Co-design of a serious game for computing education

Maud Plumettaz-Sieber
Eric Sanchez

University of Fribourg
Centre d'Enseignement et de Recherche pour la Formation
Laboratoire d'Innovation Pédagogique

Jarle Hulaas
Dominique Jaccard

University of Applied Sciences
of Western Switzerland (HES-SO)
HEIG-VD / AlbaSim Group

Context

➢ Computing education at high-school/gymnasium level

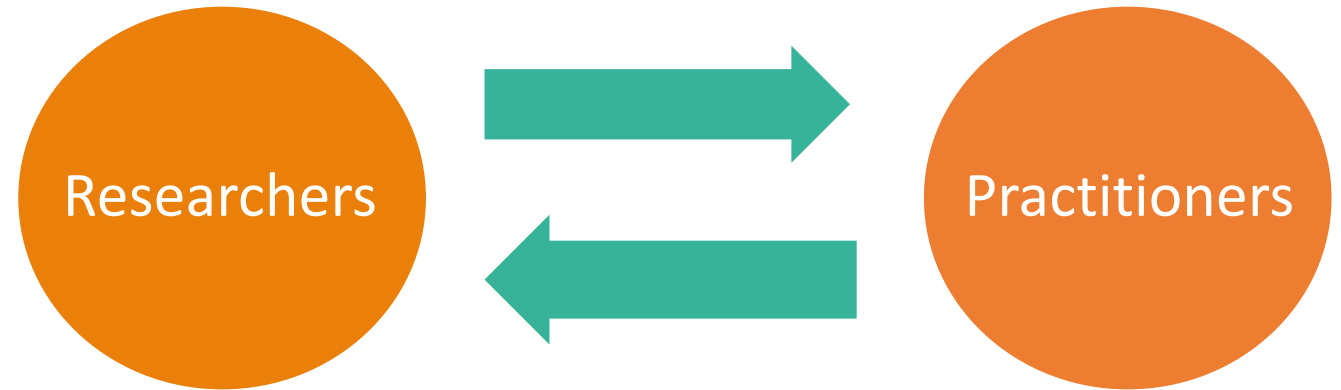➢ Compulsory in Fribourg from 2019

Urgent questions:

➢ How to teach this ?

➢ How to measure impacts ?

➢ How to find resources ?

Our Approach: Design-based Research (DBR)

Major dimensions of DBR :

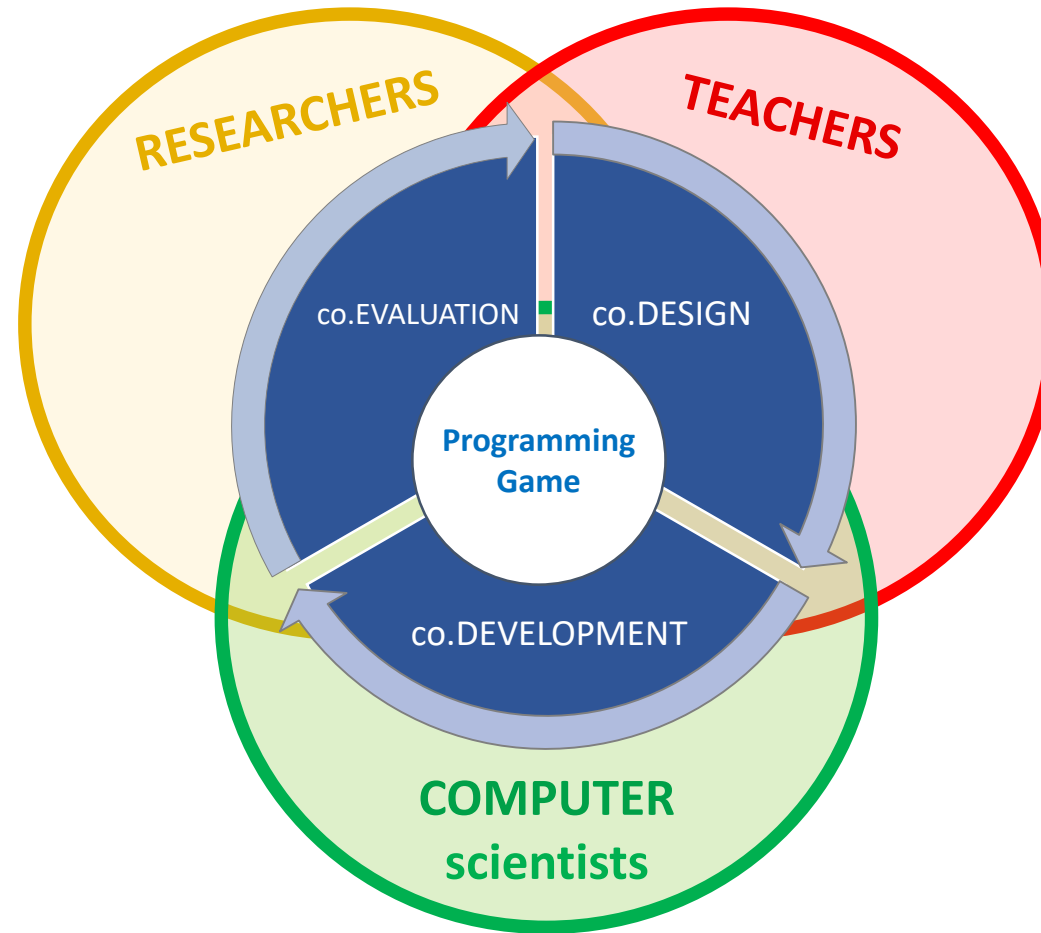➢ Design learning situations
➢ **Collaborative**
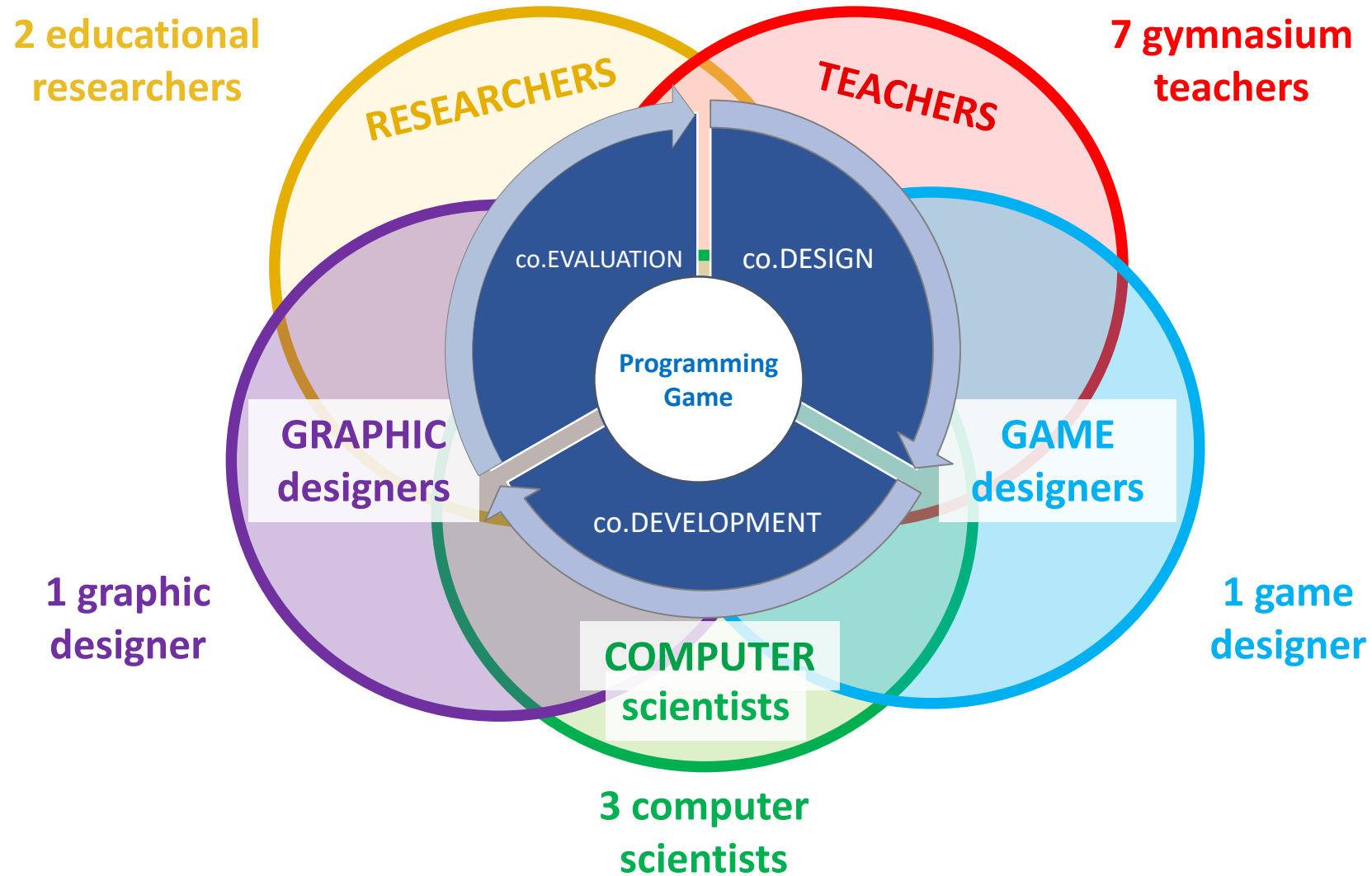➢ Iterative
➢ Ecological

Specific to this project :

➢ Model the institutionalization (debriefing) phase

Researchers

Practitioners

DBR = mutual benefit

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Concept: collaborative development, design & evaluation

With all professions involved

2 educational researchers

7 gymnasium teachers

RESEARCHERS

TEACHERS

co.EVALUATION

co.DESIGN

Programming Game

GRAPHIC designers

GAME designers

co.DEVELOPMENT

1 graphic designer

1 game designer

COMPUTER scientists

3 computer scientists

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PACT ProgGame

2.8
plusieurs variables
ⓘ

API

```
move()                    ?
left()                    ?
right()                   ?
say(text)                 ?
read()                    ?
```

Tape le bon code pour me rejoindre !

Code

```
 1   var value;
 2   move();
 3   move();
 4   moves();
 5   move();
 6   right();
 7   move();
 8   move();
 9   value = read();
10   left();
11   left();
12   move();
13   right();
14   say(value);
15   move();
16   move();
17   left();
18   move();
```

Log

moves is not defined

Resulting Serious Game

➢ Features
- JavaScript (Python coming next)
- Sequences, variables, conditionals, loops
- Extensive real-time teacher dashboard

➢ Wegas platform
- Open source
- Web-based authoring and execution platform
- Developed and maintained by AlbaSim at HEIG-VD (www.albasim.ch)

Real-time teacher dashboard

		Monitoring ⚙				Impacts		Actions	
	Niveau actuel ▾	Max atteint ⇕	Facilité globale	⇕	Historique bref	📘	✏	✉	
👤 > Details	3.3	4.0	Exceptions: 5 Incomplets: 31 Réussis: 11 Total: 47		💬	📘	✏	✉	👁
👤 > Details	3.3	4.0	Exceptions: 1 Incomplets: 24 Réussis: 11 Total: 36		💬	📘	✏	✉	👁
👤 > Details	3.3	4.0	Exceptions: 0 Incomplets: 13 Réussis: 12 Total: 25		💬	📘	✏	✉	👁
👤 > Details	3.3	4.0	Exceptions: 3 Incomplets: 34 Réussis: 11 Total: 48		💬	📘	✏	✉	👁
👤 > Details	3.2	3.2	Exceptions: 1 Incomplets: 23 Réussis: 9 Total: 33		💬	📘	✏	✉	👁

Our Design-based Research Questions

> ➢ Q1: nature of exchanged information ?
>
> ➢ Q2: mutual recognition of competences ?
>
> ➢ Q3: what interactions ?
>
> ➢ Q4: involvement and project ownership ?

Q1: nature of exchanged information

Teachers

Computer scientists

Pedagogical resource

Acceptability ?
Utility ?
Usability ?

Programming Game

Attractive and well-designed

How to model institutionalization

Graphic designer
Game designer

Educational researchers

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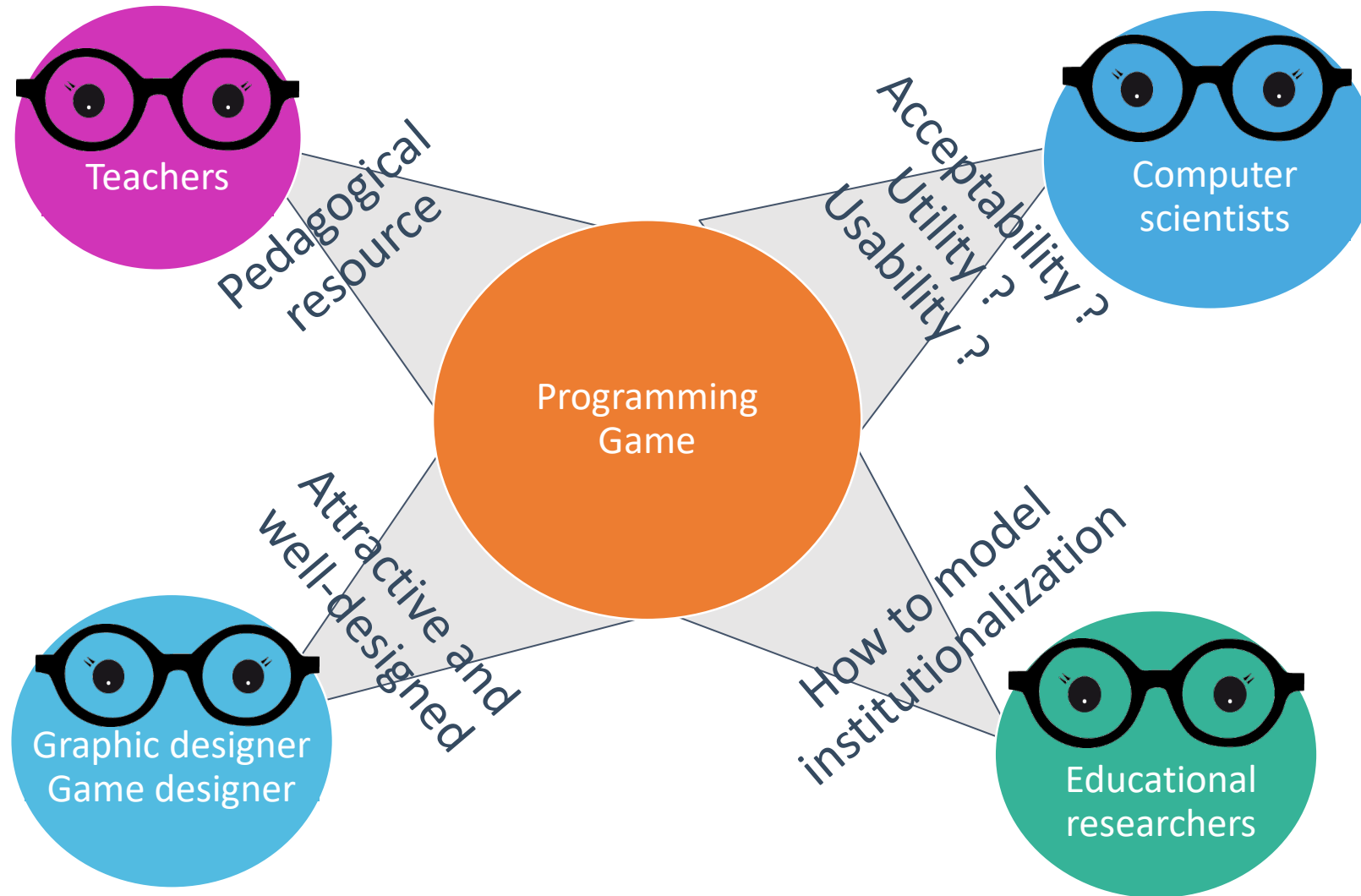
Q2: recognition of competences ⇒ YES, there is mutual respect
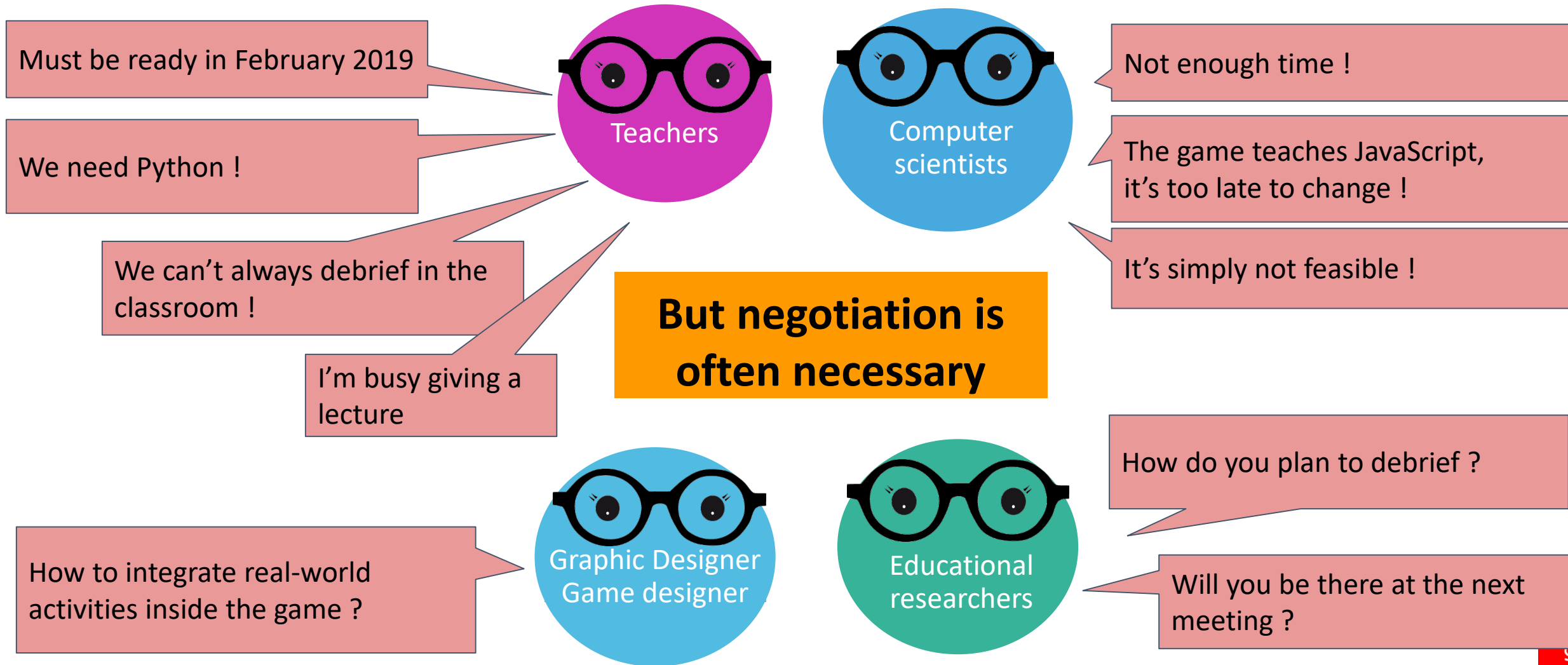
Q3: what interactions ?
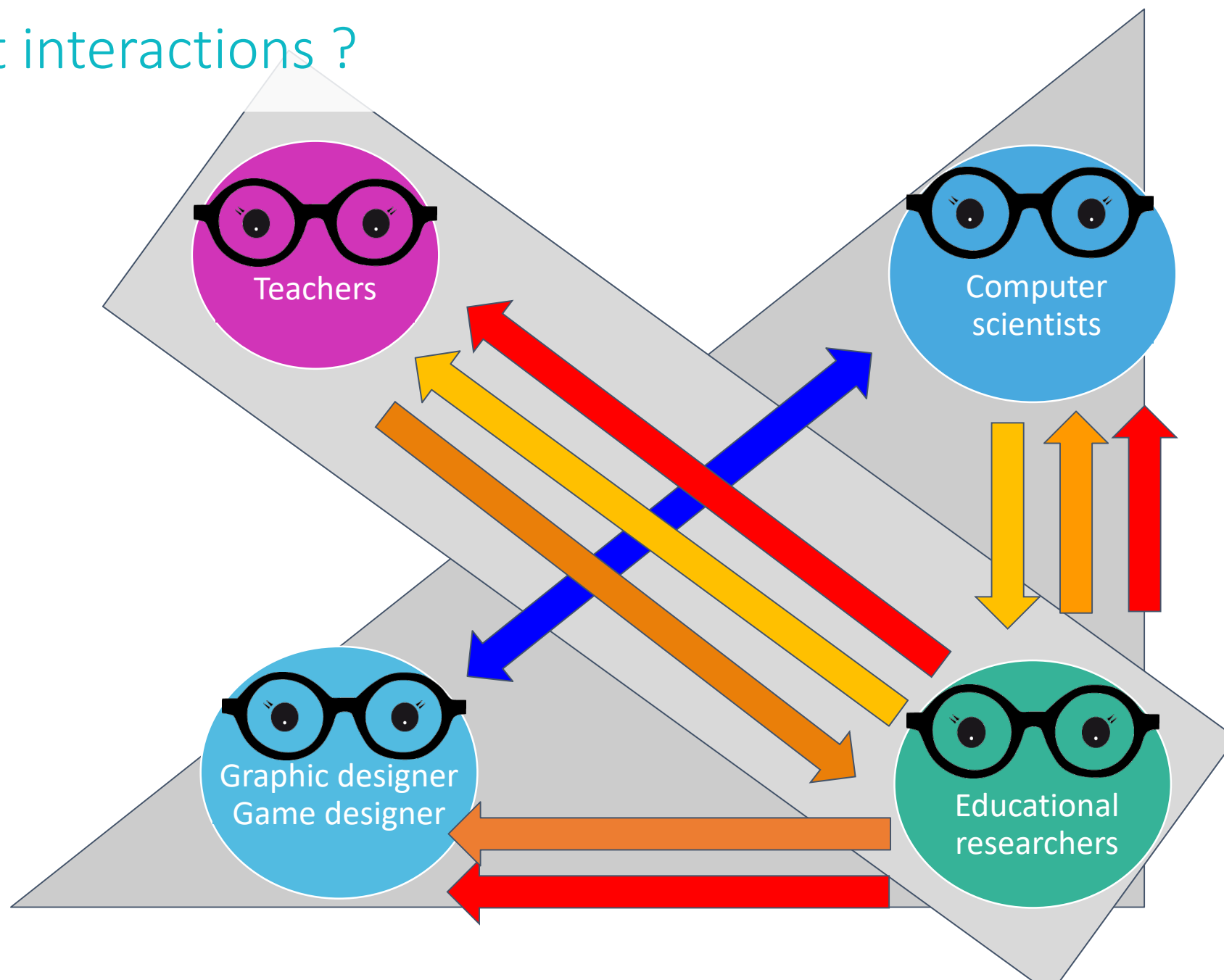
Q4: involvement

During meetings, everyone speaks out, but a survey reveals …

Do you feel that you are allowed to speak freely ?

6 (60 %)
2 (20 %)
0 (0 %)
0 (0 %)
2 (20 %)

1   2   3   4   5

Fully agree   ○ ○ ○ ○ ○   **Strongly disagree**

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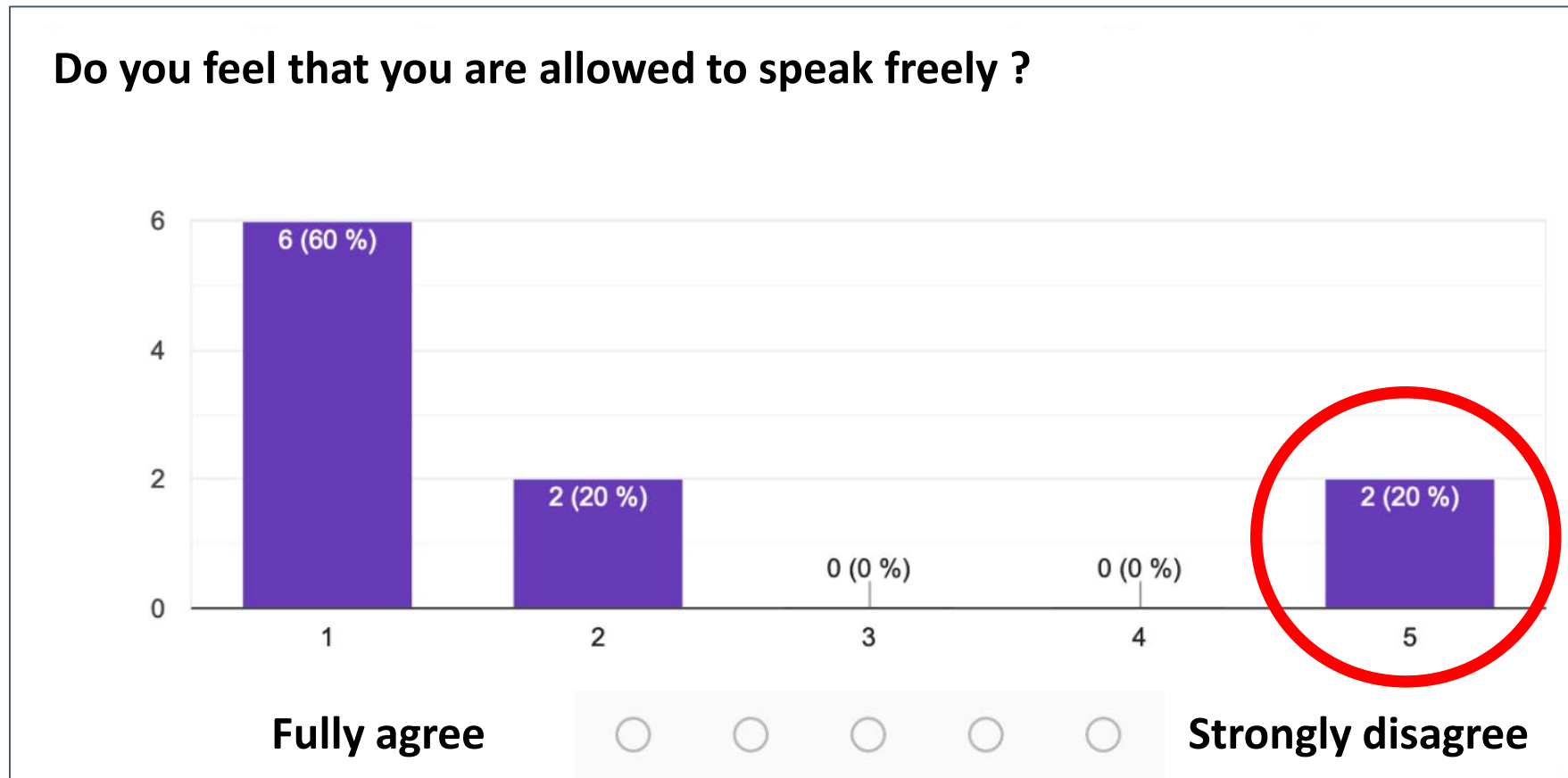
Conclusions

- ➢ The game satisfies the teachers' needs

- ➢ The serious game and its usage is both :
  - An educational resource
  - An object of research in educational sciences

- ➢ Collaboration is at the heart of Design-based Research
  - Complementarity creates synergies
  - External factors : available time and authority decisions
  - Involvement and project ownership can be improved

Thank you !

- **Interest in the serious game ?**

  Demo available online

  @ E-mail us to get teacher access rights!

- 2018-2019 grant from the
  HASLERSTIFTUNG

- Contacts :

  For pedagogical questions:
  maud.sieber@unifr.ch
  www.lip-unifr.ch

  For technical questions:
  jarle.hulaas@heig-vd.ch
  www.albasim.ch

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