Experience-oriented Approaches for Teaching and Training Requirements Engineering: An Experience Report

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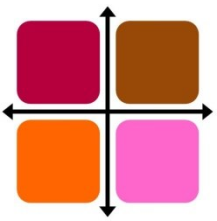
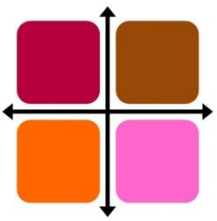


Agenda

1. *Motivation: Why Teaching and Training Requirements Engineering?*
2. *Related Work*
3. *Case Descriptions*
4. *Discussion*
5. *Conclusion and Future Work*



Motivation: Why Teaching and Training RE?

Relevance of RE for

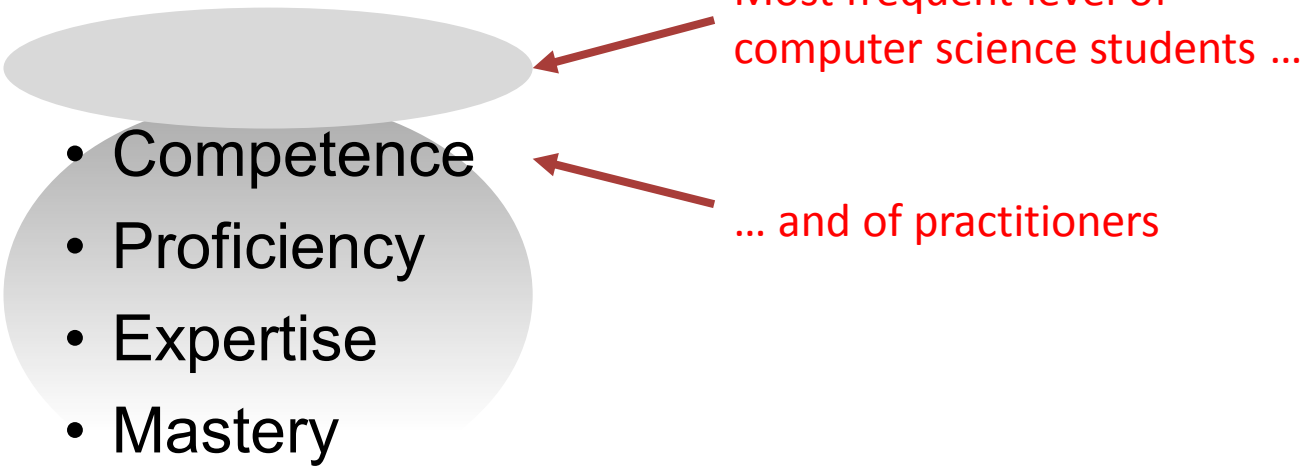
- project success
- education of software practitioners
  - at university
  - in on-the-job trainings
- Developers, consultants, and customers

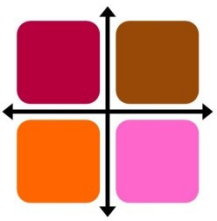
Related Work (I)

- **Lethbridge (1998):**
  - software professionals think that their education has been moderately relevant for their job (3.5 points on a scale of 0 to 5)
  - to learn how to *think* is more important than to learn specific methods
- **Foppa (1975) and more authors:**
  - listening is not as efficient as learning by doing

Related Work (II)

- **Hubert Dreyfus / Stuart Dreyfus (1980):**
  - 5 stage model:





Case Descriptions (I)

- **4 types of teaching / training:**
  - Improvisation Theatre
  - Role Game
  - Simulation
  - Real Life Project

Experience	Impro. Theatre	Role Game	Simu-lation	Real life
Novice	(4)	(3)	(3)	(1),(2)
Competence	(4)		(3)	
Proficiency	(4)		(3)	
Expertise	(4)			
Mastery				

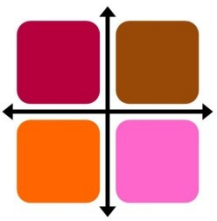
Case-study number

Case Descriptions (II)

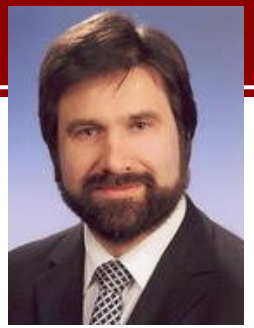
- **(1) Joint Project with IT and Business Students:**
  - Elicitation and negotiation of requirements, understanding the roles of other stakeholders,
  - Real life projects with internal or external stakeholders
  - 25-30 participants, group size 10-25
  - Success Criterion: Customer accepts project outcome. Self-reflection on achievements and failures in a post-mortem review.

Case Descriptions (III)

- **(1) Joint Project with IT and Business Students:**
  - Result:
    - practical experience in teasing out requirements from real stakeholders
    - hands-on experience of interactions of different groups with different goals within a project
    - better understanding of different stakeholders' roles and contributions
  - Strengths: realistic experience; no cook-book recipes, but rather situation-specific choice of methods
  - Challenges: presupposes theoretical knowledge; does not scale well due to limited access to (real) customer; difficult to control



Case Descriptions (IV)



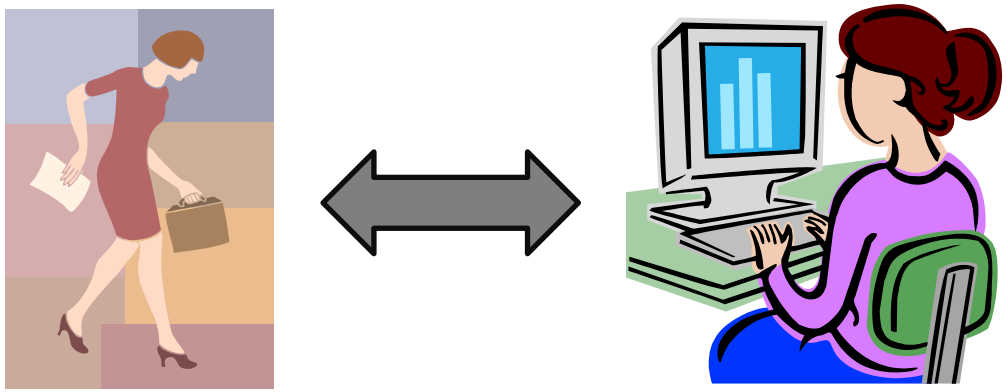
- **(2) Teaching Requirements Engineering to Business Students:**
  - Methods for elicitation, specification, management, soft skills, understanding the user's role in the process
  - Real life projects with external stakeholders
  - 25-40 participants, group size 5-12
  - Success Criterion: Projects are conducted in a real life situation. Customer accepts results. Additional written test with reflections on methods.
  - Result: Students work out real life projects
  - Strengths: realistic experience, real life problems and constraints
  - Challenges: only methods that suit for the concrete project will be trained

Case Descriptions (V)

- **(3) Requirements Engineering for Engineers:**
  - Elicitation methods, specification methods, soft skills
  - Project simulation including role games
  - 4-25 participants, group size 2
  - Success Criterion: Requirements specification and test cases satisfy quality criteria, (simulated) customer accepts prototype

Case Descriptions (VI)

- **(3) Requirements Engineering for Engineers:**
  - Participants: students and practitioners, different Dreyfus levels in the same course



customer Requirements engineer

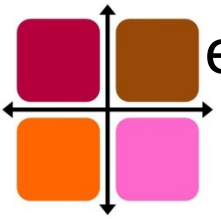
  - Result: requirements specification, test cases, user interface prototype
  - For each activity: theory part, templates, instructions, feedback
  - strengths: all Dreyfus levels learn, but learn different; interfaces between methods become clear; solutions can not be copied from other groups
  - Challenges: different projects and project complexity, no unique sample solution

Case Descriptions (VII)

- **(4) Using Improvisation Theater to Create Interaction:**
  - Soft skills and their specific aspects in RE-related situation such as requirements clarification, prioritization
  - Interactive games from Improvisation Theatre, supported by storytelling elements
  - group size 8-25, depends on trainer's experience
  - Success Criterion: Tasks per games are solved, anticipated results are achieved

Case Descriptions (VIII)

- **(4) Using Improvisation Theater to Create Interaction:**
- Result: Communicational aspects such as listening, paying attention, experienced in a simulated project-set up without the drawbacks of role plays
- For each activity: Each game trains certain communicational aspects such as overloading related to typical RE-situations
- Strengths: quick access to soft skills, method allows to experience and to discuss mistakes without participants being personally affected (by dissociation)
- Challenges: Not yet scientifically approved, not everyone enjoys games



Discussion

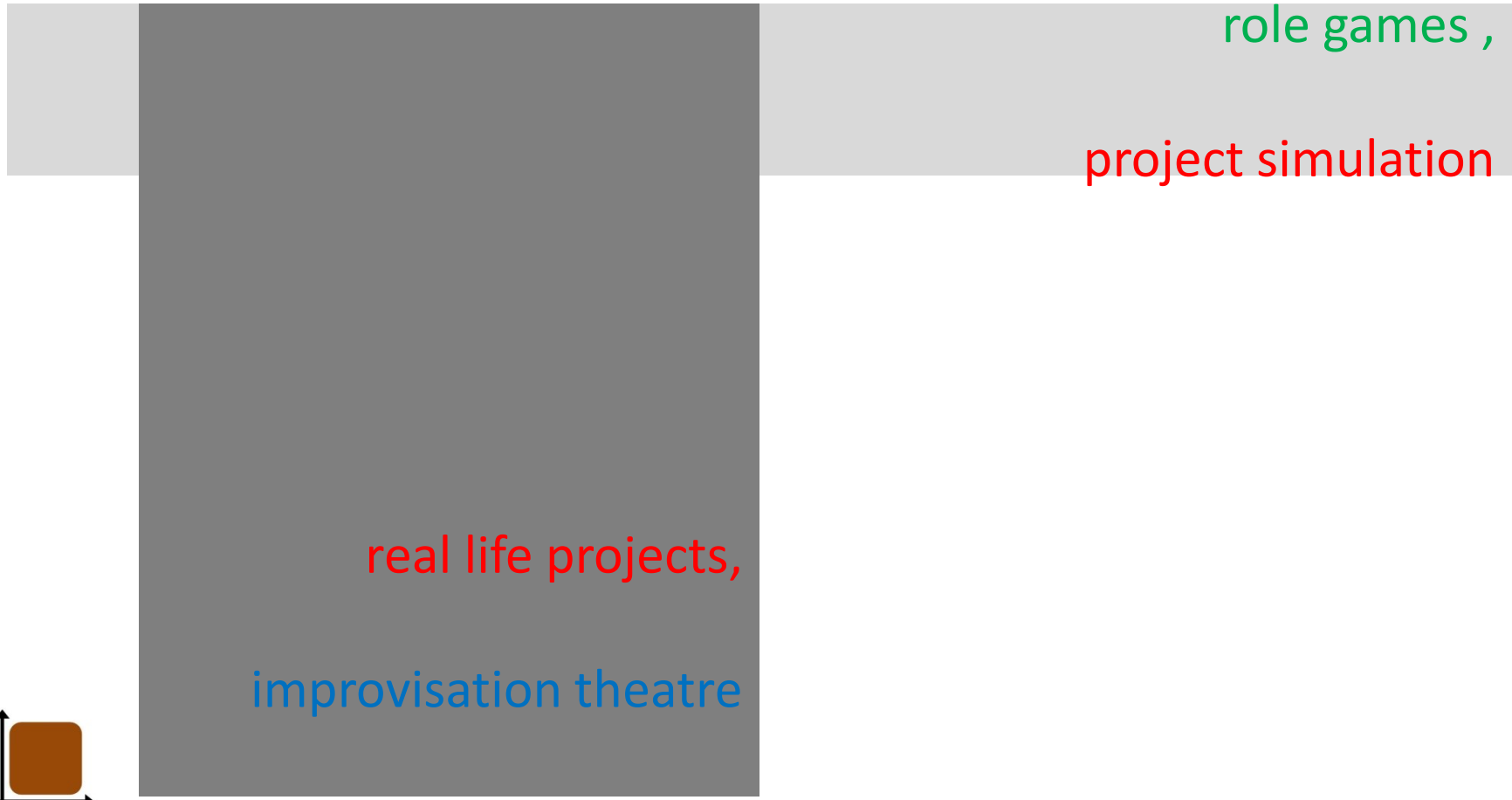
	Improvisation theatre	Role games	Project simulation, toy project	Real-life project with real customer
Group size	Some games are possible with small groups only	When group size is large, then need to form sub-groups	When group size is large => form sub-groups	Only small groups (limited availability of customer)
Controllability	High	High	Average	Low
Distributed team	No	Possible	Possible	Possible
Supervision need	Active supervision	Active supervision	Initial explana- ing	Regular supervision
Theoretical knowledge				Must be provided
Practical knowledge			,	Essential for success
Feedback to trainer	Immediate	Immediate	When reviewing interm. results	When reviewing interm. results
Dreyfus level of participants	All levels	Novice, competence	Novice, competence	All levels

NO SILVER BULLET!

depends on circumstances

Discussion

- **Hubert Dreyfus / Stuart Dreyfus (1980):**
  - 5 stage model:



Discussion

- **Hubert Dreyfus / Stuart Dreyfus (19**
  - 5 stage model:

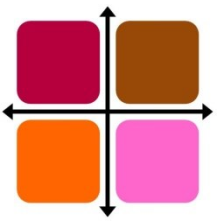
restricted time

role games => awareness, understanding,
project simulation => learning

teaching needs time

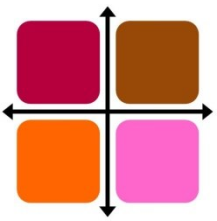
real life projects => learning,
improvisation theatre => improving competencies

No theoretical knowledge needed



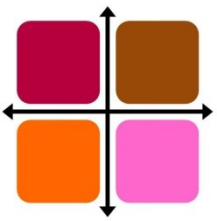
Conclusions

- Each of the four techniques is suitable for the novice and competence levels of the Dreyfus model
- On the higher levels of the Dreyfus model, training on specific topics becomes more relevant.
- => Methods like role games, project simulation and improvisation theatre are appropriate on these levels
- => These methods are suited to discuss aspects of complexity and novelty



Future Research Questions

- To what extent are our findings generalizable?
- How can we assess the level of expertise of the participants ex ante?
- Which level does the trainer need to have?
- How can trainers be trained?



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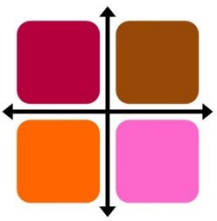

Thank you

Any questions?