

License to evaluate: Preparing learning analytics dashboards for educational practice

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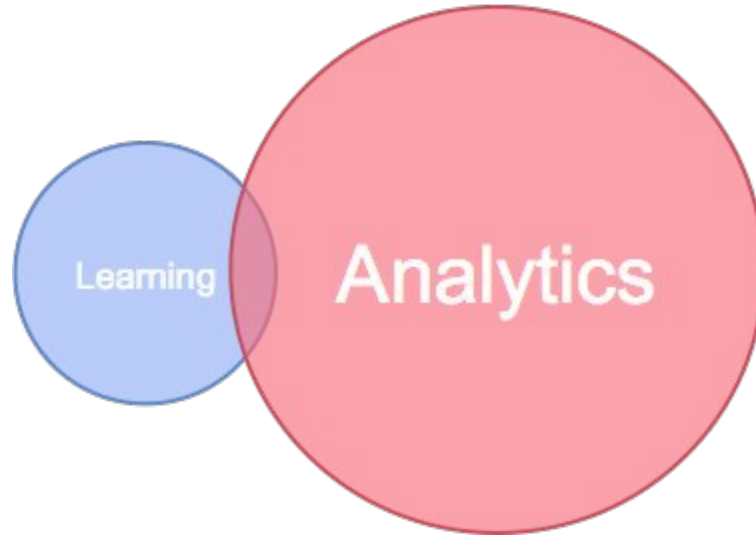
Learning analytics dashboards

... “single displays that aggregate different indicators about learner(s), learning process(es) and/or learning context(s) into one or multiple visualisations”

(Schwendimann et al., 2017)



Learning and analytics



Dashboards reviews

None investigated the connection to learning sciences

Rarely suggested using educational concepts in the design of dashboards

What is the theoretical foundation for the development of learning dashboards aimed at learners?

(Jivet et al., 2017)



Dashboards reviews

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How does dashboard evaluation relate to the theoretical foundation of learning dashboards aimed at learners?



Methodology

Systematic literature review following PRISMA (Moher et al., 2009)

“learning analytics” AND (visualization OR visualisation OR dashboard OR widget)

1439 hits + 11 papers

95 papers introducing dashboards for learners

- Only half mention any theoretical foundation
- Only half have an evaluation

26 papers

bit.ly/LADashboards



Results and insights



0. Dashboard goals

C1: Metacognitive	Improve metacognitive skills Support awareness and reflection Monitor progress Support planning
C2: Cognitive	Support goal achievement Improve performance
C3: Behavioural	Improve retention or engagement Improve online social behaviour Improve help-seeking behaviour Offer navigational support
C4: Emotional	Deactivate negative emotions Increase motivation
C5: Self-regulation	Support self-regulation

(Jivet et al., 2017)

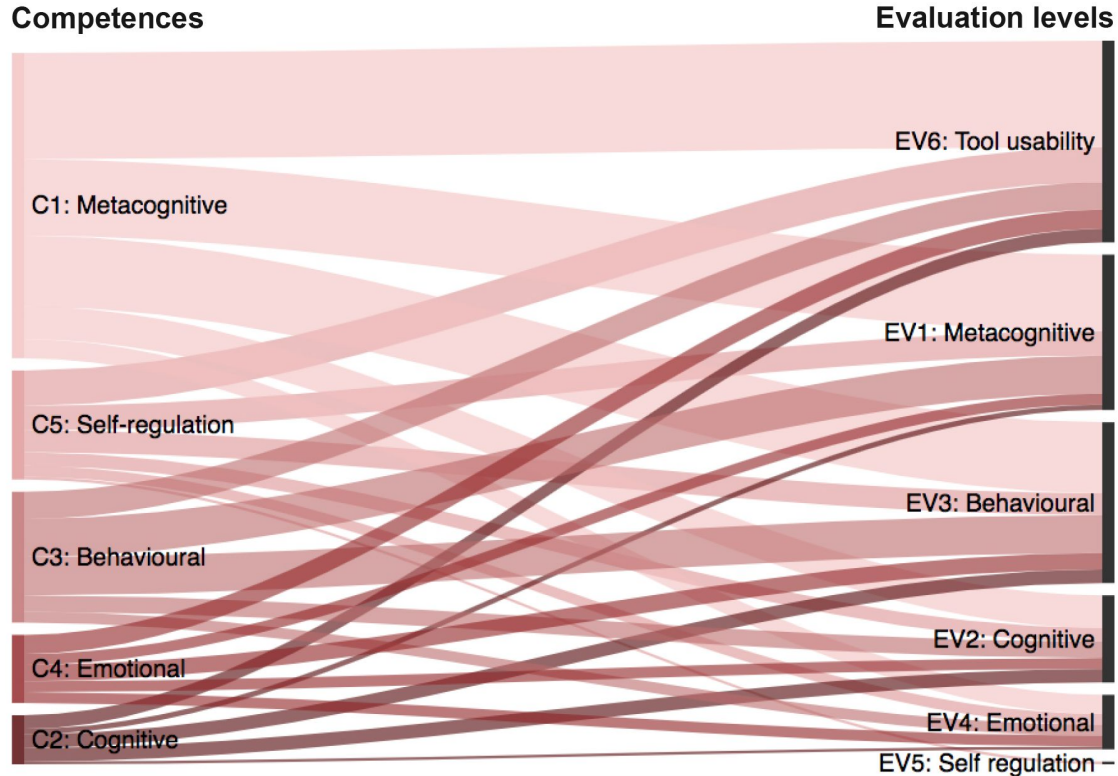


1. Evaluation criteria

EV1: Metacognitive	Understanding Agreement Impact on awareness and reflection
EV2: Cognitive	Impact on performance
EV3: Behavioural	Impact on behaviour Usage of the system
EV4: Emotional	Impact on affect Impact on motivation
EV5: Self-regulation	Support self-regulation



2. Dashboard goals vs evaluation criteria



2. Dashboard goals vs evaluation criteria

	Goal	Evaluation
C1: Metacognitive	22	14
C2: Cognitive	6	11
C3: Behavioural	12	19
C4: Emotional	5	6
C5: Self-regulation	13	1



3. Data used in dashboard evaluation

Self-reported	Feedback survey Interviews Focus group Evaluation instruments
Tracked	Resources use Learning artefacts Dashboard use
Assessment	Grades



4. Evaluation criteria vs. data types

		Self-reported			Tracked			Assessment	
		Feedback survey	Interviews	Focus group	Evaluation instruments	Resources use	Learning artefacts	Dashboard use	Grades
EV1: Metacognitive	Understanding	Dark Green	Light Green	Very Light Green					
	Agreement	Light Green							
	Awareness	Dark Green	Light Green	Very Light Green					
EV2: Cognitive	Performance						Dark Green		Dark Green
EV3: Behavioural	Behaviour	Light Green	Light Green	Very Light Green		Dark Green			
	Usage of system	Light Green	Light Green	Very Light Green		Dark Green		Dark Green	
EV4: Emotional	Motivation	Light Green	Light Green	Very Light Green	Light Green				
	Affect	Light Green	Light Green	Very Light Green	Light Green				
EV5: SRL	SRL				Light Green				
EV6: Tool usability	Satisfaction	Light Green	Light Green	Very Light Green					
	Usability	Dark Green	Light Green	Very Light Green	Light Green			Light Green	
	Usefulness	Dark Green	Light Green	Very Light Green	Light Green			Light Green	

5. Evaluating frames of reference

Social	Class
	Teammates
	Previous graduates
	Top peers
	Peers with similar goal
Achievement	Learning outcomes
	Learning goals
Progress	Self

(Jivet et al., 2017)



5. Evaluating frames of reference

- Depends on the academic achievement level (Kim et al., 2016)
- Distracts from achievement goals (Corrin et al., 2015)
-

vs.

- “Healthy peer pressure and informal competition” (Tan et al., 2016)
- Intimidating and stressful (Wise et al., 2014)



**How can we build
better dashboards?**



1. Awareness is not enough.

“Just getting on a scale every day does not make you lose weight.”



2. Design decisions should be motivated.



3. Comparison with peers should be used cautiously.



4. Do not assume the dashboard will have the same effect on all its users.



5. The dashboard should be seamlessly integrated into the usual learning activities of the learner.



6. Evaluate dashboards as pedagogical tools,
not as software systems.

- I. Goals*
- II. Affect and motivation*
- III. Usability*



7. Evaluate how much learners agree with the data and how they interpret it in order to build trusted learning analytics dashboards.



8. Use data triangulation to validate effects with self-reported data, as well as tracked data and assessment data.



9. Evaluate design features that rely on educational concepts.



10. Use existing validated measurement instruments.



Instead of a conclusion...

Motivate design decisions

Sync evaluation with goals

Explain dashboard effects

Use validated instruments

