ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Using Learning Analytics at School

a Go-Lab study

María Jesús Rodríguez-Triana (Chus),
Adrian Holzer, Andrii Vozniuk & Denis Gillet

maria.rodrigueztriana@epfl.ch

June 27th 2015, Bilbao

Motivation

Inquiry Based Learning (IBL) goal:

to encourage students to develop their own *questioning*, figure out their own responses by making proper *hypotheses* and *designing* proper experiments, and *reflect* on the observations.

Motivation

IBL Challenge: providing stakeholders with technologies that support orchestration [14] [18]

- teachers play a crucial role in the orchestration of learning activities

- to help them in this endeavour:

  what are their orchestration needs in a IBL scenario?

Related work

- **Orchestration:** challenges that teachers, students, parents, institution, etc. face throughout the learning scenario lifecycle [4][13]
- **Teachers information needs** to be addressed [5]:
  - learning design and teacher practice
  - learning process
  - learning outcomes generated by the students

Related work

IBL platforms addressing orchestration aspects:

- standalone tools

SMILE

- platforms with proprietary applications

Green-Touch

SAILS

nQuire

- platforms that integrate third-party tools

SCY Science Created by YOU

weSPOT

WISE

GO-LAB

Go-Lab

IBL + OER + Orchestration support

Repository

www.golabz.eu

Sharing & Search

Platform

www.graasp.eu

Creation & Adaptation

Inquiry Leaning Spaces (ILSs)

OER + IBL + scaffolding apps

Research

- **Question**: What are the teacher information needs when orchestrating ILSs?
- **Methodology:**

	Data gathering techniques	**Participants**	**Purpose**
	1 Survey	23 expert teachers	Reveal teachers' main needs based on their *current practice*
	4 Case studies	1 novice teacher 1 expert teacher 50 students	Better understand the needs that emerge *during the ILS lifecycle*

Expert Teacher Survey

Needs	%teachers
Learning outcomes	52.17%
Automatic evaluation	21.74%
Time spent (per phase, app, ILS)	17.39%
Current phase per student / students per phase	13.04%
Followed path	13.04%
Intermediate learning outcomes	8.70%
Self-evaluation	8.70%
Used resources, apps, labs	8.70%
Students questions/ comments	8.70%
Stuck students	8.70%
Peer-evaluation	4.35%
Teacher-evaluation	4.35%
Current actions	4.35%
Current state	4.35%
Visited phases	4.35%
Used devices (e.g., phones, tablets, PCs)	4.35%
Statistics per session (filtered)	4.35%
Students who required hints	4.35%
Evidence of face-to-face interaction	4.35%
Expert feedback on the ILS design	4.35%
Specifications and tips for other teachers	4.35%

M. J. Rodríguez-Triana, A. Holzer, A. Vozniuk, and D. Gillet, “Orchestrating inquiry-based learning spaces: An analysis of teacher needs,” in 4th International Conference on Advances in Web-Based Learning (ICWL). Guangzhou, China: Springer International Publishing, 2015, pp. 131–142.

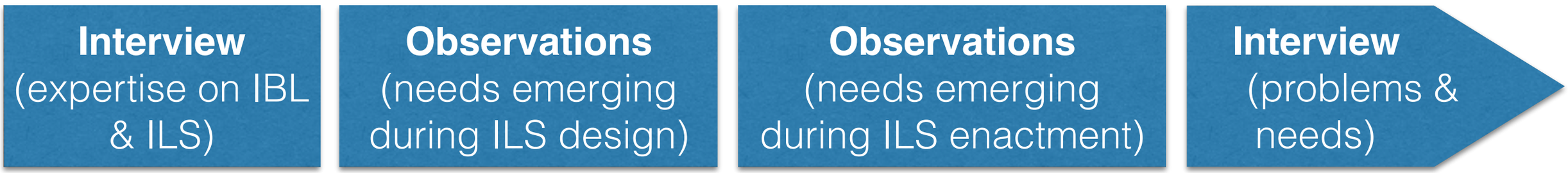
Expert Teacher Survey

Needs	%teachers	Learning Design	Learning Process	Learning Outcome
Learning outcomes	52.17%			x
Automatic evaluation	21.74%			x
Time spent (per phase, app, ILS)	17.39%		x	
Current phase per student / students per phase	13.04%		x	
Followed path	13.04%		x	
Intermediate learning outcomes	8.70%		x	x
Self-evaluation	8.70%			x
Used resources, apps, labs	8.70%		x	
Students questions/ comments	8.70%		x	
Stuck students	8.70%		x	
Peer-evaluation	4.35%			x
Teacher-evaluation	4.35%			x
Current actions	4.35%		x	
Current state	4.35%		x	
Visited phases	4.35%		x	
Used devices (e.g., phones, tablets, PCs)	4.35%		x	
Statistics per session (filtered)	4.35%		x	
Students who required hints	4.35%		x	
Evidence of face-to-face interaction	4.35%		x	
Expert feedback on the ILS design	4.35%	x		
Specifications and tips for other teachers	4.35%	x		
Proportion of interested teachers		**8.70%**	**56.52%**	**73.91%**

Expert Teacher Survey

Needs	%teachers	Learning Design	Learning Process	Learning Outcome
Learning outcomes	52.17%			x
Automatic evaluation	21.74%			x
Time spent (per phase, app, ILS)	17.39%		x	
Current phase per student / students per phase	13.04%		x	
Followed path	13.04%		x	
Intermediate learning outcomes	8.70%		x	x
Self-evaluation	8.70%			x
Used resources, apps, labs	8.70%		x	
Students questions/ comments	8.70%		x	
Stuck students	8.70%		x	
Peer-evaluation	4.35%			x
Teacher-evaluation	4.35%			x
Current actions	4.35%		x	
Current state	4.35%		x	
Visited phases	4.35%		x	
Used devices (e.g., phones, tablets, PCs)	4.35%		x	
Statistics per session (filtered)	4.35%		x	
Students who required hints	4.35%		x	
Evidence of face-to-face interaction	4.35%		x	
Expert feedback on the ILS design	4.35%	x		
Specifications and tips for other teachers	4.35%	x		
Proportion of interested teachers		**8.70%**	**56.52%**	**73.91%**

Case Studies



Case Studies (Alice)

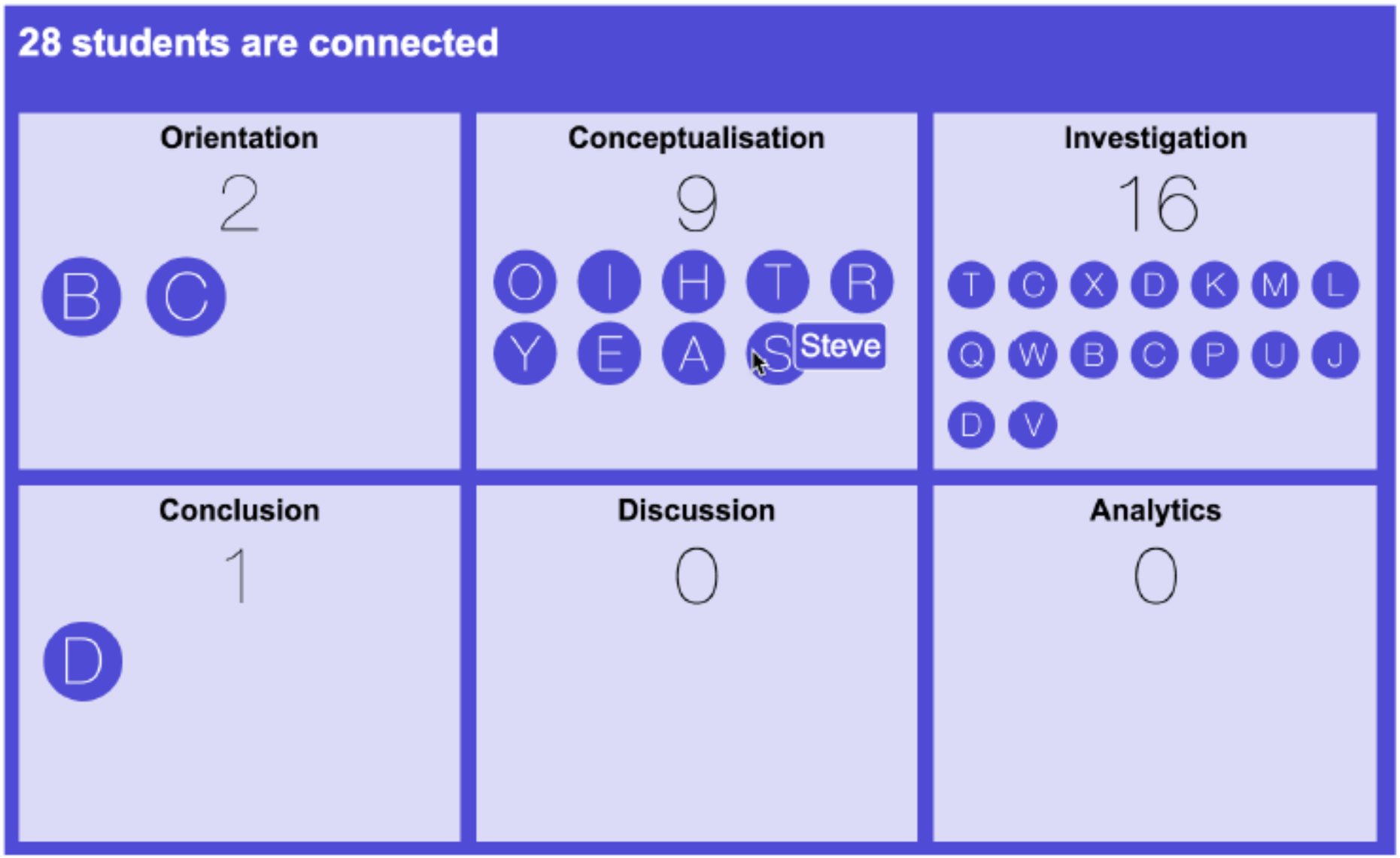
Case Studies (Bob)

Contextual LA apps

- **Open Social API**
- **Activity Streams**
- **HTML, CSS and JavaScript**
- **WebSocket protocol**

A. Vozniuk, M. J. Rodríguez-Triana, A. Holzer, S. Govaerts, D. Sandoz and D. Gillet, "Contextual learning analytics apps to create awareness in blended inquiry learning," Information Technology Based Higher Education and Training (ITHET), 2015 International Conference on, Lisbon, 2015, pp. 1-5.

Contextual LA apps



Contextual LA apps

Get data from **Tuesday, March 10th 2015 at 11:47 until now** Fetch

	Orientation	Conceptualisation	Investigation	Conclusion	Discussion	Analytics
Average time	**01:28**	**08:37**	**18:41**	**02:37**	**00:00**	**00:00**
David	01:10	05:43	21:26	02:51	00:00	00:00
Alice	01:45	16:52	13:02	00:00	00:00	00:00
Bob	00:59	06:03	19:41	04:22	00:00	00:00
Charlie	02:00	05:55	20:37	03:18	00:00	00:00

4 students submitted files

Alice (1 file)

- Report_Alice.pdf in Investigation 19 minutes ago

Bob (1 file)

- Report_Bob.pdf in Conclusion 11 minutes ago

Charlie (1 file)

- Report_Charlie.pdf in Conclusion 4 minutes ago

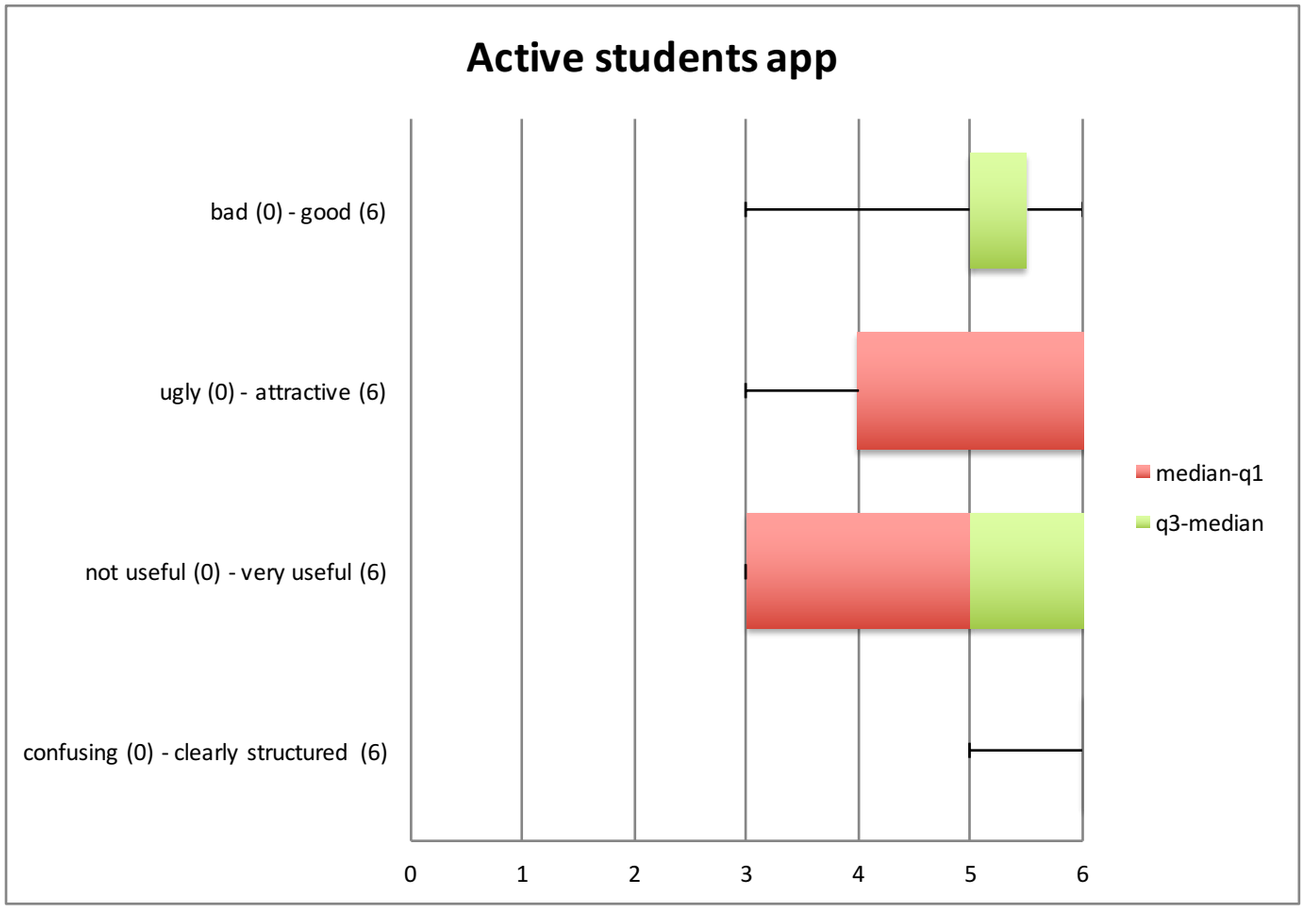
David (2 files)

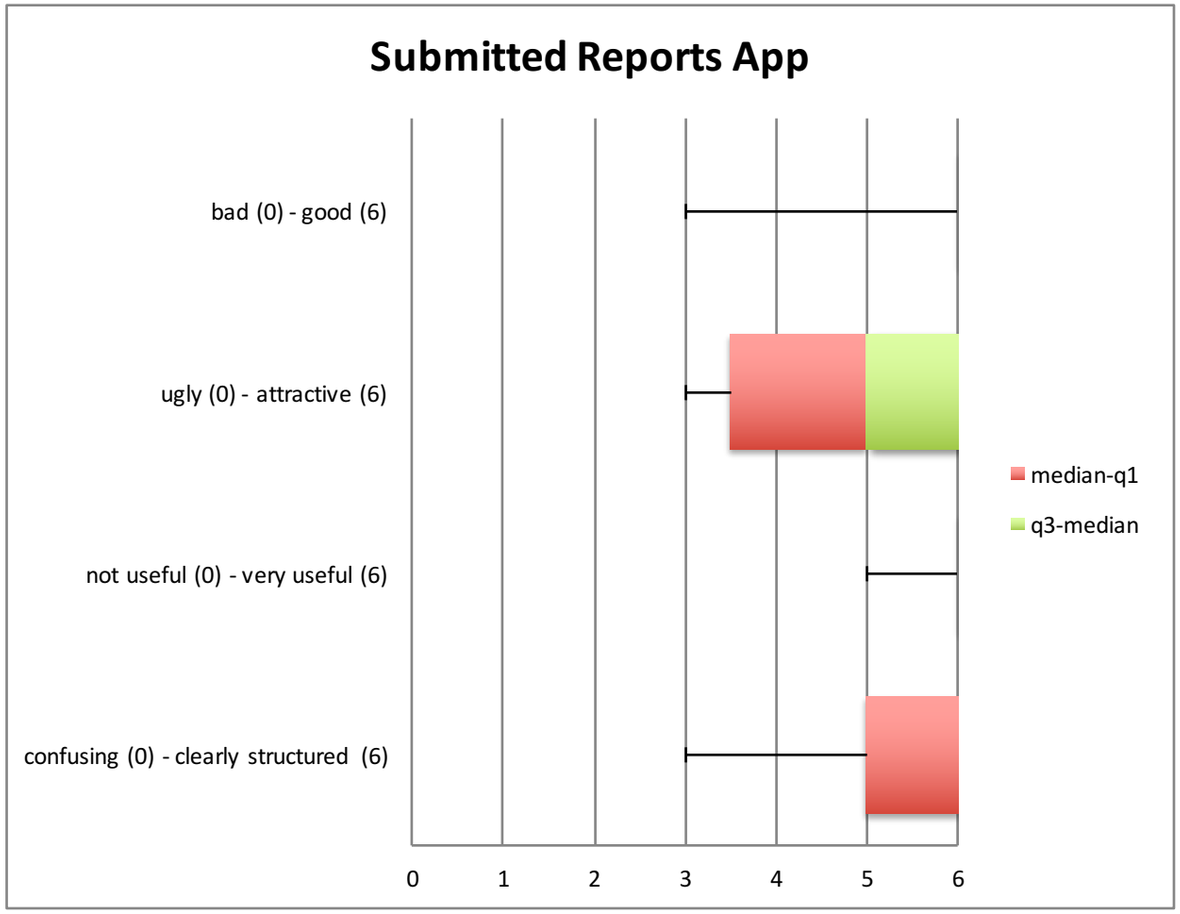
- Report_David.pdf in Conclusion on Sunday, January 4th 2015 at 18:10:27
- AppendixA_David.md in Discussion a few seconds ago

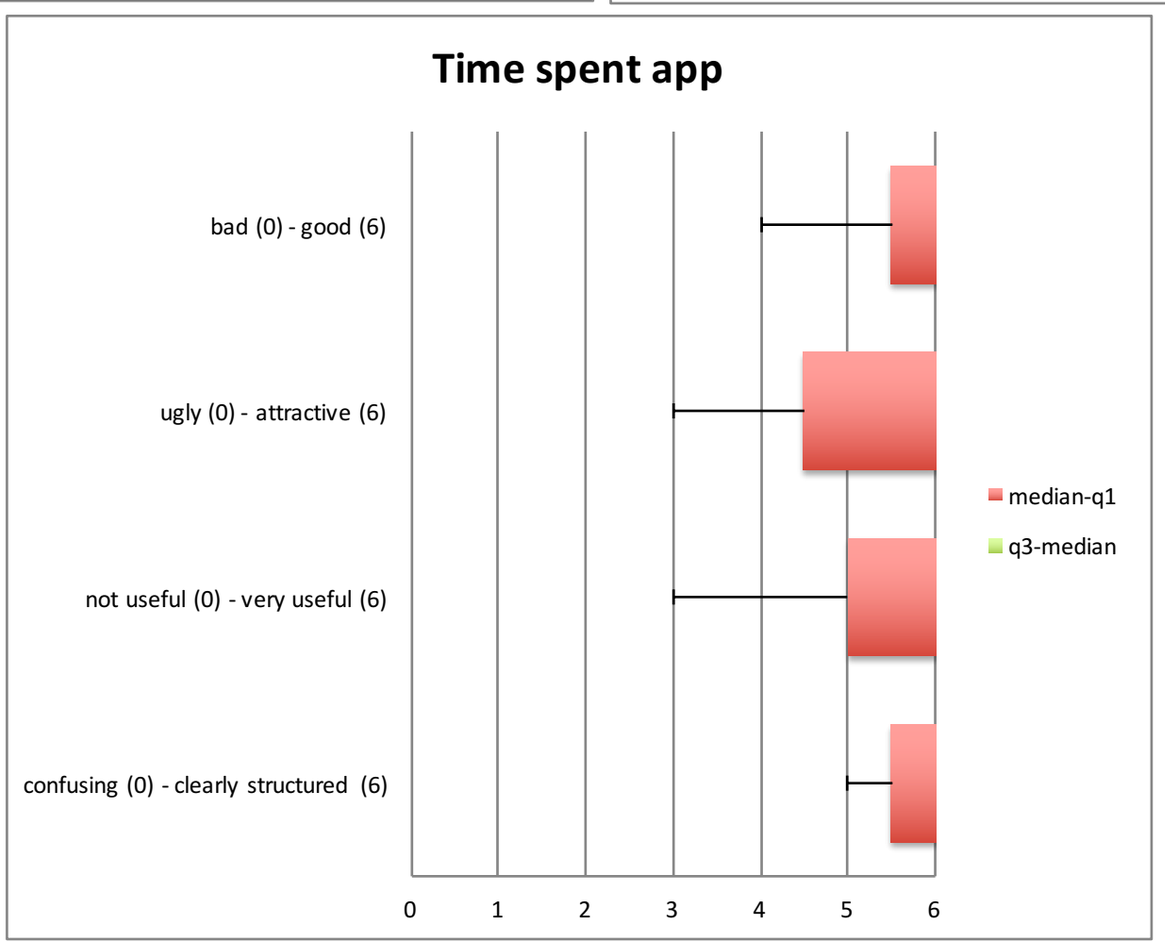
Contextual LA apps

Purpose	Tool	Teacher 1							Teacher2						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
Teacher awareness	Active users														
	Time spent														
	Submitted reports														
Student awareness	Active users														
	Time spent														
	Submitted reports														

Evaluation from 27 expert teachers in IBL





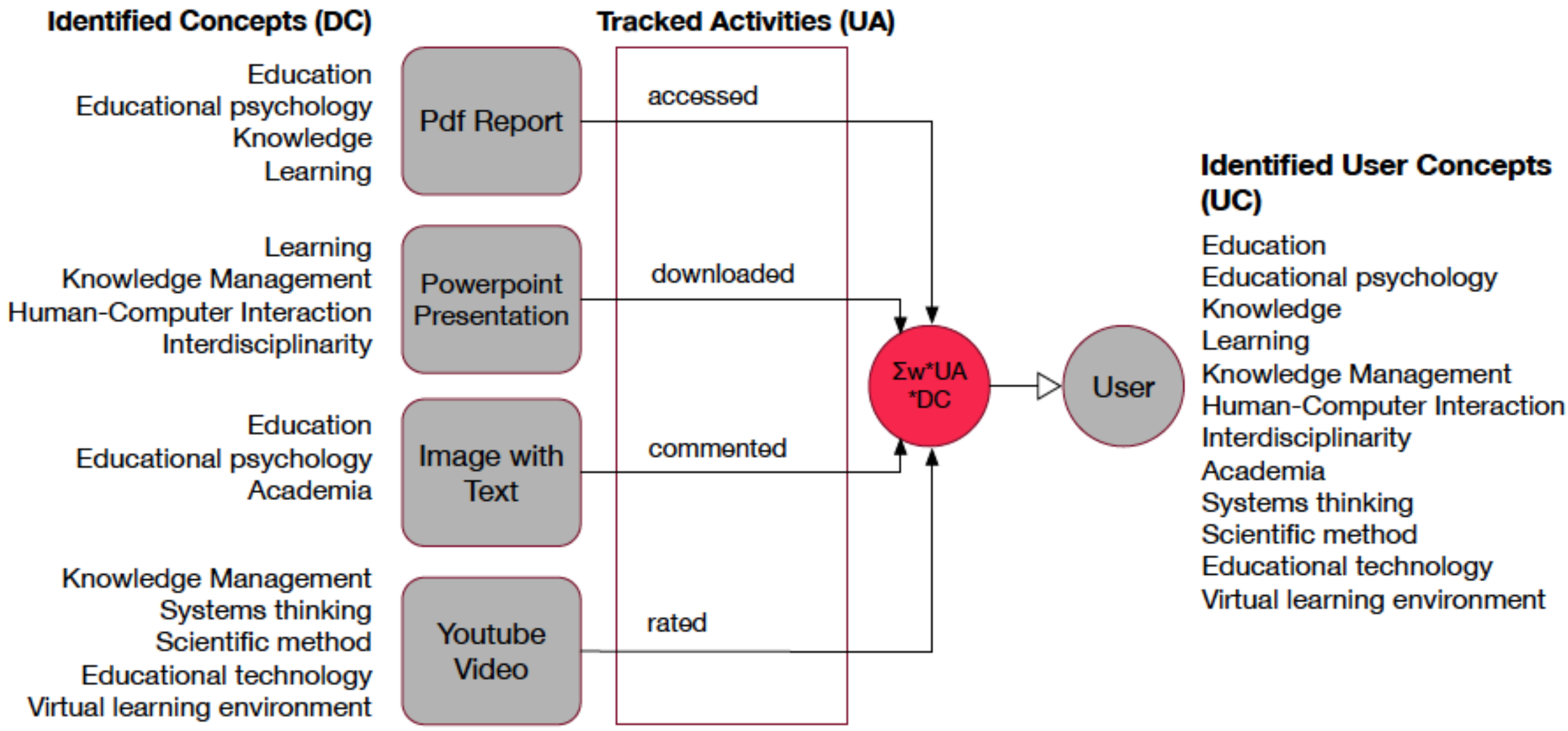


Case Studies

- **Learning Design:**
    - doubts, recommendations and feedback from experts
    - monitoring apps were added
- **Learning Process:**
    - awareness
    - design for face-to-face learning but used in a blended context
    - reflection
- **Learning Outcomes:**
    - storage of learning artefacts generated by the students
    - assessment

Current work

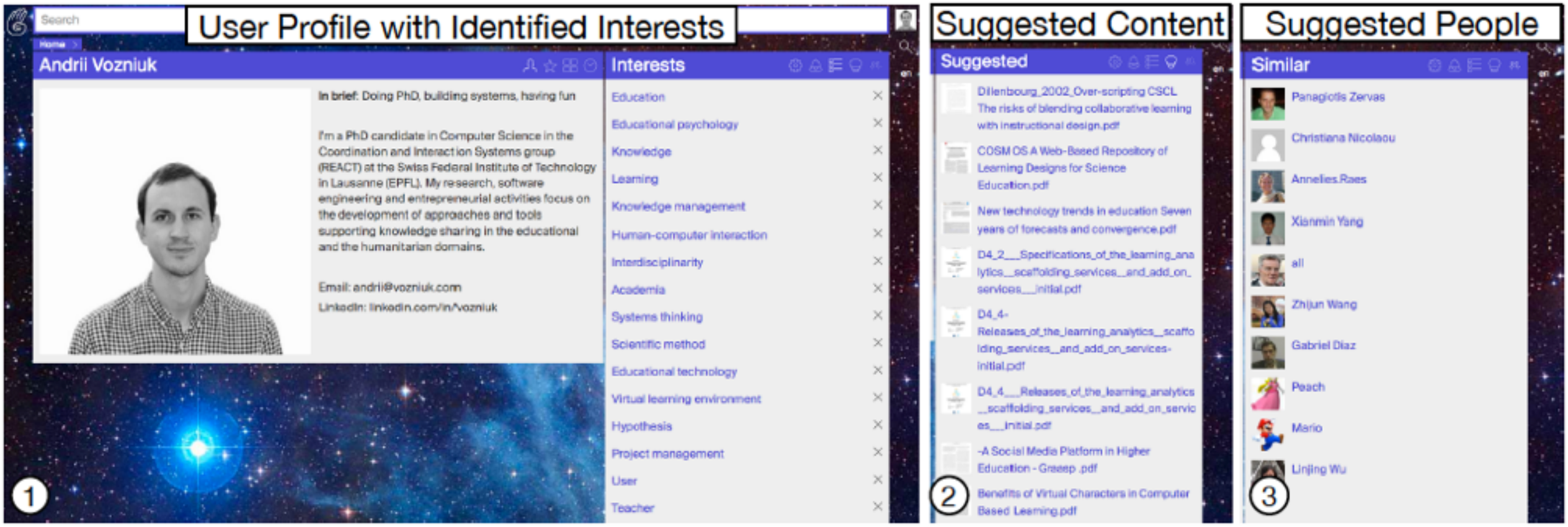
- **Recommender based on interests and concepts**



Vozniuk, A., Rodriguez-Triana, M. J., Holzer, A., and Gillet, D. (2016) Combining Content Analytics and Activity Tracking to Identify User Interests and Enable Knowledge Discovery. 6th International Workshop on Personalization Approaches in Learning Environments (PALE).Halifax, Canada

Current work

- **Recommender based on interests and concepts**



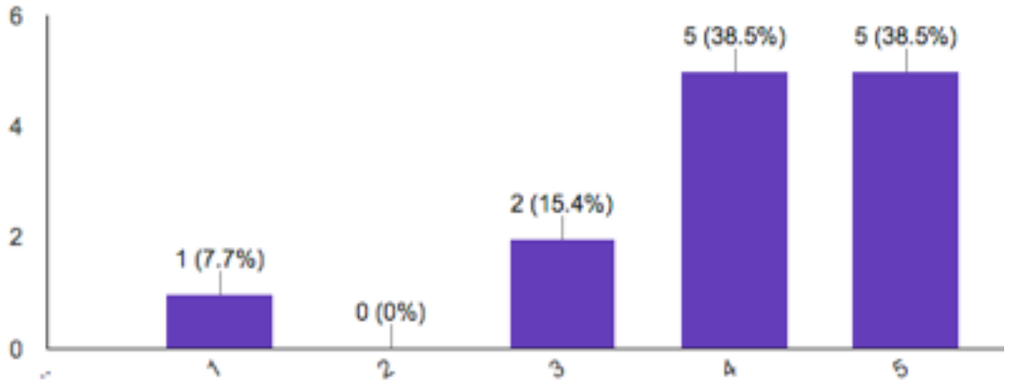
Vozniuk, A., Rodriguez-Triana, M. J., Holzer, A., and Gillet, D. (2016) Combining Content Analytics and Activity Tracking to Identify User Interests and Enable Knowledge Discovery. 6th International Workshop on Personalization Approaches in Learning Environments (PALE).Halifax, Canada

Current work

- **Recommender based on interests and concepts**

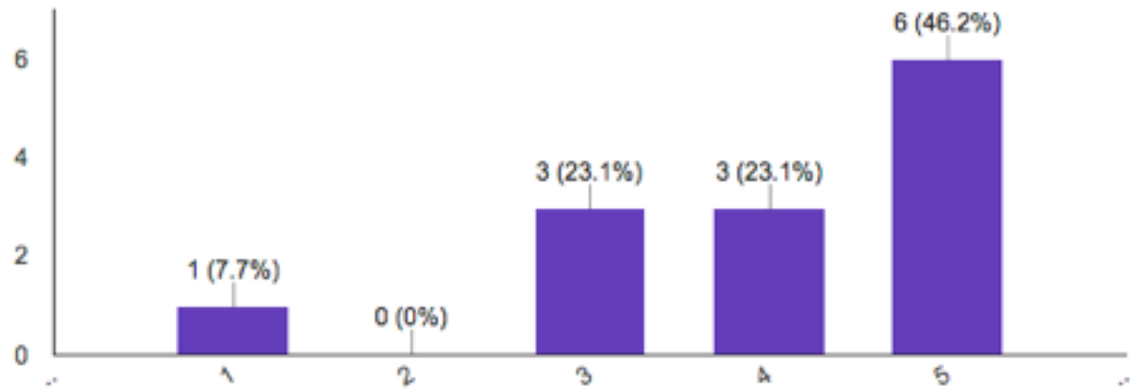
I think that I would like to get content recommendations based on my interests:

(13 responses)



I think that I would like to get similar users recommendations based on my interests:

(13 responses)



Vozniuk, A., Rodriguez-Triana, M. J., Holzer, A., and Gillet, D. (2016) Combining Content Analytics and Activity Tracking to Identify User Interests and Enable Knowledge Discovery. 6th International Workshop on Personalization Approaches in Learning Environments (PALE).Halifax, Canada

Conclusions

- **Purpose:** investigate teacher orchestration needs using ILSs
- **Methodology:** survey & case studies
- **Strategy:** contextual Learning Analytics
- **Findings**:
    - Learning design: teachers appreciate *guidance & expert feedback*
    - Learning process: teachers request *awareness & reflection tools* to support and better understand the learning process as well as improve the learning design.
    - Learning outcomes: to have access to student *learning artefacts* to enable guidance and assessment

Future Work

Following iterations of the DBR process:

- explore student orchestration needs

- further evaluate the solutions created to support the different stakeholders

Comments, questions ?

María Jesús Rodríguez-Triana
maria.rodrigueztriana@epfl.ch

Andrii Vozniuk
andrii.vozniuk@epfl.ch

Denis Gillet
denis.gillet@epfl.ch

Thank you ;)

References

1. Barab, S., Squire, K.: Design-Based Research: Putting a stake in the ground. The Journal of the Learning Sciences 13(1), 1–14 (2004)

4. Dillenbourg, P., Zufferey, G., Alavi, H., Jermann, P., Do-Lenh, S., Bonnard, Q., ..., Kaplan, F.: Classroom orchestration: The third circle of usability. In: International Conference on Computer Supported Collaborative Learning. vol. 1, pp. 510–517. ISLS, Hong Kong (2011)

5. Dyckhoff, A.L., Lukarov, V., Muslim, A., Chatti, M.A., Schroeder, U.: Supporting action research with learning analytics. In: International Conference on Learning Analytics and Knowledge. pp. 220–228. ACM, New York (2013)

7. de Jong, T., Linn, M.C., Zacharia, Z.C.: Physical and virtual laboratories in science and engineering education. Science 340(6130), 305–308 (2013)

13. Prieto, L.P., Holenko Dlab, M., Guti´errez, I., Abdulwahed, M., Balid,W.: Orchestrating technology enhanced learning: a literature review and a conceptual framework. International Journal of Technology Enhanced Learning 3(6), 583–598 (2011)

14. Roschelle, J., Dimitriadis, Y., Hoppe, U.: Classroom orchestration: synthesis. Computers & Education 69, 523–526 (2013)

16. Sharples, M., Anastopoulou, S.: Designing orchestration for inquiry learning. In: Orchestrating Inquiry Learning, pp. 69–85. Routledge (2012)

18. Sutherland, R., Eagle, S., Joubert, M.: A vision and strategy for Technology Enhanced Learning. Report from the STELLAR Network of Excellence (2012)