

# What happens when students get to choose indicators on customisable dashboards?

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# Overview of today's presentation

## Part 1: LAK Best Paper Award

### **Quantum of Choice: How learners' feedback monitoring decisions, goals and self-regulated learning skills are related.**

Jivet, I., Wong, J., Scheffel, M., Valle Torre, M., Specht, M., & Drachsler, H.



The 11th International  
Learning Analytics and Knowledge  
Conference

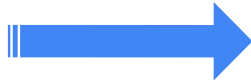
April 12 - 16, 2021

Online - Everywhere!



## Part 2: Ongoing research

# Learning analytics dashboards



**Action**



**Feedback**

Are dashboards effective?

**For whom are dashboards effective,  
why and in what context?**

# Dashboard design shortcomings

1. Task-level feedback (Matcha et al., 2019)
2. Limited student involvement (Dollinger & Lodge, 2018; West et al. 2020)
3. “One-size-fits-all” designs (Teasley, 2017; Gašević et al., 2016)

# Dashboard design shortcomings & our approach

1. Task-level feedback (Matcha et al., 2019)

**Include process-level feedback**

2. Limited student involvement (Dollinger & Lodge, 2018; West et al. 2020)

**Large scale field study with a customisable dashboard:**

- **goal setting**
- **indicator selection**

3. “One-size-fits-all” designs (Teasley, 2017; Gašević et al., 2016)

**Effects of learner goals (Schunk, 2012) & SRL skills (Zimmerman, 1990) on indicators selection**

For whom are **dashboards** effective, **why** and **in what context**?



**Meaningful data**



**Self-regulated  
learning**



**Learner goals**

If learners have the choice to configure the data on their own dashboard...

- RQ1: What data do they first **choose** to monitor?
- RQ2: Is there a relationship between **the way learners formulate their goals** and the **indicators** they choose to monitor?
- RQ3: Is there a relationship between **the way learners formulate their goals**, their **SRL skills** and the **indicators** they choose to monitor?



# The widget

## My learning dashboard

Learning with a MOOC can be challenging. This tool supports you to achieve your goals. Here you can (1) actively set your goal for this course and (2) select indicators to monitor your progress towards your goal.

### What do you want to achieve by the end of this course?

Some examples for a goal are learning specific topics covered by the course, completing the course and getting a certificate, completing all activities in the course in a certain timeframe, dedicating 3 hours weekly to this course, etc.

Save goal

Goal input

### How would you like to monitor progress towards this goal?

You can choose between three and six indicators. You can change them at the beginning of every week. Hover over each indicator to show its description.

- |  |   |
|--|---|
| <input type="checkbox"/> Engagement in discussions     | <input type="checkbox"/> Completed course activities              |
| <input type="checkbox"/> Current course grade          | <input type="checkbox"/> Online presence                          |
| <input type="checkbox"/> Content revision              | <input checked="" type="checkbox"/> Timing of starting activities |
| <input type="checkbox"/> Productivity                  | <input checked="" type="checkbox"/> Submitted discussion prompts  |
| <input type="checkbox"/> Completed reading assignments | <input checked="" type="checkbox"/> Completed graded assignments  |
| <input type="checkbox"/> Completed videos              | <input type="checkbox"/> Timing of completing activities          |

Save indicators

The average number of days between completing an activity and the end of the course week that the activity is assigned to. This is an indicator of how close to the end of the learning week, on average, you complete the learning activities.

Select 3-6 indicators

Indicator descriptions

### Self-regulated learning (SRL) questionnaire

Help our research and fill out the SRL questionnaire. The questionnaire assesses four self-regulated learning skills in relation to this course: time management, help-seeking, goal setting and self-evaluation and will not take more than 10 minutes.

Fill out the SRL survey

Embedded SRL questionnaire + demographics

The Views of Assessment Experts

Further Considerations on the Role of Assessment

The Usability of Assessment

Where to Start? The Assessment Cycle

My learning dashboard

🕒 My learning dashboard  
10 min

## My learning dashboard

Learning with a MOOC can be challenging. This tool supports you to achieve your goals. Here you can (1) actively set your goal for this course and (2) select indicators to monitor your progress towards your goal.

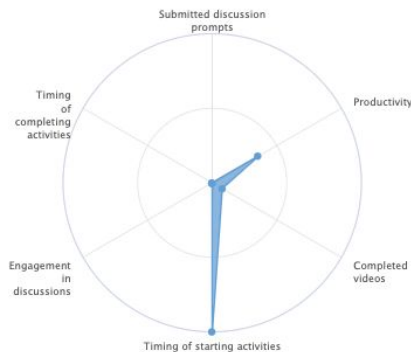
### What I want to achieve by the end of the course:



finish the course on time and get a certificate

### My outcomes and learning behaviour since the beginning of the course:

Hover over the points on the chart to get more information. The information shown on the chart is updated once per day.



Change goal

Change indicators

Show explanations

Open FAQ

Change settings

Show explanations

### Self-regulated learning (SRL) questionnaire

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Fill out the SRL survey

**Task-level:  
Content progress indicators**

- Completed course activities
- Submitted discussion prompts
- Completed graded assignments
- Completed reading assignments
- Completed videos
- Current course grade

**Process-level:  
Learning behaviour indicators**

- Content revision
- Engagement in discussions
- Productivity
- Online presence\*
- Timing of starting activities
- Timing of completing activities

# Methods

# Coursera MOOCs

Teachers

39 ( $\pm 10$ ) years old

Highly educated

- 30% PhD, 45% Masters

*Data collection: 19 weeks*

Students, consultants, managers

32 ( $\pm 11$ ) years old

Educated


- 3% PhD, 38% Masters

*Data collection: 14 weeks*

**Free** Access all lectures, readings, and assignments for free

## Assessment in Higher Education: Professional Development for Teachers

★★★★★ 4.8 94 ratings

 Marit Nieuwenhuys [+5 more instructors](#)


**Go To Course** Already enrolled  
Financial aid available

5,359 already enrolled

Browse > Business > Business Essentials

## Driving business towards the Sustainable Development Goals

★★★★★ 4.8 323 ratings

 Gabriele Jacobs [+21 more instructors](#)

**Go To Course** Already enrolled  
Financial aid available

8,870 already enrolled

### **Indicator selection data:**

- 12 binary variables
- Ordinal: Number of indicators selected (3-6)

### **Goal data - Schunk (2012):**

- *Learning component*: knowledge, understanding, skills, transfer
- *Performance component*: complete the course, certificate
- *Time frame*

### **SRL data - SOL-Q-R (Jansen et al., 2018)**

- Metacogn. Before learning
- Metacogn. after learning
- Time management
- Help seeking

## **RQ1 Indicator selection**

Frequencies

Compare the two courses (Chi-square, Mann-Whitney)

## **RQ2 Goals**                      **indicator selection**

Regressions: course, 3 binary goal variables (goal components)

## **RQ3 Goals + SRL**                      **indicator selection**

Regressions: course, 3 binary goal variables, 4 SRL subscale scores



	<b>Total</b>	<b>Course</b>		<b>Used for</b>
		<b>AHE</b>	<b>SDG</b>	
Accessed the widget	1711	845	866	
Accepted consent	584	295	289	
Set indicators	401	200	201	RQ1
Set indicators, goal and SRL survey	216	121	95	RQ2, RQ3

# Results

# RQ1 Indicator selection

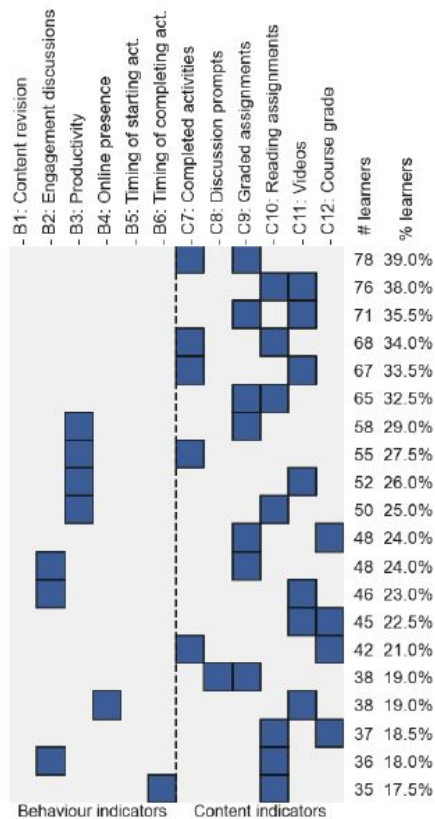
**Table 2: The number (#L) and percentage (%L) of learners that selected 3, 4, 5 or 6 indicators in each course.**

	Total (N=401)		AHE (N=200)		SDG (N=201)	
	#L	%L	#L	%L	#L	%L
3 indicators	101	25.2%	39	19.5%	62	30.8%
4 indicators	54	13.5%	22	11.0%	32	15.9%
5 indicators	69	17.2%	28	14.0%	41	20.4%
6 indicators	177	44.1%	111	55.5%	66	32.8%

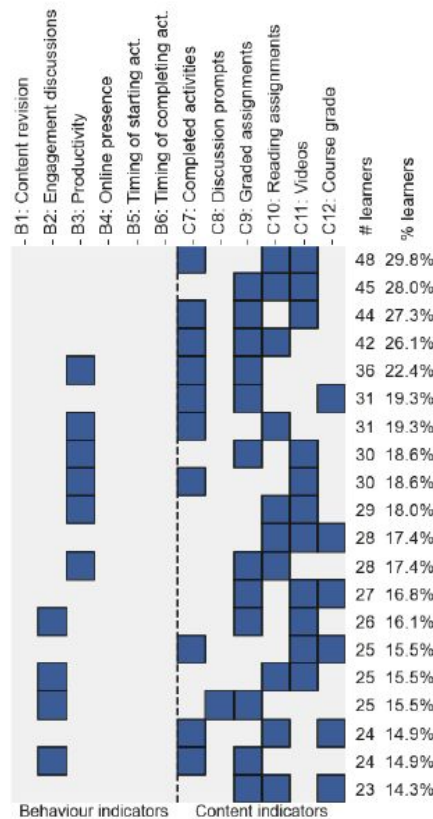
# RQ1 Indicator selection

		Total (N=401)		AHE (N=200)		SDG (N=201)		$\chi^2$	
		# learners	% learners	# learners	% learners	# learners	% learners	Value	p
<i>Learning behaviour indicators</i>									
B1	Content revision	102	25.4%	63	31.5%	39	19.4%	7.73	.005**
B2	Engagement in discussions	122	30.4%	74	37.0%	48	23.9%	8.15	.004**
B3	Productivity	189	47.1%	99	49.5%	90	44.8%	0.90	.343
B4	Online presence	109	27.2%	63	31.5%	46	22.9%	3.76	.055
B5	Timing of starting activities	69	17.2%	46	23.0%	23	11.4%	9.40	.002**
B6	Timing of completing activities	117	29.2%	62	31.0%	55	27.4%	0.64	.423
<i>Content progress indicators</i>									
C7	Completed course activities	251	62.6%	114	57.0%	137	68.2%	5.33	.021*
C8	Submitted discussion prompts	95	23.7%	59	29.5%	36	17.9%	7.45	.006**
C9	Completed graded assignments	248	61.8%	123	61.5%	125	62.2%	0.02	.887
C10	Completed reading assignments	231	57.6%	111	55.5%	120	59.7%	0.73	.395
C11	Completed videos	241	60.1%	122	61.0%	119	59.2%	0.14	.713
C12	Current course grade	152	37.9%	75	37.5%	77	38.3%	0.03	.867

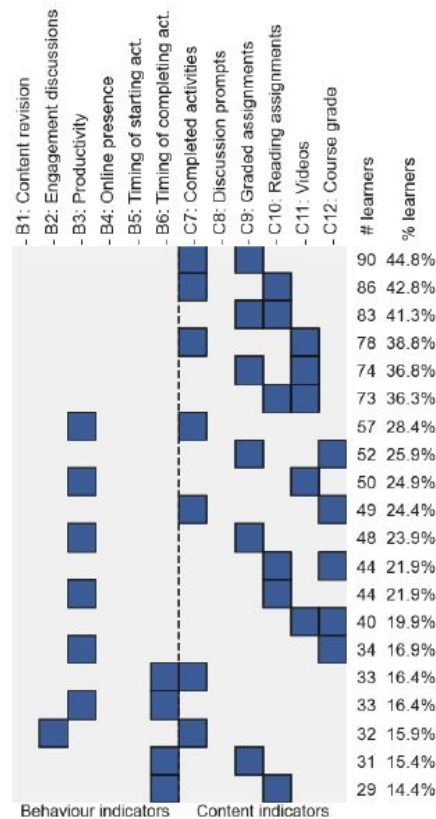
Note: \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < 0.05$ .



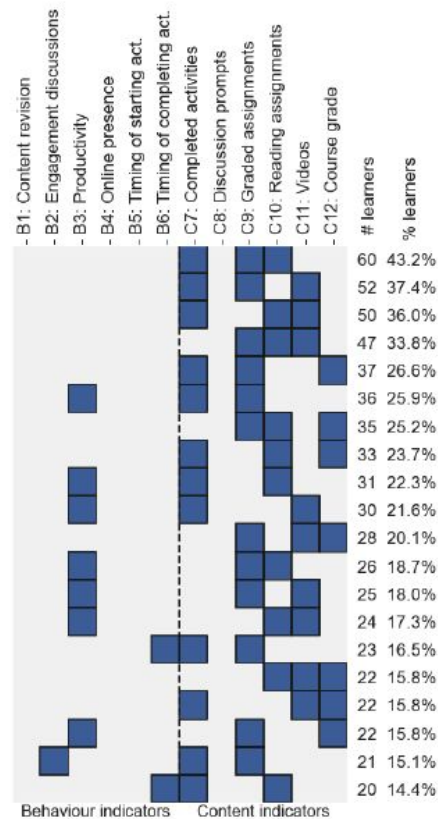
(a) 2 indicators in AHE



(b) 3 indicators in AHE



(c) 2 indicators in SDG



(d) 3 indicators in SDG

# RQ2 Goals ----> indicator selection

	Total (N=215)		AHE (N=120)		SDG (N=95)		$\chi^2$ (df = 1)	
	# learners	% learners	# learners	% learners	# learners	% learners	Value	p
<i>Learning component</i>	192	89.3%	102	85.0%	90	94.7%	5.26	<b>.022*</b>
Knowledge	88	40.9%	38	31.7%	50	52.6%	9.64	<b>.002**</b>
Understanding	38	17.7%	12	10.0%	26	27.4%	11.0	<b>&lt;.001***</b>
Skills	70	32.6%	50	41.7%	20	21.1%	10.3	<b>.001**</b>
Transfer	81	37.7%	38	31.7%	43	45.3%	4.17	<b>.041*</b>
Strategy	14	6.5%	8	6.7%	6	6.3%	0.01	.918
<i>Performance component</i>	72	33.5%	43	35.8%	29	30.5%	0.39	.413
Certificate	50	23.3%	32	26.7%	18	18.9%	1.77	.183
Complete course	54	25.1%	31	25.8%	23	24.2%	0.07	.785
<i>Time frame</i>	21	9.8%	10	8.3%	11	11.6%	0.634	.426
Only learning comp.	142	66.0%	77	64.2%	65	68.4%		
Only performance comp.	23	10.7%	18	15.0%	5	5.3%		
Both types of comp.	50	23.3%	25	20.8%	25	26.3%		

Note: \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < 0.05$ .

# RQ2 Goals ----> indicator selection

Learning behaviour indicators						
Response variables	Deviance	AIC	R <sup>2</sup> McF	Overall model test		
				$\chi^2$	df	p
B1 Content revision	235	245	0.020	4.71	4	.318
B2 Engagement in discussions	260	270	0.560	15.40	4	.004*
B3 Productivity	296	306	0.003	0.94	4	.919
B4 Online presence	246	256	0.419	10.70	4	.030*
B5 Timing of starting activities	196	206	0.050	10.30	4	.036*
B6 Timing of completing activities	257	267	0.029	7.70	4	.103
Content progress indicators						
Response variables	Deviance	AIC	R <sup>2</sup> McF	Overall model test		
				$\chi^2$	df	p
C7 Completed course activities	268	278	0.011	3.05	4	.549
C8 Submitted discussion prompts	243	253	0.029	7.36	4	.118
C9 Completed graded assignments	282	292	0.012	3.43	4	.489
C10 Completed reading assignments	293	303	0.009	2.63	4	.621
C11 Completed videos	286	296	0.008	2.33	4	.676
C12 Current course grade	285	295	0.014	3.92	4	.417
Number of indicators selected	511	525	0.024	12.50	4	.014*



# RQ2 Goals ----> indicator selection

Predictor	Number of indicators selected				B2: Engagement in discussions				B4: Online presence				B5: Timing of starting activities			
	B	Z	p	OR	B	Z	p	OR	B	Z	p	OR	B	Z	p	OR
Intercept					0.10	0.18	.859	1.10	-0.79	-1.33	.184	0.45	-1.81	-2.77	.006	0.16
Course (ref. AHE)	-0.88	-3.25	<b>.001**</b>	0.42	-0.94	-2.98	<b>.003**</b>	0.39	-0.77	-2.36	<b>.018*</b>	0.46	-1.01	-2.53	<b>.011*</b>	0.37
<i>Goal components</i>																
Learning	0.16	0.34	.735	1.17	-0.32	-0.61	.545	0.72	0.28	0.48	.629	1.32	0.59	0.95	.340	1.81
Performance	0.09	0.27	.785	0.11	-0.01	-0.03	.979	0.99	0.06	0.16	.871	1.06	0.14	0.29	.769	1.14
Time frame	0.61	1.11	.265	1.83	-1.30	-1.84	.066	0.27	-1.34	-1.65	.099	0.26	1.12	1.81	.071	3.05

Note: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < 0.05$ .



# RQ3 Goals, SRL ----> indicator selection

					Overall model test			Comparison to RQ2 model		
		Deviance	AIC	R <sup>2</sup> McF	$\chi^2$	df	p	$\chi^2$	df	p
<i>Learning behaviour indicators</i>										
B1	Content revision	228	246	0.050	11.98	8	.152	7.27	4	.122
B2	Engagement in discussions	236	254	0.143	39.30	8	<b>&lt;.001***</b>	23.9	4	<b>&lt;.001***</b>
B3	Productivity	290	308	0.024	7.17	8	.519	6.23	4	.183
B4	Online presence	240	258	0.064	16.50	8	<b>.036*</b>	5.79	4	.216
B5	Timing of starting activities	195	213	0.058	11.90	8	.155	1.65	4	.799
B6	Timing of completing activities	243	261	0.084	22.15	8	<b>.005**</b>	14.4	4	<b>.006**</b>
<i>Content progress indicators</i>										
C7	Completed course activities	266	284	0.019	5.07	8	.750	2.02	4	.732
C8	Submitted discussion prompts	237	255	0.054	13.54	8	.095	6.18	4	.186
C9	Completed graded assignments	282	300	0.014	4.13	8	.845	0.70	4	.951
C10	Completed reading assignments	292	310	0.014	4.04	8	.853	1.41	4	.843
C11	Completed videos	279	297	0.032	9.13	8	.331	6.81	4	.147
C12	Current course grade	283	301	0.024	6.82	8	.557	2.90	4	.575
<i>Number of indicators selected</i>		496	518	0.052	27.30	8	<b>&lt;.001***</b>	14.90	4	<b>.005**</b>

Note: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < 0.05$ .

# RQ3 Goals, SRL ----> indicator selection

Predictor	Number of indicators selected				B2: Engagement in discussions				B4: Online presence				B6: Timing of completing activities			
	B	Z	p	OR	B	Z	p	OR	B	Z	p	OR	B	Z	p	OR
Intercept					-2.77	-2.17	.030	0.06	-1.47	-1.19	.236	0.23	-1.79	-1.46	.145	0.17
Course (ref. AHE)	-0.83	-2.94	<b>.003**</b>	0.44	-1.10	-3.08	<b>.002**</b>	0.33	-0.71	-2.03	<b>.042*</b>	0.49	-0.34	-1.01	.312	0.71
<i>Goal components</i>																
Learning	0.12	0.24	.809	1.13	-0.40	-0.68	.496	0.67	0.34	0.57	.570	1.40	0.11	0.20	.839	1.12
Performance	0.06	0.18	.859	1.06	0.01	0.03	.975	1.01	0.06	0.15	.881	1.06	-0.06	-0.14	.889	0.95
Time frame	0.76	1.35	.178	1.14	-1.22	-1.64	.102	0.30	-1.36	-1.65	.099	0.26	1.30	2.25	<b>.025*</b>	3.68
<i>SRL skills</i>																
Meta before	0.19	0.99	.323	1.21	-0.43	-1.71	.088	0.65	0.41	1.55	.122	1.50	0.36	1.48	.140	1.44
Meta after	0.01	0.03	.975	1.01	0.53	1.94	.052	1.70	-0.41	-1.50	.134	0.66	-0.64	-2.32	<b>.020*</b>	0.53
Time management	0.19	1.28	.201	1.21	0.02	0.10	.919	1.02	0.13	0.74	.459	1.14	0.52	2.73	<b>.006**</b>	1.68
Help seeking	0.17	1.67	.095	1.19	0.54	4.04	<b>&lt;.001***</b>	1.72	0.05	0.40	.691	1.05	0.02	0.13	.896	1.02

Note: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < 0.05$ .

# RQ3 Goals, SRL ----> indicator selection

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Note: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < 0.05$ .

# Findings

- Learners focus on content progress indicators.
  - Easy to understand & immediately actionable
  - Paradox of choice (Schwarz, 2004)
  - Feedback literacy (Carless, 2018)
  
- The way learners formulate goals does not predict their monitoring choices.
  - Same choices, but different motivations, insights and interpretation

# Findings

- Time management predicts use of procrastination indicators.
  - TM is weakly positively associated with academic online achievement (Broadbent, 2017).
  - What about learners with lower time management skills?
- Help seeking predicts monitoring engagement in discussion.
  - What about learners who don't know where to seek help?
- Course is a significant predictor for multiple indicators.
  - Demographics
  - Course design (peer assignments)

# Engaging Students in the Design of Learning Analytics Tools

An Exploratory Sequential Mixed Method Study\*

Jacqueline Wong  
Ioana Jivet  
Manuel Valle Torre

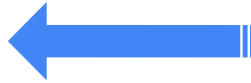
Gabrielle Martins van Jaarsveld  
Martine Baars  
Marcus Specht

\*Manuscript in preparation





# Our approach for crafting dashboard indicators



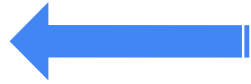
**Input:**

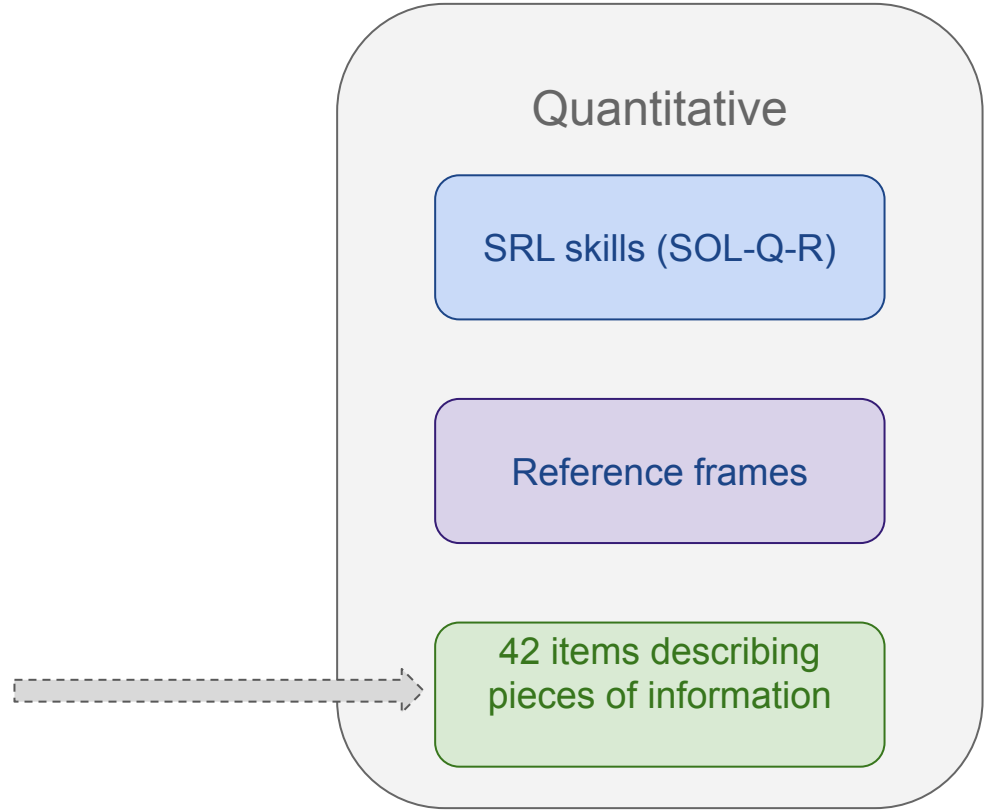
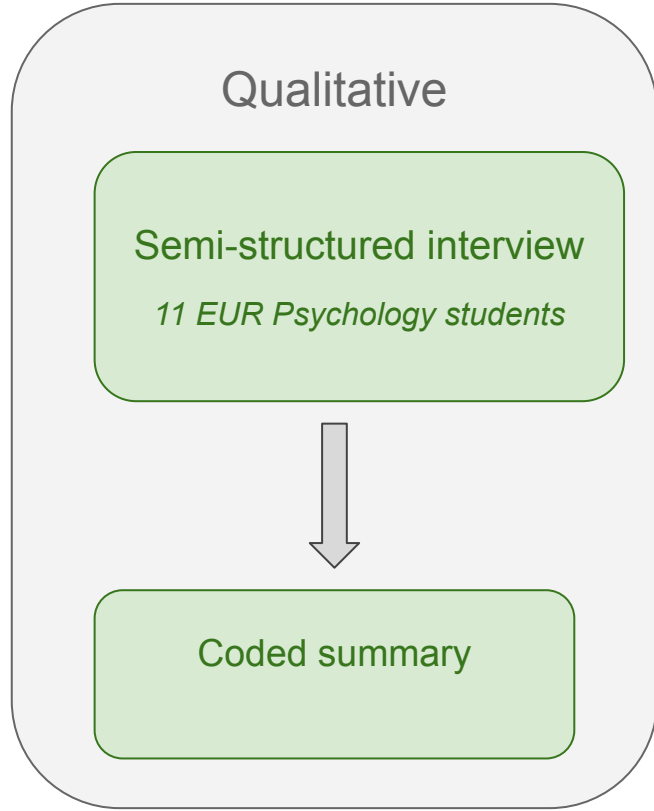
- **Current practice**
- **Needs and wants**

What **information and tools** do students use when studying?



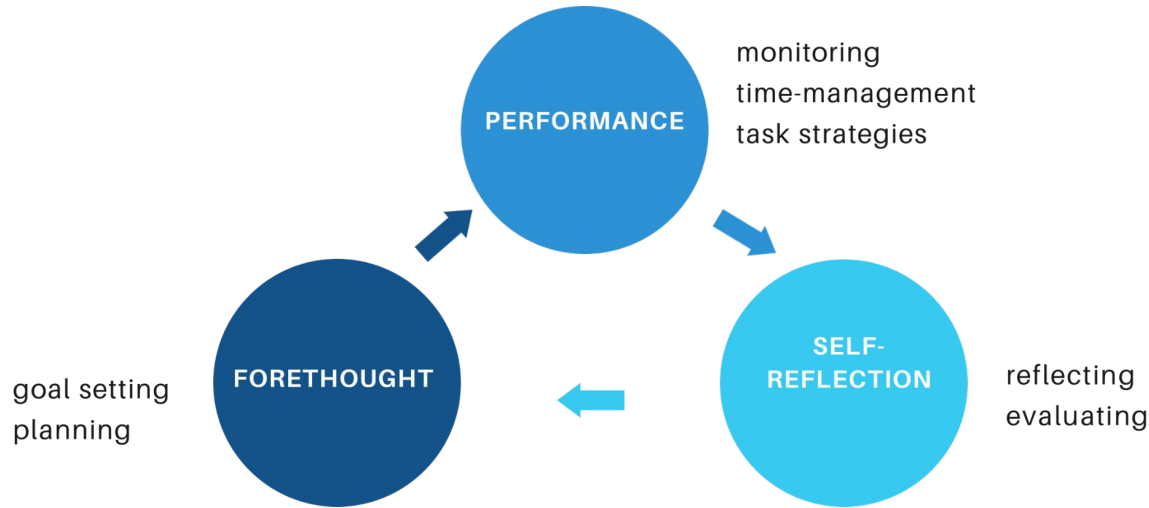
How can we address these needs with **learning analytics**?





# Qualitative Study

# Semi-structured interview



Zimmerman (2009)

**Main Question:** Could you describe how you approach learning?

**Sub Question :** Do you set goals or plan for what you are going to study? Could you give an example of your goal / plan? (Would you specify a time frame? If so, what time-frame would you use?)

**Tooling Question:** What information do you use or what information do you think you might need for setting goals or planning? (e.g., deadlines or course schedule)

# Coding

## Self-reflection: Information and Tooling

“Yeah, it would maybe be nice to to sort of keep ***a record of what you study yourself, or how long you study.*** So you can look back at that, and you can see how much time you spent studying each topic. ***So you know, what took you more time, what took you less time. And that also shows some kind of growth, or what some topics you struggled with, or what you found easy, or maybe what you didn't spend enough time on.***”

# Resulting Categories of Information

## **course requirements**

*The criteria for passing the course*

## **deadlines**

*The due date of assignments*

## **content of the course**

*A detailed list of topics in the course.*

## **course characteristics**

*An indication of the time needed to complete a module (e.g., "Module 1 takes approximately 2 hours.")*

## **performance**

*Information about how well you are progressing in the course assignments*

## **study behaviours**

*Information about how close to the deadline you submit your assignments*

## **interpretative (complex information)**

*Information about how effective your study behaviours are (e.g., how procrastination affects your learning)*



## study behaviours

- The total amount of time you spent studying.
- The amount of time you spent on each topic, week, or study session to find your study pattern.
- Information about how late you start an activity after it has been assigned to you
- Information about how close to the deadline you submit your assignments
- Information about how focused you are when studying
- Information about how productive you are at different moments of the day (e.g., morning, afternoon, evening)
- Information about how productive you are when experiencing different moods (e.g., boredom, enjoyment, anxiety)
- Information about how productive you are when studying in different environment (e.g., location, noise).
- A list of the strategies you use when studying (e.g., highlighting, summarizing, creating mindmaps)
- An overview of how often you use certain study strategies
- Information about how often you try different study strategies to get better grades
- Information about the quality of your study products (e.g., summaries or notes) and how it compares to peers

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## Interpretative (complex information)

- Information about how effective your study behaviours are (e.g., how procrastination affects your learning)
- Information about how effective your study strategies are (e.g., how notetaking or making summaries affect your learning)
- Information about how well you follow your planning
- Information about how often you change your planning
- Information about how accurate the course estimation is for you (e.g., You spent 20% more time on this topic than estimated by the course instructor.)
- Information about how accurate you are in estimating the time you need for studying (e.g., You spent 10% less time on this activity than what you planned for it.)

# Quantitative Study



# Survey Part II: Reference frames

Social	Current peers
	Current peers with high performance
	Current peers with similar goals
	Past students who completed the course
Goal	Goals set by the teacher
	Your goals for this course
Self	Your own past performance

**Work in  
progress**

# Implications and the future

- Explore customisable dashboards  
Kitto et al. (2020), Ochoa & Wise (2020)
- Effect of student agency
- Assist the development of feedback literacy and data literacy
  - Preconfigured dashboards
  - Nudges (Thaler & Sustain, 2008)
- Crafting learning behaviour indicators
  - Meaningful feedback → Relevant data sources

# Work in progress

- Widget & Coursera log processing code available on



- Expand data collection on survey *What information do students want?*



**Thank  
you!**

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