

Effect of YPT Competitions on *Soft and Hard Skills*

according to *Preparatory YPT Teachers*

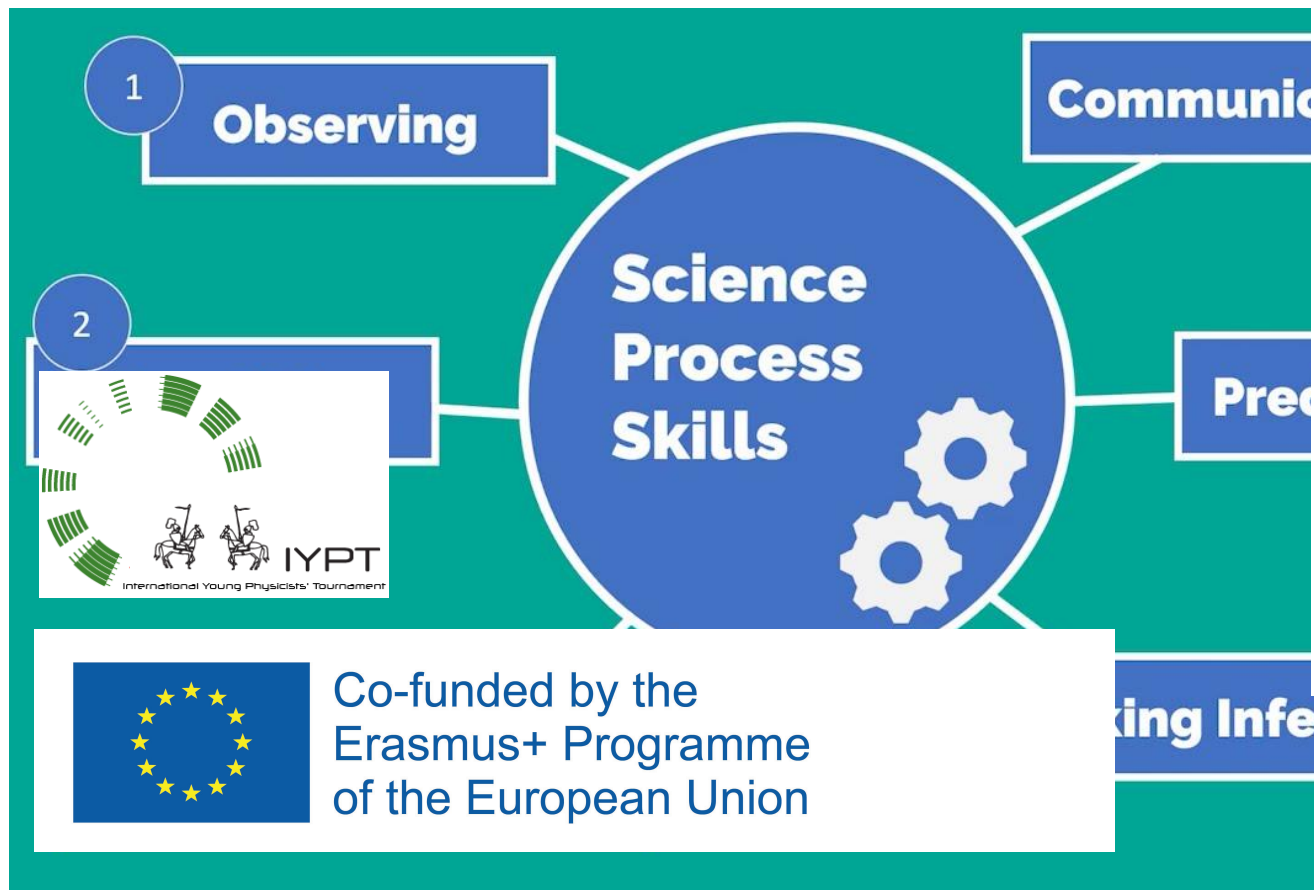
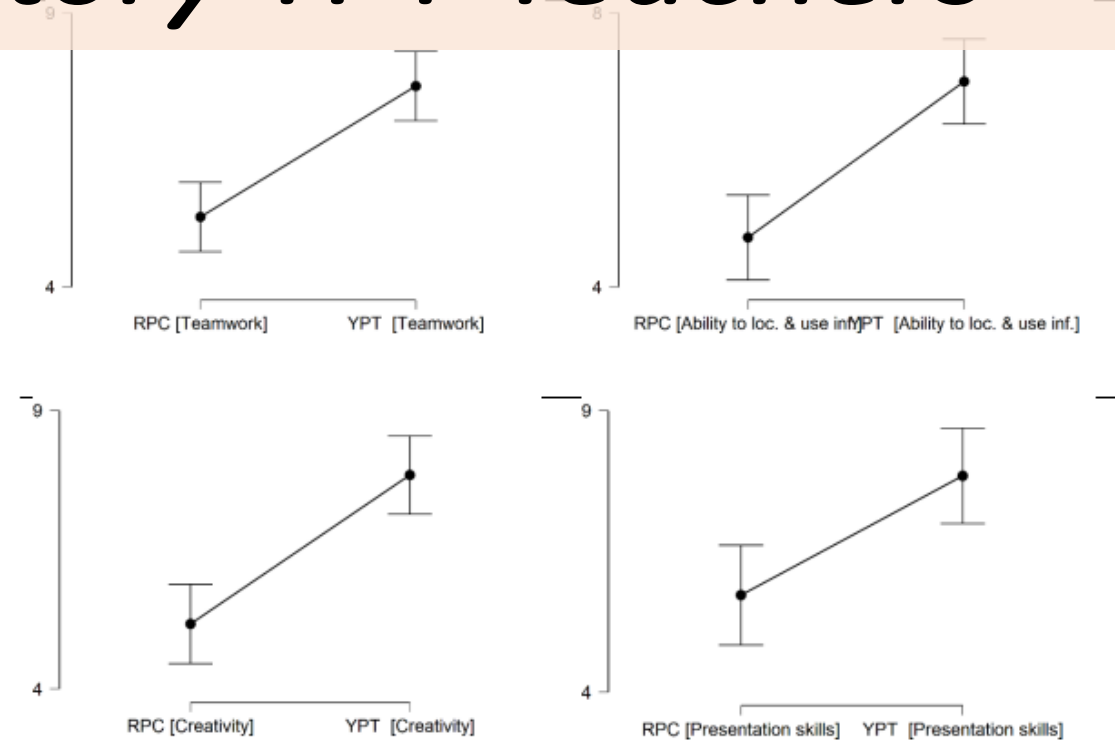


Figure 1: Paired T-Test: Soft Skills in RCP vs. YPT

Measure 1	Measure 2	t	df	p
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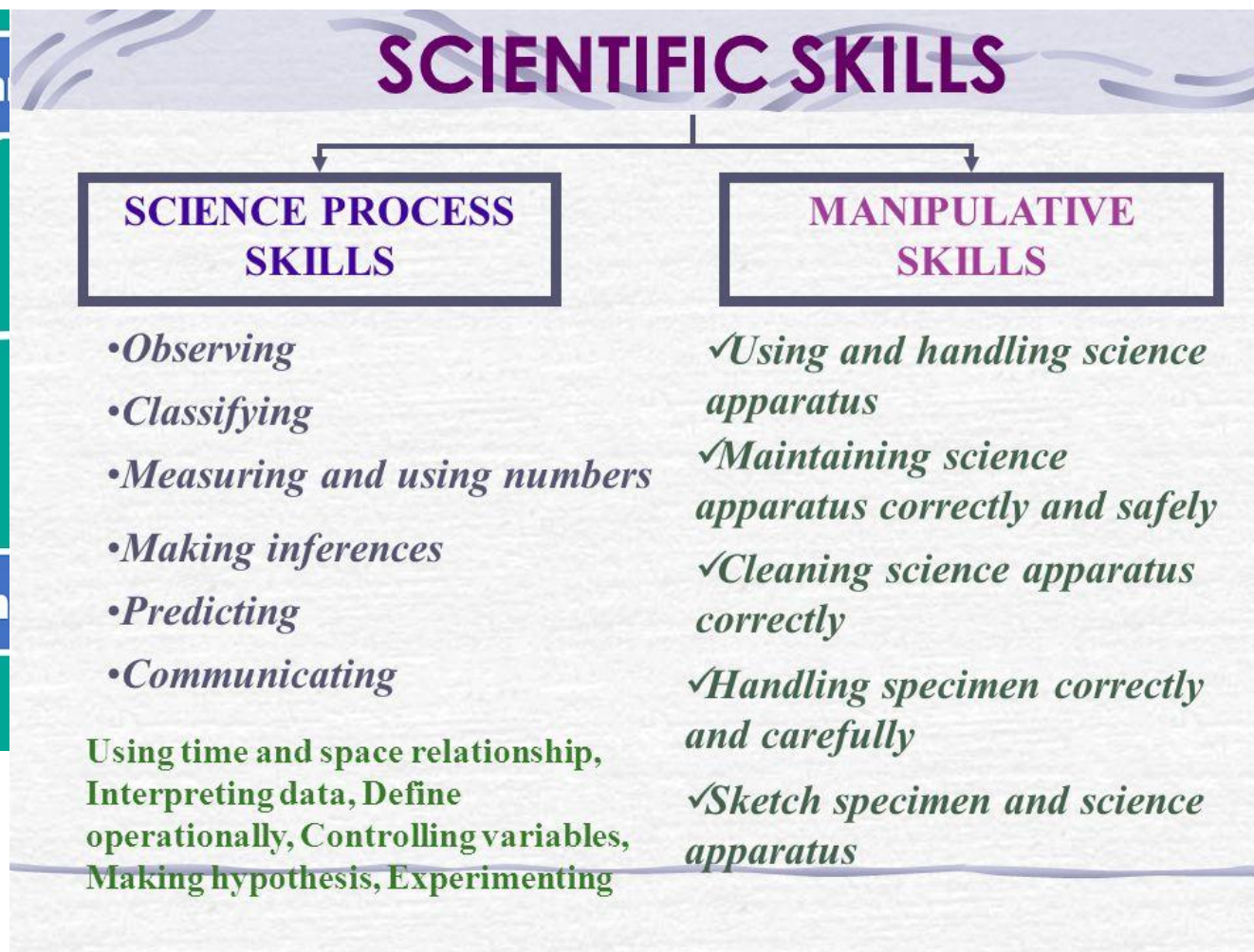
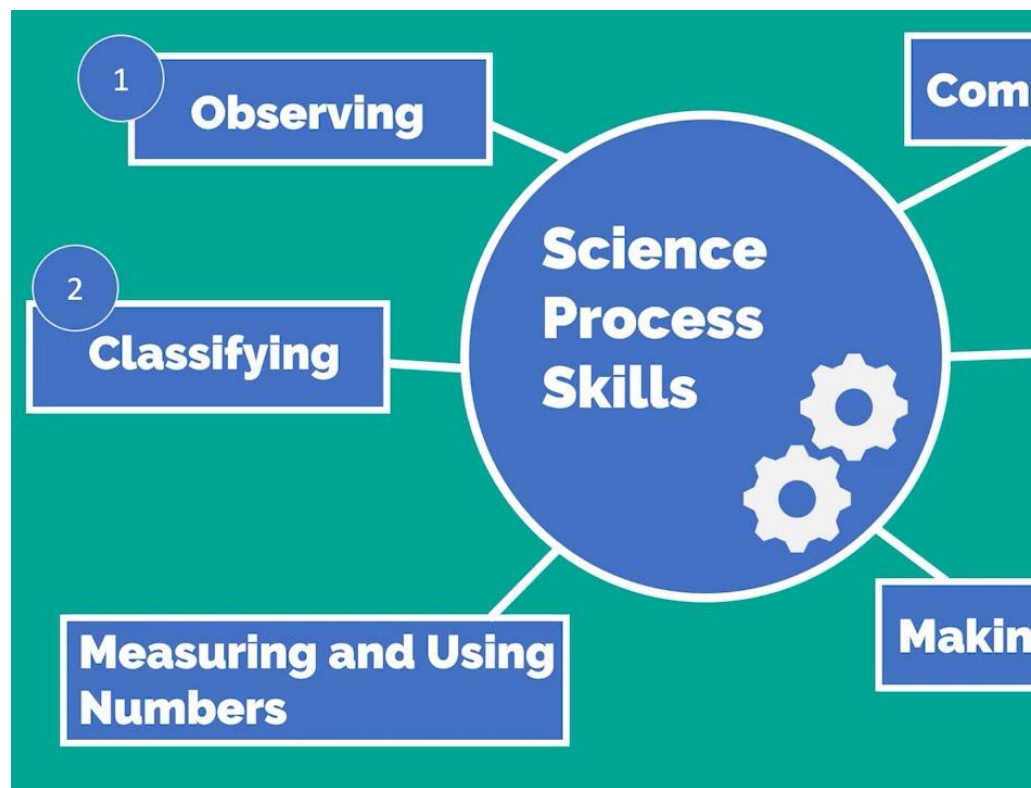
Note: Student's t-test. Visualization of Paired T-Test: Soft Skills in RCP vs. YPT



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Source: <https://www.youtube.com/watch?v=kDVlzmXW1pE>

Skills of Scientists'? Skills of Successful People?



Research question

According to our own experiences, YPT type competitions can have serious effects on many skills and motivation of most high school students.. In order to quantify this experience, we have formulated the following main research question:

What impact of different teaching platforms do teachers attribute to students' soft and hard skill development " (RPC, YPT and Non-YPT competitions)?

In addition, , we were confident that other connections and relationships would come to light in the course of the research, but we see these as some welcome side effects.

Hypotheses

Based on our many years of experience in preparing high school students for the IYPT or any YPT competitions, we formulate the following hypotheses:

- 1. We do not find significant differences between traditional competitions and classroom physics classes in terms of their impact on most of the skills examined.*
- 2. YPT competitions have a serious positive effect on soft skills and certain hard skills compared to the other two learning modes (RCP and Non-YPT competitions).*

Background of the Colleagues

Country	High School Teacher	YPT preparer	Number of other competitions (non-YPT)
SLO	Yes	Yes	8
SLO	Yes	Yes	1
SLO	Yes	Yes	1
SLO	Yes	Yes	1
SLO	No	Yes	1
SLO	Yes	Yes	1
SLO	Yes	Yes	1
SLO	Yes	Yes	7
SLO	No	Yes	0
SLO	Yes	Yes	1
SLO	Yes	Yes	1
SLO	Yes	Yes	0
SLO	Yes	Yes	1
HUN	Yes	No	6
HUN	Yes	No	1
HUN	Yes	Yes	3
HUN	Yes	No	3
HUN	Yes	Yes	3
HUN	Yes	Yes	3
HUN	Yes	Yes	3
SLO: 13	Yes: 18	Yes: 17	SLO mean = 1,85
HUN: 7	No: 2	No: 3	HUN mean = 3,14

Investigated skills

Soft skills

- Teamwork
- Ability to locate and use information
- Creativity
- Presentation skills
- Debating skills
- English (language) skills or ability

Hard skills

- High school mathematics
 - High school physics
 - Solving close-ended problems in physics
 - Designing experiments
 - Conducting experiment (based on clear manual)
 - Interpreting experimental data, data analysis
 - Developing own theoretical model
 - Numerical simulations
 - Independent research in scientific literature
 - Critical assessment of others' results
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All the skills mentioned above were examined in RCP, YPT & Non-YPT, and possible effect of the countries were examined, too.

RPC, YPT and Non YPT on Soft Skills

Descriptive Statistics of effect of RPC on soft skills

	RPC [Teamwork]	RPC [Ability to loc. & use inf.]	RPC [Creativity]	RPC [Presentation skills]	RPC [Debating skills]	RPC [English skills]
Mean	5.278	4.722	5.167	5.722	4.444	3.588

Descriptive Statistics of effect of YPT on soft skills

Mean	7.667	7.000	7.842	7.842	7.579	7.105
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Descriptive Statistics of effect of non YPT competitions on soft skills

Mean	3.158	6.278	5.526	2.579	2.632	2.421
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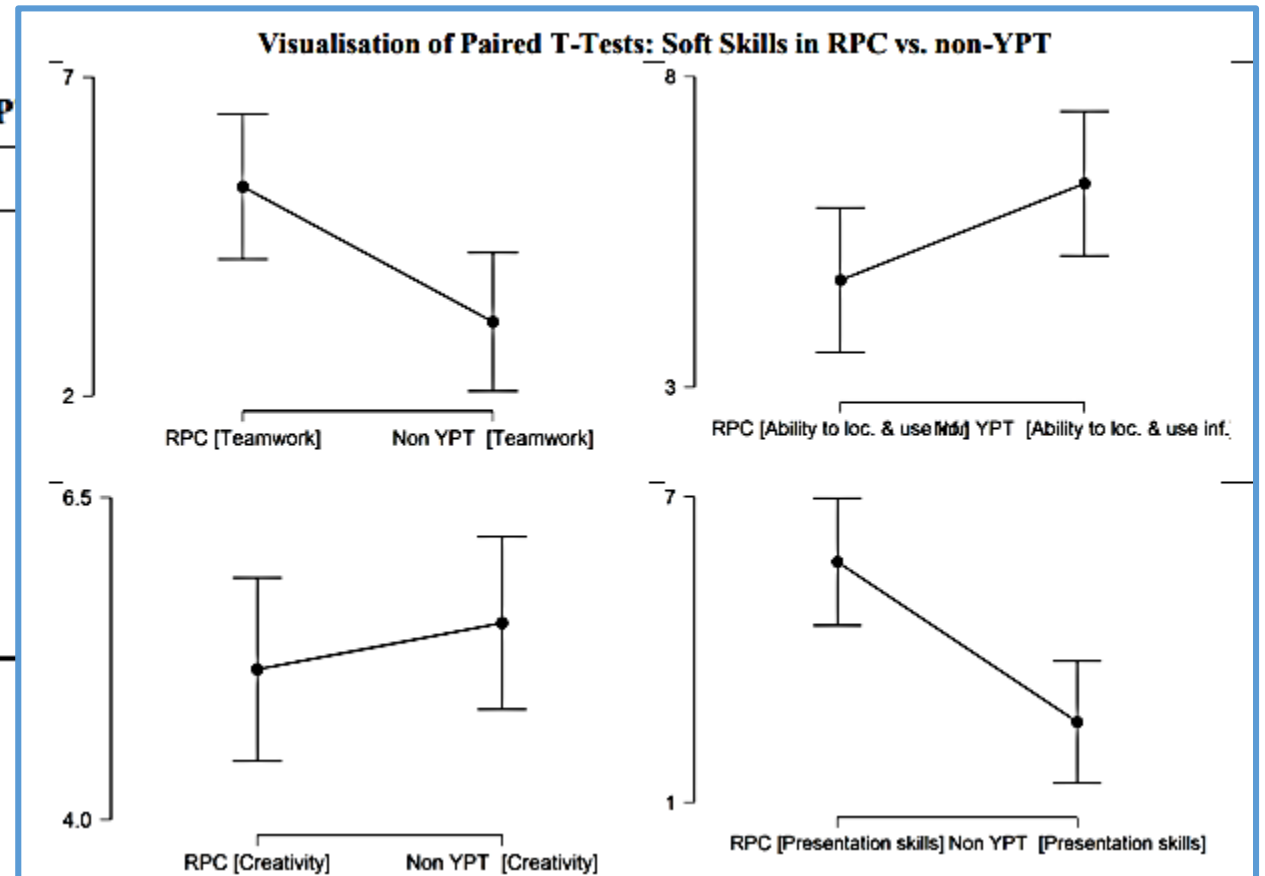
RPC and Non YPT on Soft Skills

1. We do not find significant differences between traditional competitions and classroom physics classes in terms of their impact on most of the skills examined.

Paired Samples T-Test: Soft Skills in RPC vs. non-YPT

Measure 1	Measure 2
RPC [Teamwork]	- Non YPT [Teamwork]
RPC [Ability to loc. & use inf.]	- Non YPT [Ability to loc. & use inf.]
RPC [Creativity]	- Non YPT [Creativity]
RPC [Presentation skills]	- Non YPT [Presentation skills]
RPC [Debating skills]	- Non YPT [Debating skills]
RPC [English skills]	- Non YPT [English skills]

Note. Student's t-test.



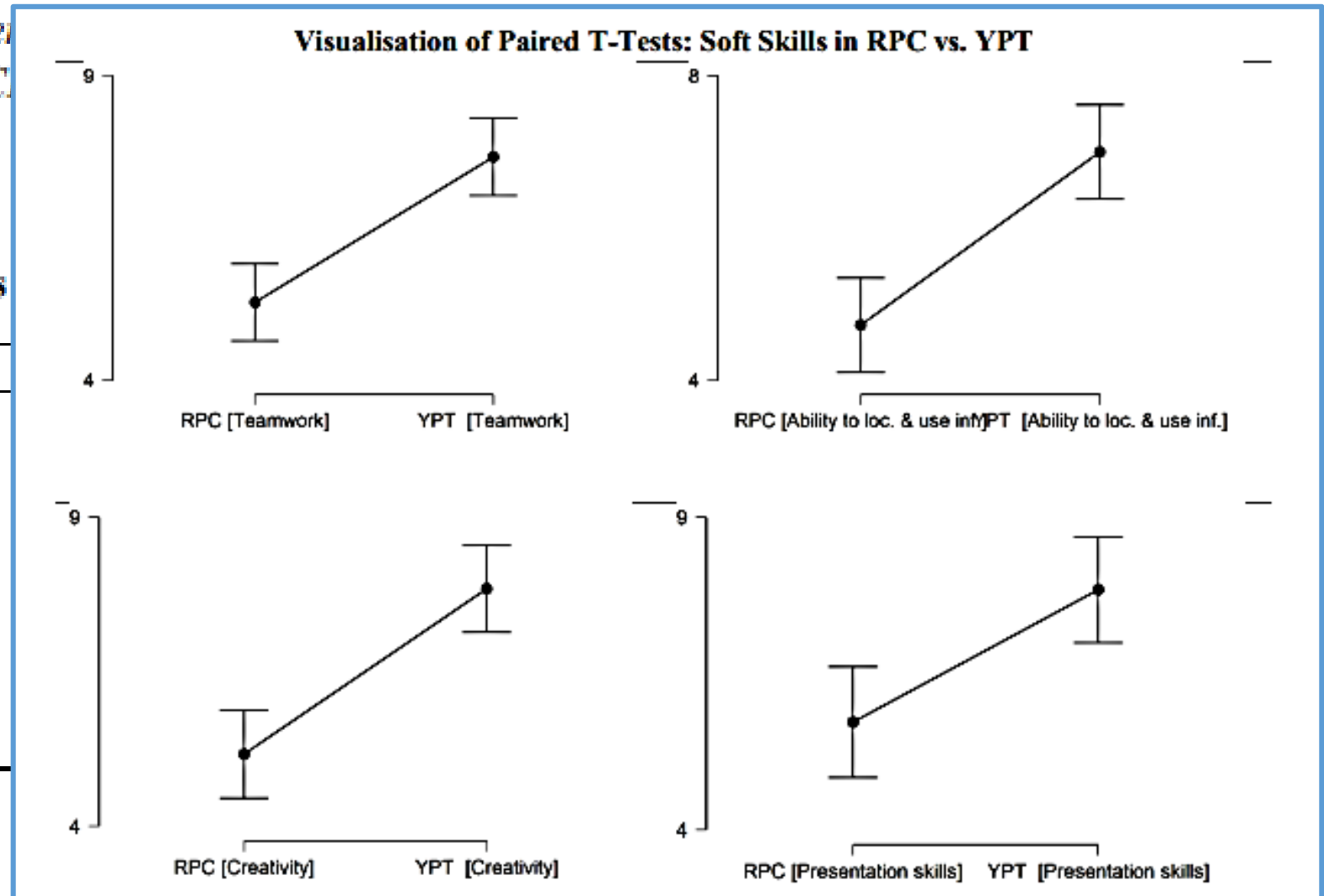
RPC and YPT on Soft Skills

2. YPT competitions have a set of other two learning modes (RPC)

Paired Samples

Measure 1

RPC [Teamwork]	-
RPC [Ability to loc. & use inf.]	-
RPC [Creativity]	-
RPC [Presentation skills]	-
RPC [Debating skills]	-
RPC [English skills]	-



RPC, YPT and Non YPT on Hard Skills

Descriptive Statistics: Hard Skills in RPC

	RPC [High school mathematics]	RPC [High school physics]	RPC [Solving closed-ended problems in physics]	RPC [Designing experiments]	RPC [Conducting experiment (based on clear manual)]	RPC [Interpreting experimental data, analysis]	RPC [Developing own theoretical model]	RPC [Numerical simulations]	RPC [Independent research in scientific literature]	RPC [Critical assessment of others' results]
Mean	6.444	7.778	7.444	4.056	6.000	5.444	2.500	1.944	3.389	4.111

Descriptive Statistics: Hard Skills in YPT

Mean	6.947	7.737	4.579	8.000	5.579	8.526	6.368	6.263	7.158	7.947
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Descriptive Statistics: Hard Skills in non-YPT

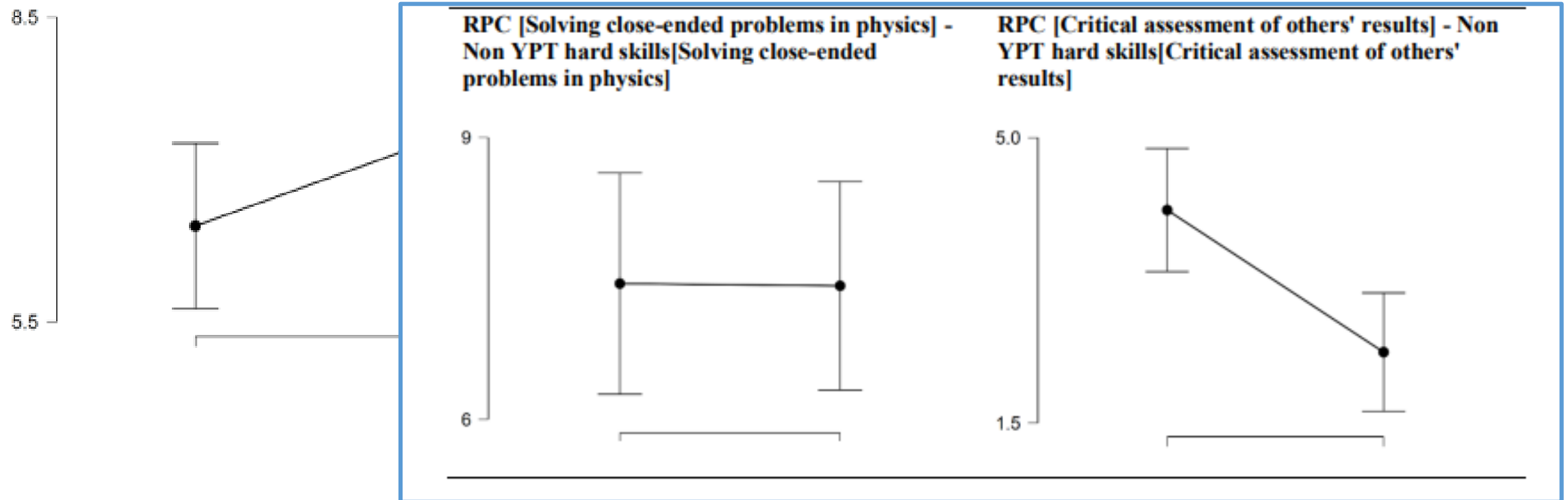
Mean	7.263	7.667	7.421	3.474	4.158	4.222	3.316	2.684	4.833	2.368
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RPC and Non YPT on Hard Skills

1. We do not find significant differences between traditional competitions and classroom physics classes in terms of their impact on most of the skills examined.

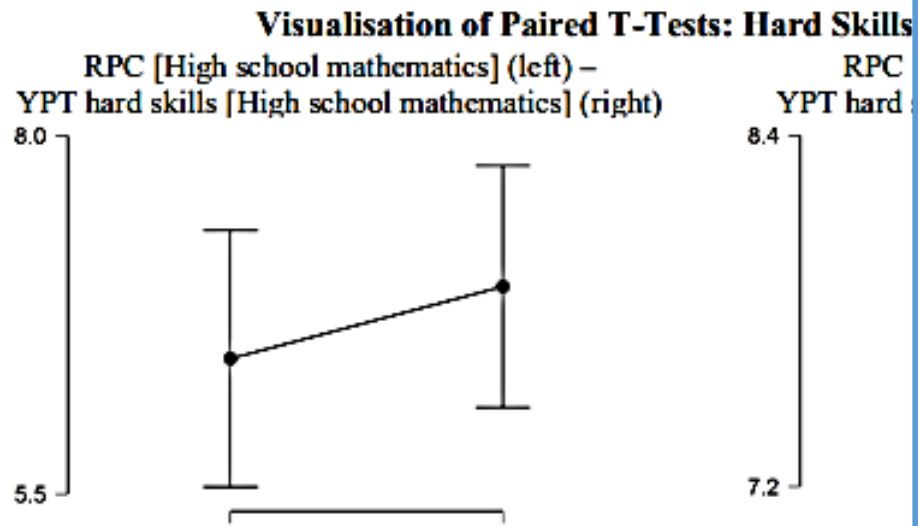
RPC [High school mathematics] - Non YPT hard skills[High school mathematics]

RPC [High school physics] - Non YPT hard skills[High school physics]

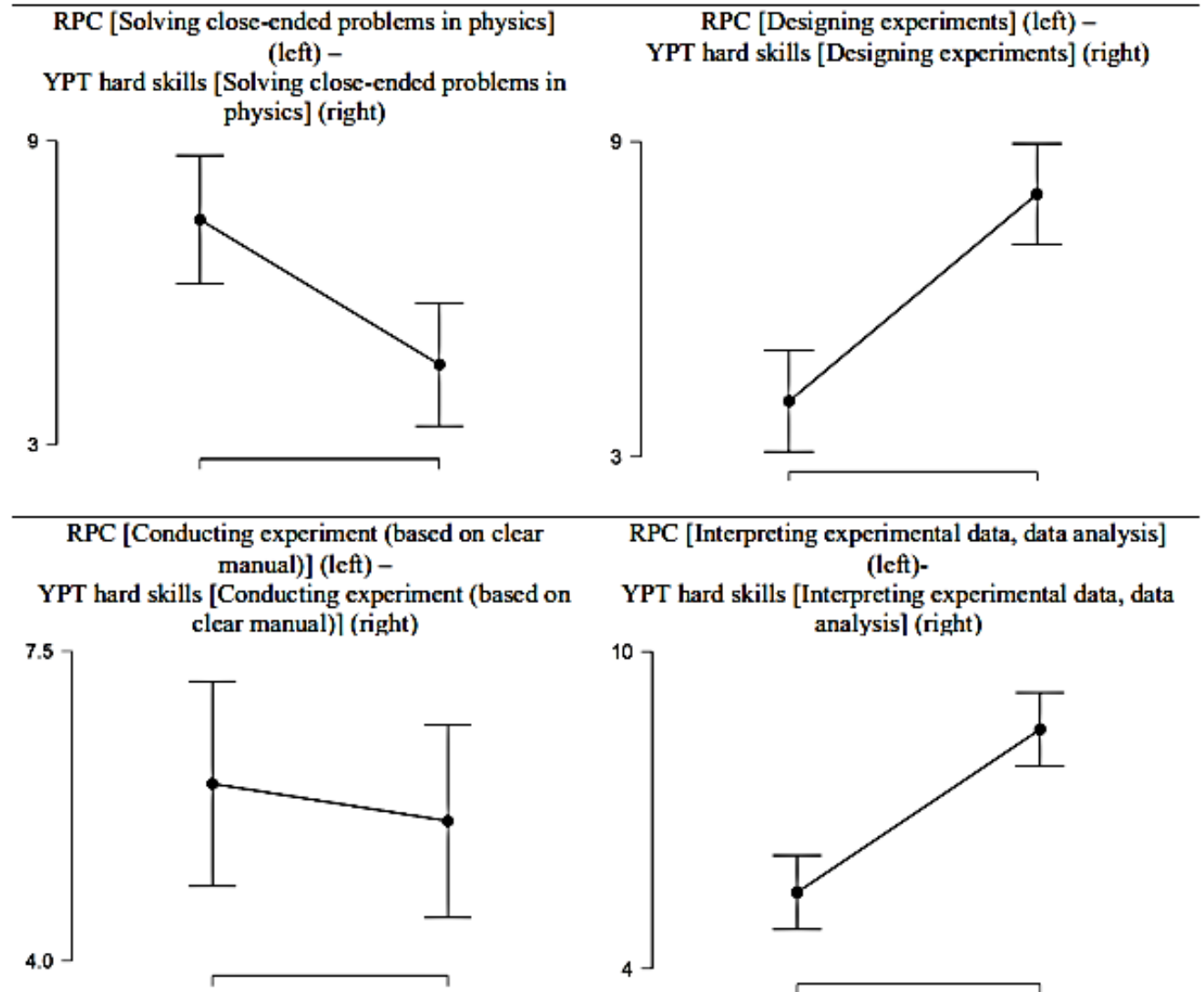


RPC and YPT on Hard Skills

2. *YPT competitions have a serious positive other two learning modes (RCP and Non-YPT)*



Visualisation of Paired T-Tests: Hard Skills in RPC vs. YPT



Conclusions: Hypotheses 1.

1. We do not find significant differences between traditional competitions and classroom physics classes in terms of their impact on most of the skills examined.

Few significant differences between the effects of traditional classes and competitions on soft skills:

- teamwork
- discussion skills

are less developed by non-YPT competitions even compared to RPC.

It also seems that **traditional competitions are strongly mathematics-centred** and therefore require preparation similar to traditional lessons.

Of course, this is both an advantage and a disadvantage, as it does not require special extra time and energy investment from teachers – as they are complained about it in the case of YPT -,

but it is difficult to increase the number of students who are successful in physics, as mathematics knowledge severely limits the number of students available.

Conclusions: Hypotheses 2.

2. YPT competitions have a serious positive effect on soft skills and certain hard skills compared to the other two learning modes (RCP and Non-YPT competitions).

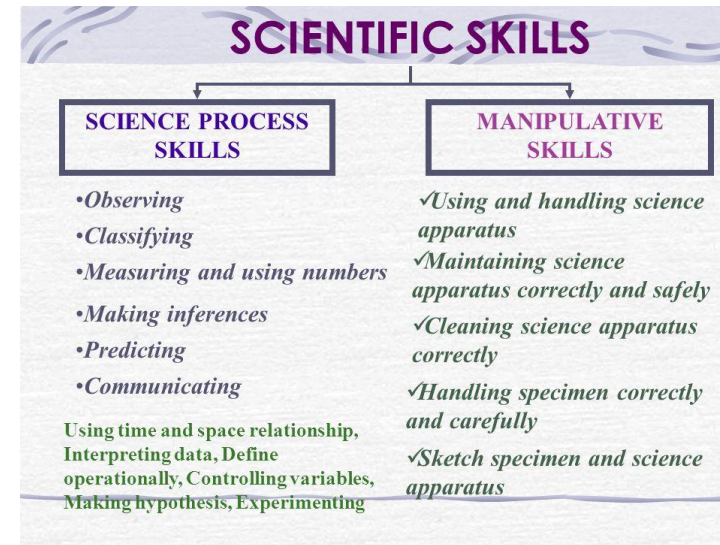
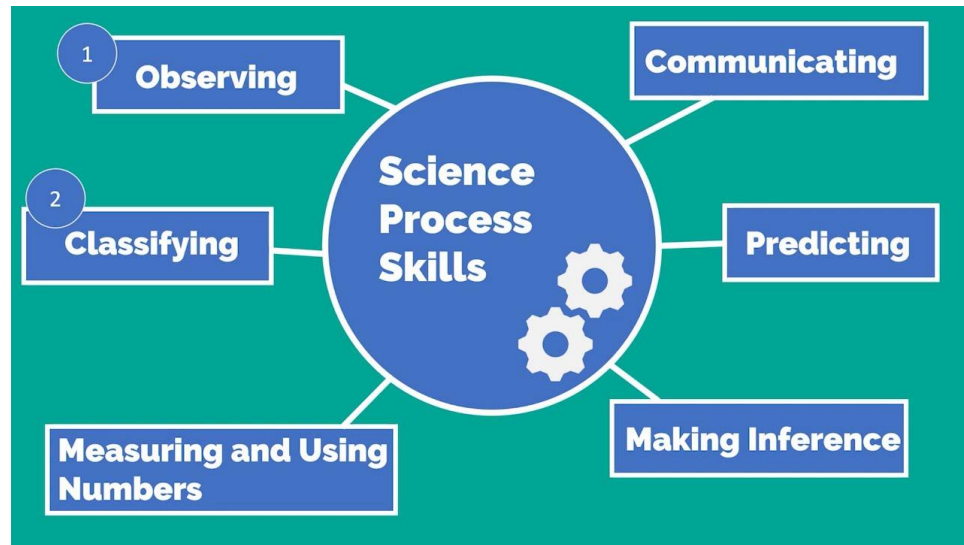
There are **several positive significant differences** in the effect of YPT-type learning compared to RPC and non-YPT-type learning **on soft and hard skills**.

In the field of **soft skills** examined, it can be stated that **YPT develops significantly better** than RPC or non-YPT competitions - with one exception, the effect of YPT and non-YPT on *Ability to locate & use information* does not show a significant difference.

Of the **hard skills** examined, the three platforms (RPC, YPT, and non-YPT) show **no significant difference** in *High school mathematics* and *High school physics*, and in the case of *Solving close-ended problems in physics* **YPT shows less developmental effect than the other two**.

However, there are **significant positive differences** in *Designing experiment*, *Interpreting experimental data*, *data analysis*, *Developing own theoretical model*, *Numerical simulations*, *Independent research in scientific literature independent literature use*, and *Critical assessment of others' results*.

Skills of Scientists'? Skills of Successful People?



What is our teaching aim?

If not only teaching the Newtons III. law, but also developing some (scientific?) skills too....

- Sometime use of YPT methods in regular Physics education
- Encourage students to participate on YPT competitions

Thank you for your attention! Questions?