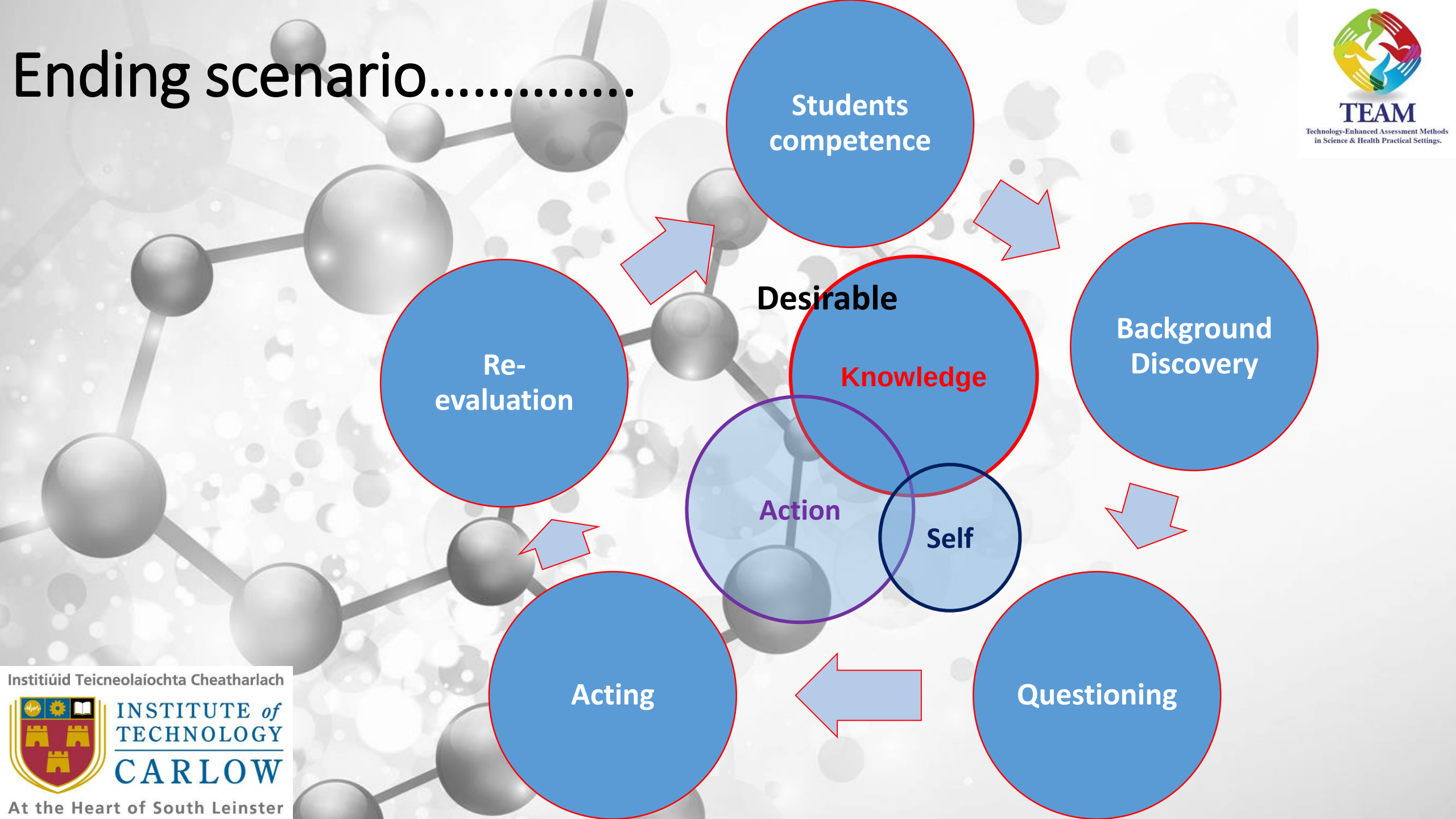
Students competence
Core requirements
Background Discovery
Miniprojects approach
Further exploration
Questioning
Acting
Write it up Analysis
Re-evaluating what's known

Ending scenario.....



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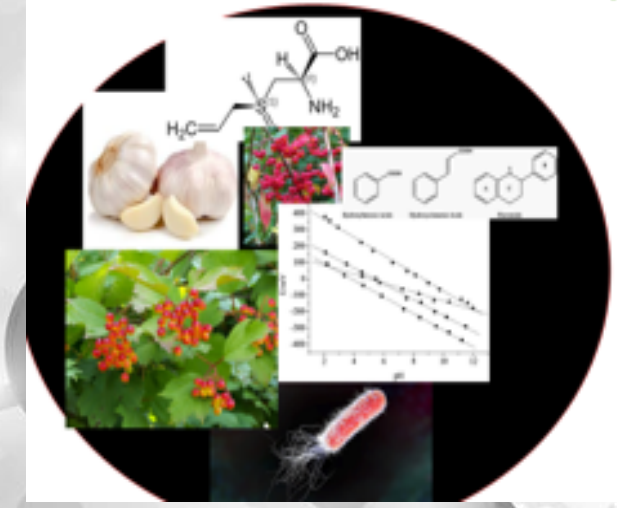
The Bioscience Project "Revolution"

The Format

2018

Year 3 Bioscience Research Projects Group A/B and C



Section 2. Core skills development

The core skills developmental approach is designed to build upon previously developed skills, renewing some aspects of those skills and developing new skills.

The fundamental aspects of the 3-mini-projects that the students are required to meet/master are the following:

- Independent thinking and critical analysis

That is the ability to identify the problem. Draft a potential approach to it and feedback the necessary changes required to suit the technical difficulties encountered in identifying and tackling the problem.

- Sourcing the literature for relevant information and protocols.

That is operating an appropriate literature review to enable the task ahead. Identifying valid references from not valid/reliable ones. *For example*: many webpages are not a valid source

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Format: Example

Section 3. **Grading criteria and marks (intended per mini-project)**

1.	Student and group involvement:	**5**
2.	Technical capacity and quality in the lab:	**5**
3.	Approach to problem solving	**5**
4.	Projects write up	**12**
5.	Group communication and discussion	**3**

Outside the project marking

6.	Self and peer evaluation	**10**
7.	Presentation	**10**

An additional **20 marks** (in total or 10 marks per each mini-project) can be alloc
student's effort (demonstrated by experimental evidence) goes beyond the core-require

Section 6. **Mini-project titles and core requirement specifications.**

Mini-project 1.

Determination of Allinase activity in *Allium sativum* (garlic cloves).

Expected outcomes (core-requirements):

1. Establishment of an in-house protocol;
2. establishment of a quantitative method
3. Evaluation and quantification of Allinase activity

Mini-project 2.

Evaluation of Allicin in *Allium sativum* and establishment of antimicrobial effect on selective bacterial strains.

Expected outcomes (core-requirements):

1. Establishment of an in-house extraction protocol
2. Establishment of a quantitative method to quantify Allicin
3. Establishment of an antimicrobial assay for Allicin

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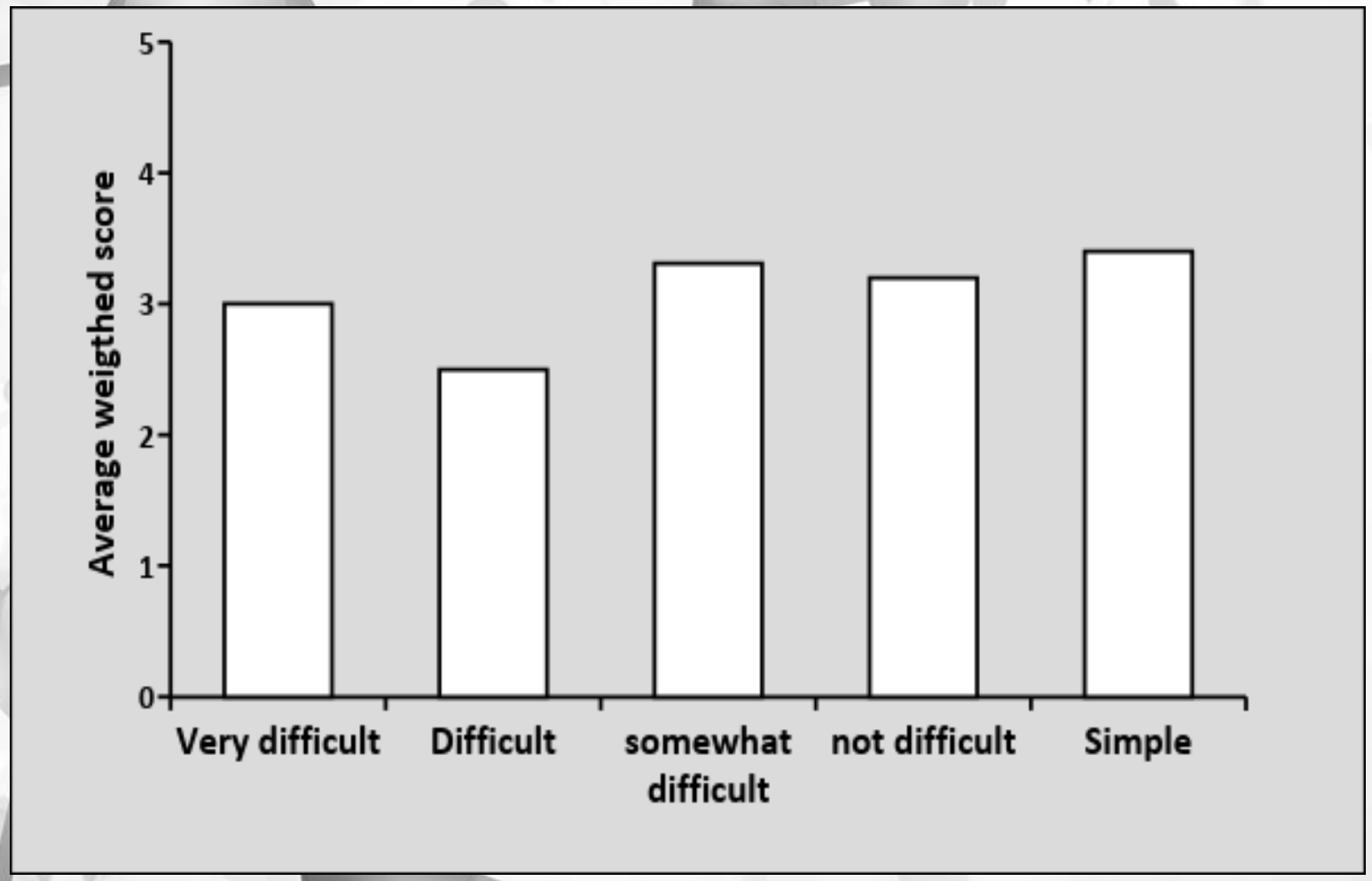
3 years in the making……



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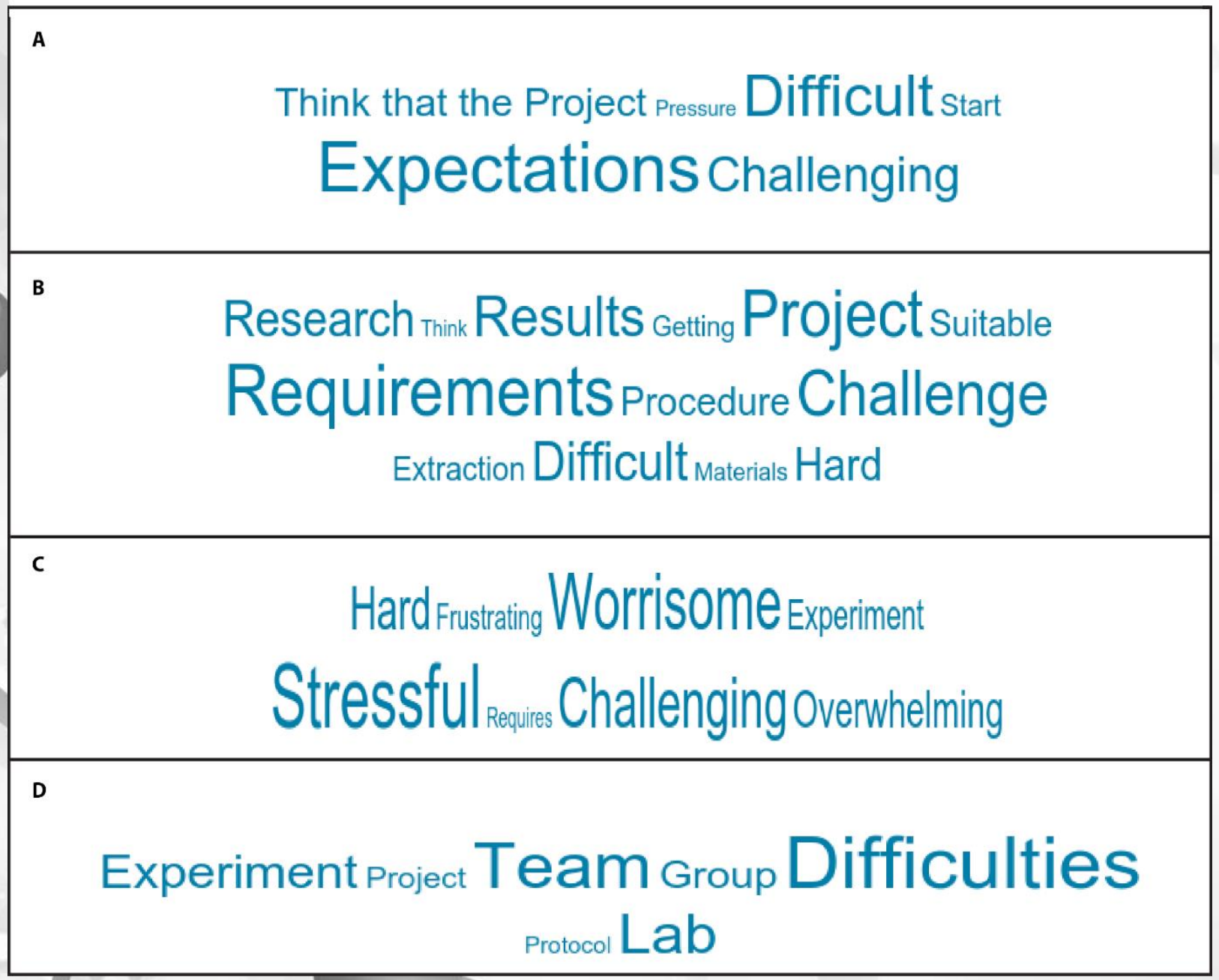

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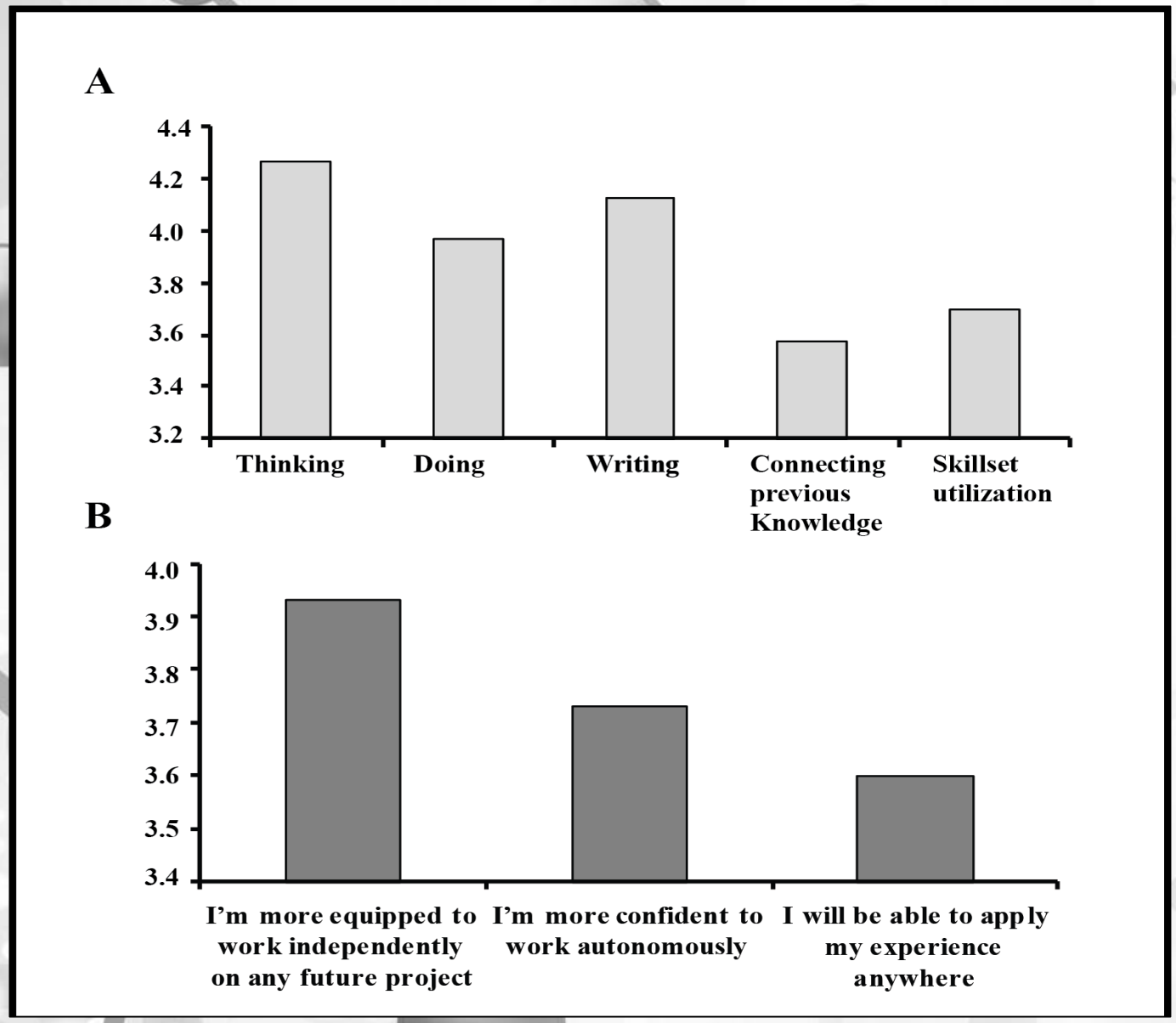
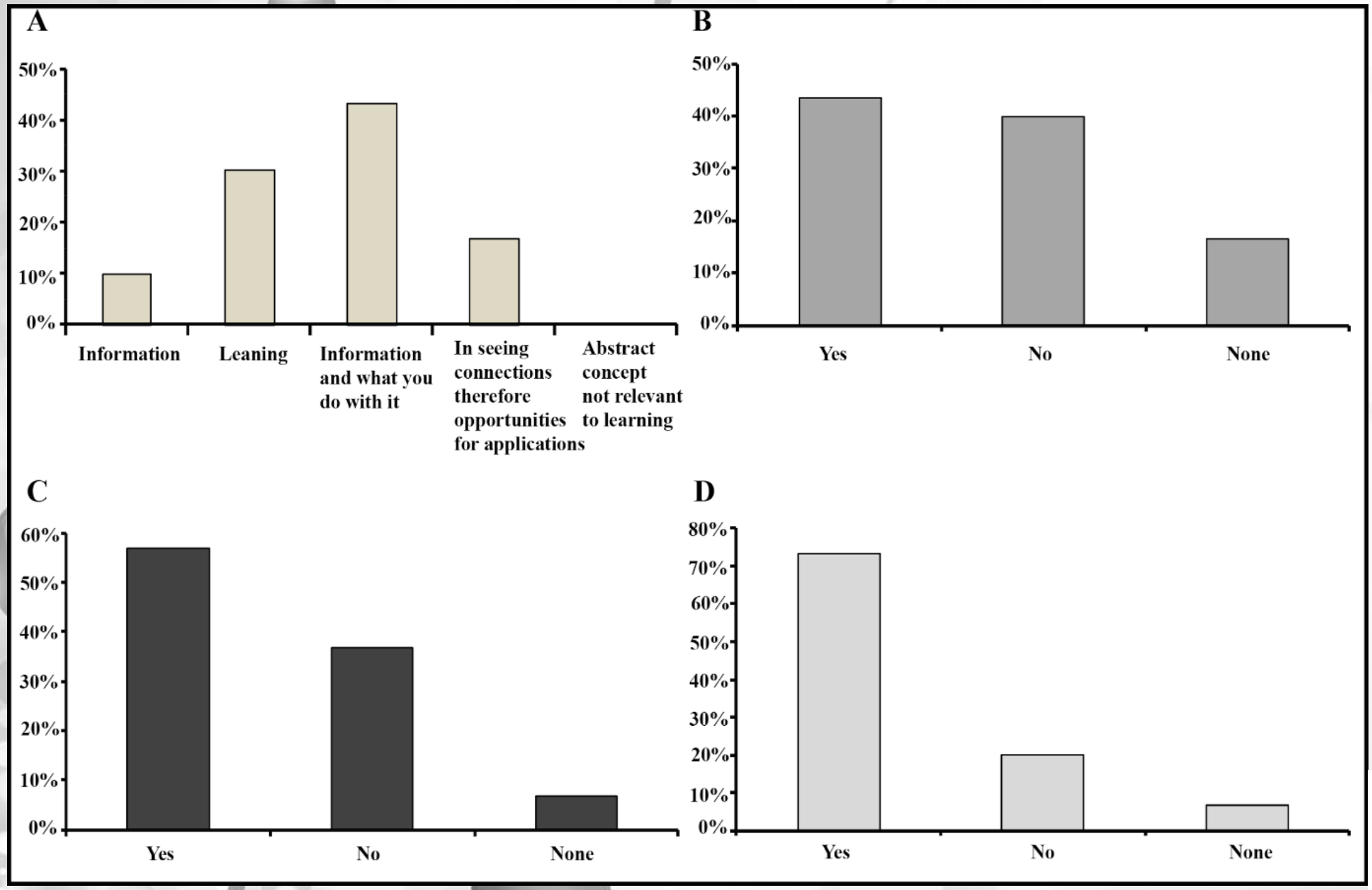

A
4.4
4.2
4.0
3.8
3.6
3.4
3.2
Thinking
Doing
Writing
Connecting previous Knowledge
Skillset utilization
B
4.0
3.9
3.8
3.7
3.6
3.5
3.4
I'm more equipped to work independently on any future project
I'm more confident to work autonomously
I will be able to apply my experience anywhere



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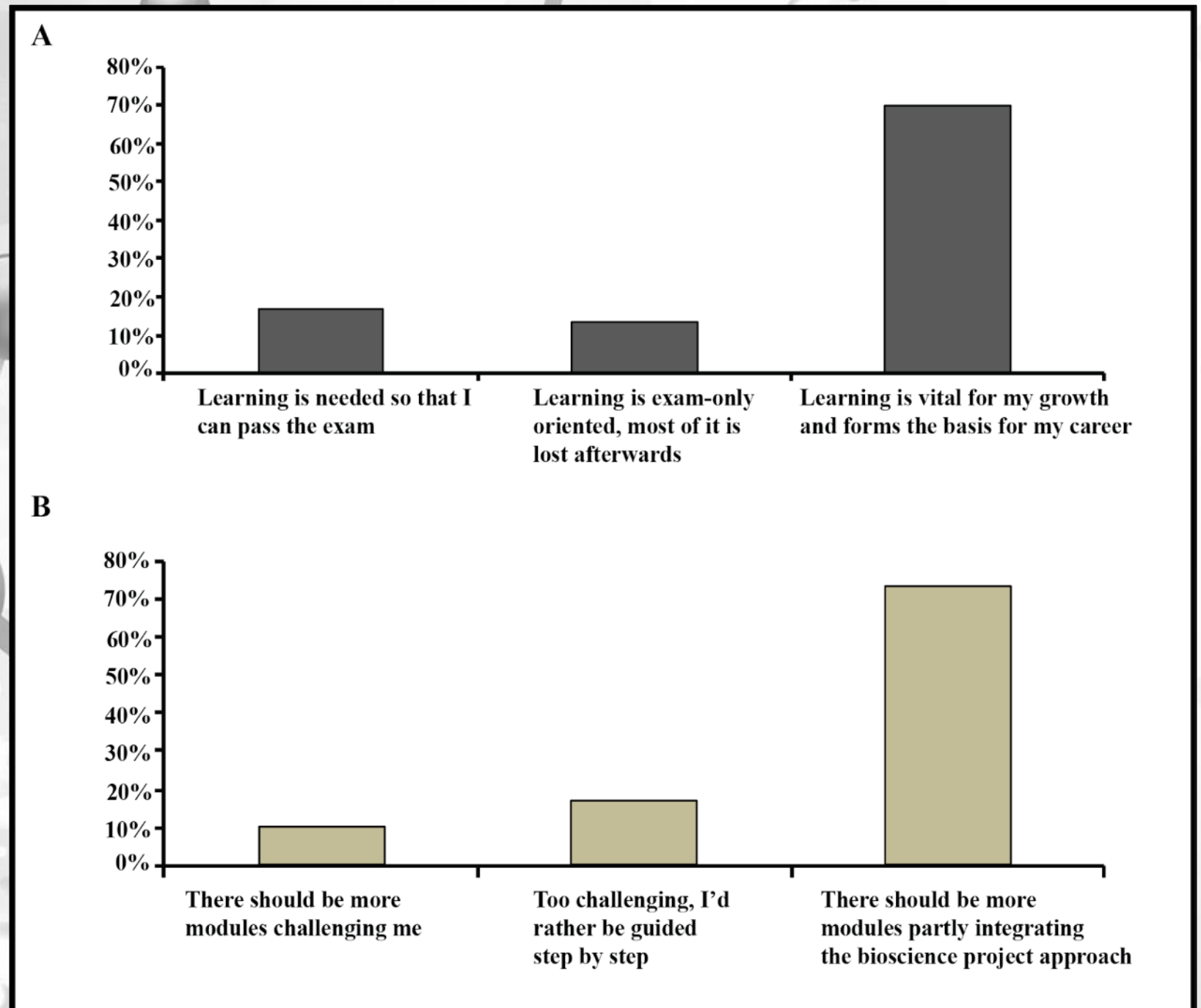
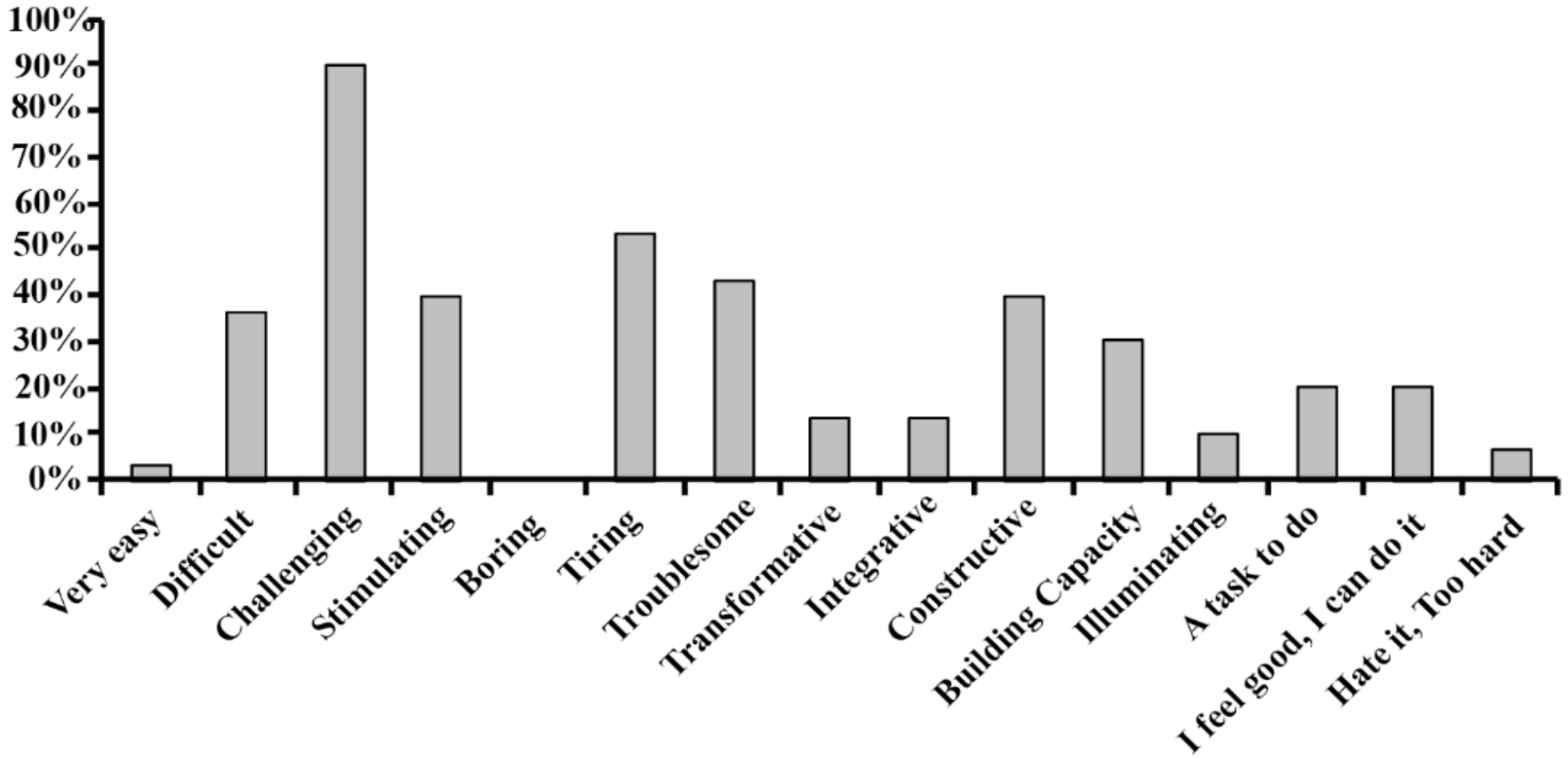


C


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Very easy
Difficult
Challenging
Stimulating
Boring
Tiring
Troublesome
Transformative
Integrative
Constructive
Building Capacity
Illuminating
A task to do
I feel good, I can do it
Hate it, Too hard

4th year viewpoints

- **Support to disjoining of theory and practical (Barrett and Coate)**

"...if you work in science the lab practical is good but the theory you just learn it off just for the sake of it."

- **Did students benefit from their previous experience?**

"I think it does improve, there's areas that I like and I get notifications on research gate for instance, so I think yes it does, because before...."

"I even find myself occasionally going through the notes like for a..."

"I try to challenge what I have learned in college, it is 4 years, you do not want to leave and....."

The learners a at work

Students competence

Re-evaluating what's known

Acting

Background Discovery

Questioning

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Thank you
any questions ?

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