

# NFC LearnTracker: Seamless support for learning with mobile and sensor technology

**Bernardo Tabuenca** 4<sup>th</sup> Immersive Education Summit

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**Welten Institute**  
Research Centre for Learning, Teaching and Technology

**Open Universiteit**  
[welten-institute.org](http://welten-institute.org)



# Agenda

My research:

- Background & Previous work
- Ongoing work
  - NFC LearnTracker
  - Self-regulation with learning analytics
- Future work
  - Ambient Learning Displays
  - Internal Feedback

# Background & Previous work

## Objectives

1. Support meta-cognitive skills for lifelong learning
2. Bind daily life activities with learning

# Ubiquitous support for lifelong learning

*“Lifelong learning is like a never ending personal revolution.”* via @BryantMcGill,

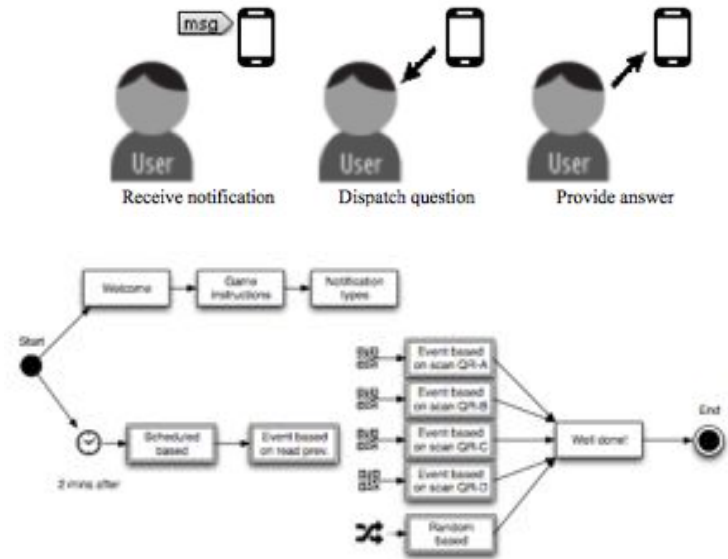
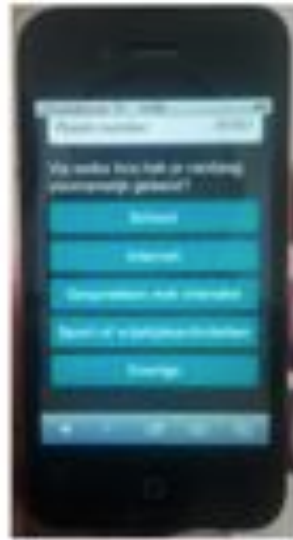
Voice of Reason

*“We have developed and shaped technology, but now, technology is shaping us.”*

Latour et al. (Actor Network Theory)



# Fostering reflective practice with mobile notifications: time location and channels



- Tabuenca, B., Kalz, M., Börner, D., Ternier, S., & Specht, M. (2014). "Where Is My Time? Identifying Productive Time of Lifelong Learners for Effective Feedback Services". In Computer Assisted Assessment. Research into E-Assessment (pp. 149-161). Springer International Publishing.
- Tabuenca, B., Kalz, M., Ternier, S., Specht, M., (2014) "Stop and think: Exploring mobile notifications to foster reflective practice on meta-learning". In IEEE Transactions on Learning Technologies. Special Issue on Seamless, Ubiquitous, and Contextual Learning.

# Bind learning with daily life activities

	Listen	Watch	Write	Read
<b>In the living room</b>				
Having breakfast	-7.08	-4.86	9.1	5.06
Cleaning	-99.1	-0.47	-1.83	-0.01
Sitting in the sofa	-0.72	9.1	-0.82	8.08
<b>In the bathroom</b>				
Having shower	-1.49	1.35	0	1.18
Sitting on the toilet	1.85	22.81	10.22	26.01
<b>In my room</b>				
Waking up in the morning in	6.07	4.66	9.08	4.05
Getting dressed	-4.1	1.16	-3.27	0.68
Lying on bed anytime	11.87	16.11	9.31	19.2
<b>In the kitchen</b>				
Preparing breakfast	-11.81	1.05	-2.38	-0.02
Sorting groceries	-26.4	0	0.68	5.39
Cooking	-60.02	1.38	-1.9	8.01
<b>Waiting for someone/something</b>				
Anywhere in the street	-4.24	0.89	9.6	6.26
At the bus stop	-4.84	-4.38	7.48	9.08
In a commercial center	-4.12	1.11	14.1	10.81

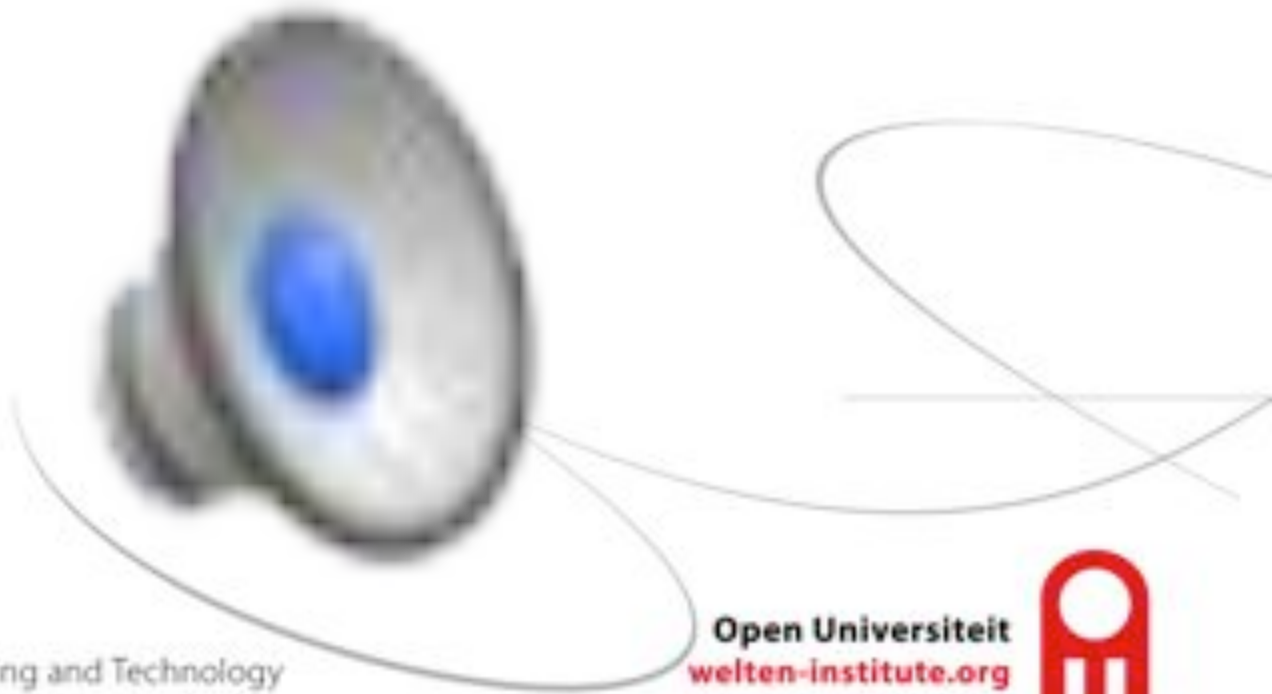


- Tabuenca, B., Ternier, S., & Specht, M. (2013). Supporting lifelong learners to build personal learning ecologies in daily physical spaces. *International Journal of Mobile Learning and Organisation*, 7(3), 177–196.
- Tabuenca, B., Kalz, M., Specht, M. (2014), "'Tap it again, Sam": harmonizing the frontiers between digital and real worlds in education". In *IEEE Proceedings of Frontiers in Education Conference*, Madrid. October 2014

**Ongoing work**

# Measure learning time

Tabuenca, B., Kalz, M., Specht, M. (2014), Seamless support for lifelong learners with mobile and sensor technology, In Journal of Immersive Education (Accepted) November 2014

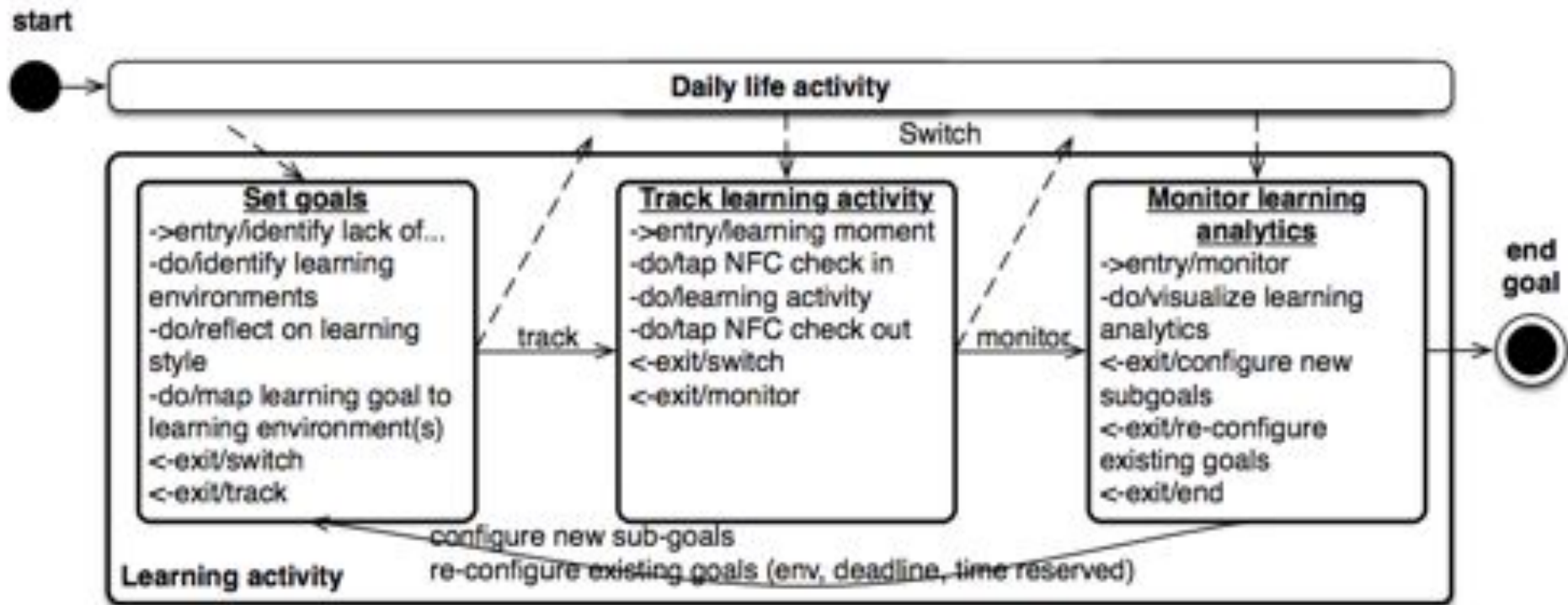




# NFC LearnTracker

## Goal definition

Aaqui tienes que introducir a Candy y a hattie y las movidas teoricas



# NFC LearnTracker

## Goal definition



# NFC LearnTracker

## Perform Learning Activity



A. Write two paragraphs for a journal article taking the first coffee



B. Reading scientific literature during waiting times



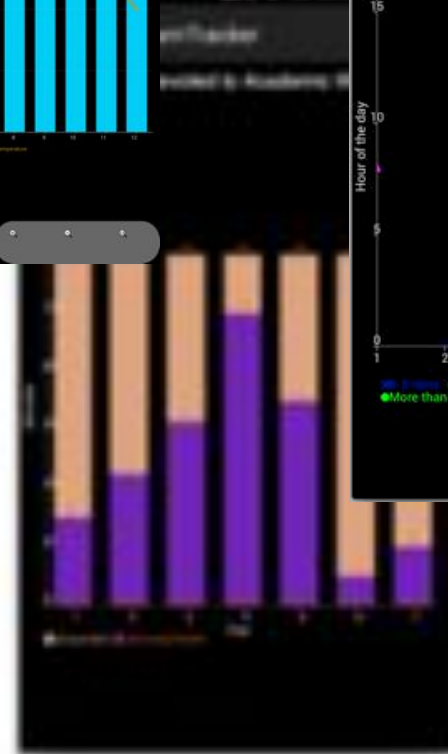
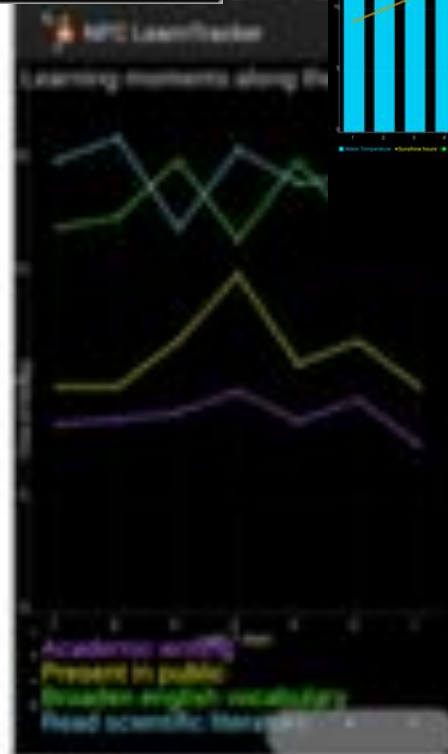
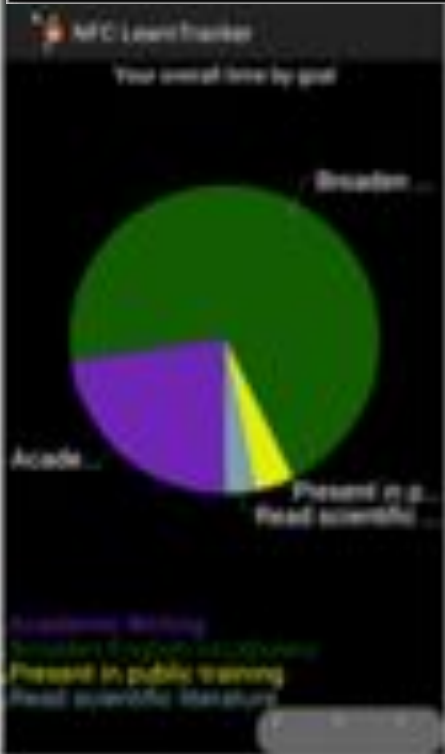
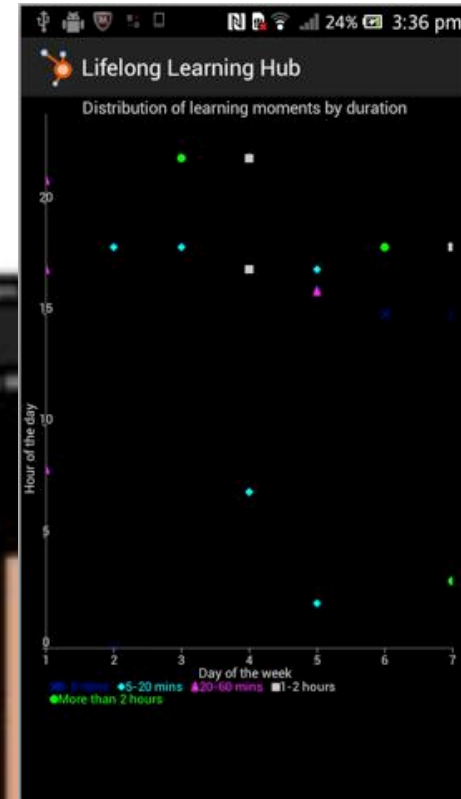
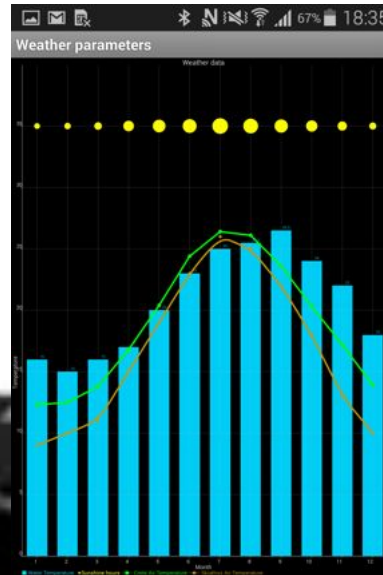
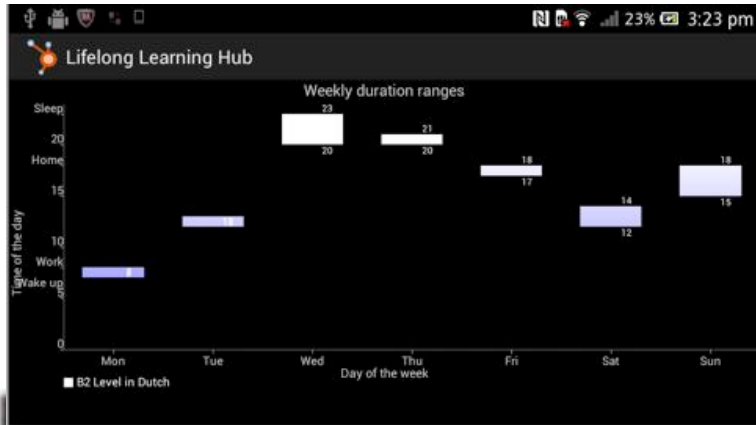
C. Listening english podcasts commuting to work, college, gym...



D. Watch top presenters' videos during commercial breaks

# Learning Analytics

via Visualizations



# Studyload

## Teacher's perspective

1. Having an account on how much time...
  - is invested by students on learning
  - fluctuates the time invested on different learning tasks
2. Identify tasks that require more / less time than scheduled.
3. Identify potential dropout
  - Students
  - Moments/Assignments

# Studyload

Ongoing experiment

3 Groups. University Students

- Psychology. Klinische I
- Geographical Information Systems
  - Open Universiteit
  - Radboud University

Potential groups. Invitation

# Studyload

## Yardstick: Geographical Information Systems

Course name	Geographical Information Systems		
Course ID	N35231		
	Foreseen:	Date start	Duration (hours)
<b>Block / Task / Module</b>			
1.1 Knowing GIS		Monday, 17 November 2014	5
2.1 Abstraction and perception		Thursday, 20 November 2014	3
2.2 Geometry		Saturday, 22 November 2014	2
2.3 Getting to know ArcGIS / Georeferencing		Monday, 24 November 2014	4
2.4 Representation and implementation		Thursday, 27 November 2014	5
2.5 Examples of GIS implementations		Monday, 01 December 2014	2
3.1 Data input and editing		Wednesday, 03 December 2014	2
3.2 Remote sensing		Friday, 05 December 2014	2
3.3 Digital image classification		Saturday, 06 December 2014	2
3.4 Data errors		Sunday, 07 December 2014	2
3.5 Manual digitalizing		Monday, 08 December 2014	4
3.6 Working with digital sensor images		Thursday, 11 December 2014	5
3.7 Clearinghouses and metadata		Monday, 15 December 2014	2
4.1 Data querying		Thursday, 18 December 2014	4
4.2 Data transformation and reclassification		Saturday, 20 December 2014	4
4.3 Processing by attributes		Monday, 22 December 2014	4
4.4 Processing by neighbourhood		Thursday, 01 January 2015	4
4.5 Spatial interpolation		Saturday, 03 January 2015	6
4.6 Processing by overlay		Thursday, 08 January 2015	6
4.7 DEM analysis		Saturday, 10 January 2015	2
4.8 Data action modelling		Monday, 12 January 2015	2
5.1 Data output		Thursday, 15 January 2015	8
Exam		Wednesday, 21 January 2015	6
Final assignment		Monday, 26 January 2015	14
<b>OVERALL</b>			<b>100</b>
Load per week			10

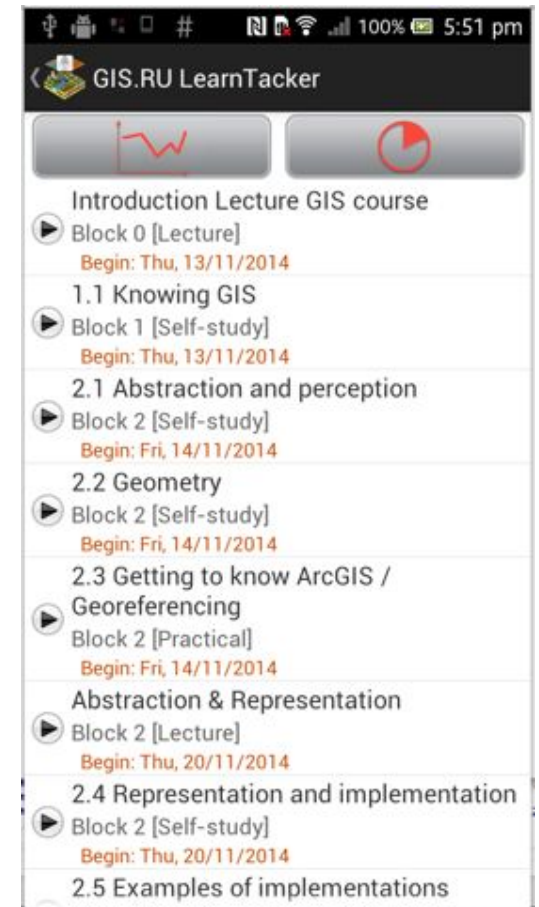
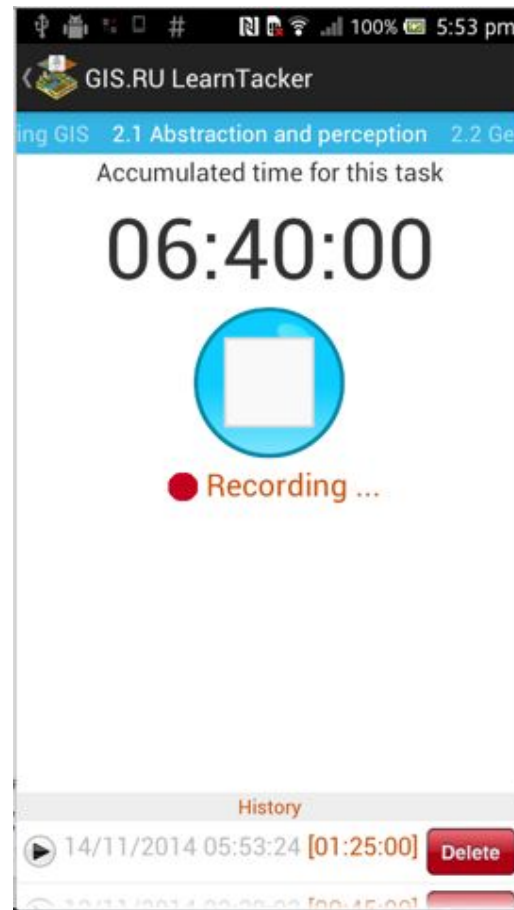
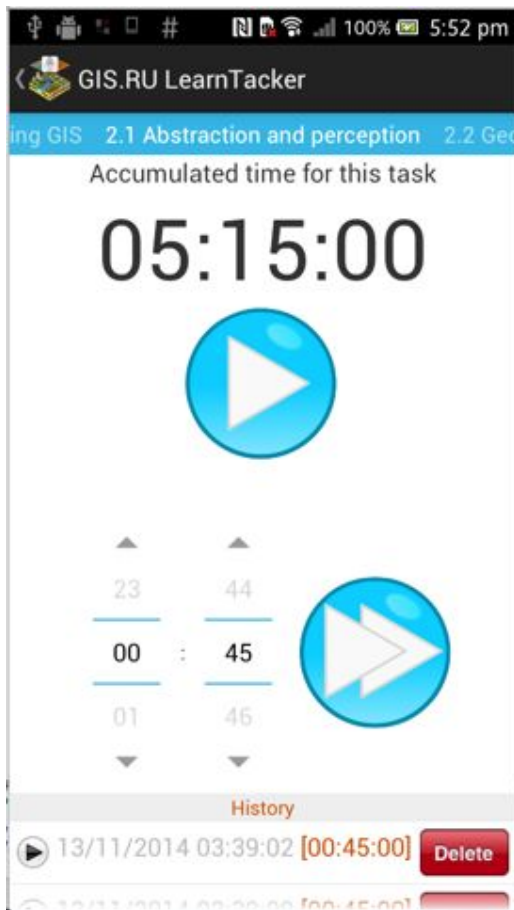
GIS.RU LearnTacker

Introduction Lecture GIS course

- Block 0 [Lecture]
  - Begin: Thu, 13/11/2014
- 1.1 Knowing GIS
  - Block 1 [Self-study]
    - Begin: Thu, 13/11/2014
  - 2.1 Abstraction and perception
    - Block 2 [Self-study]
      - Begin: Fri, 14/11/2014
    - 2.2 Geometry
      - Block 2 [Self-study]
        - Begin: Fri, 14/11/2014
      - 2.3 Getting to know ArcGIS / Georeferencing
        - Block 2 [Practical]
          - Begin: Fri, 14/11/2014
        - Abstraction & Representation
          - Block 2 [Lecture]
            - Begin: Thu, 20/11/2014
          - 2.4 Representation and implementation
            - Block 2 [Self-study]
              - Begin: Thu, 20/11/2014
            - 2.5 Examples of implementations

# Studielast

## Record time: Geographical Information Systems





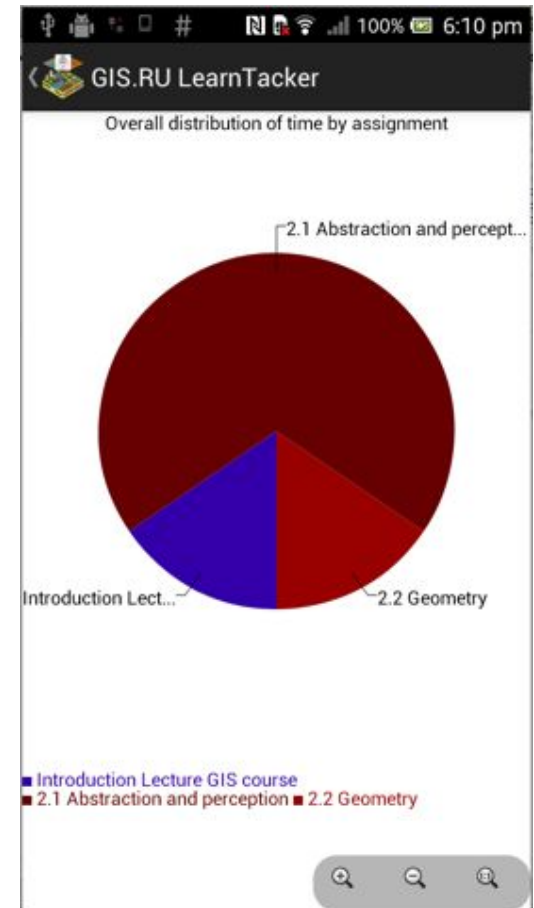
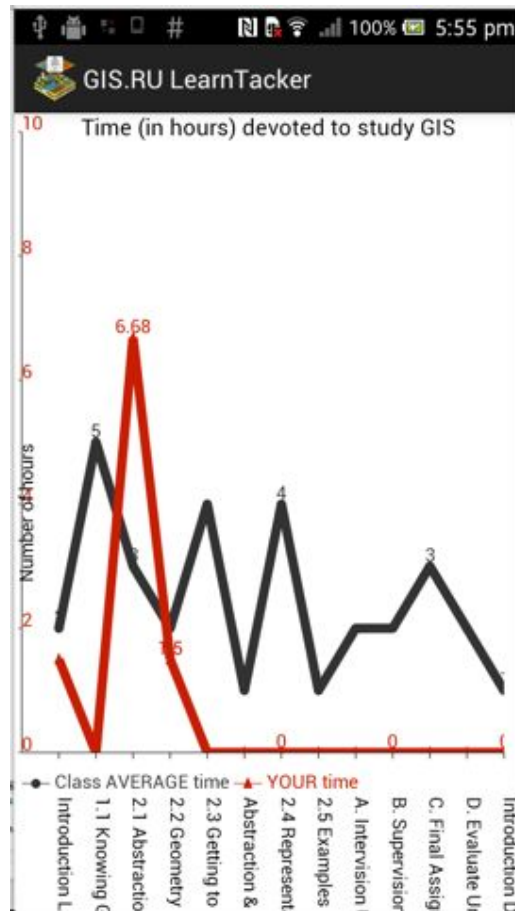
# Studielast

## Learning Analytics: via visualizations

**Control group**  
Record Time

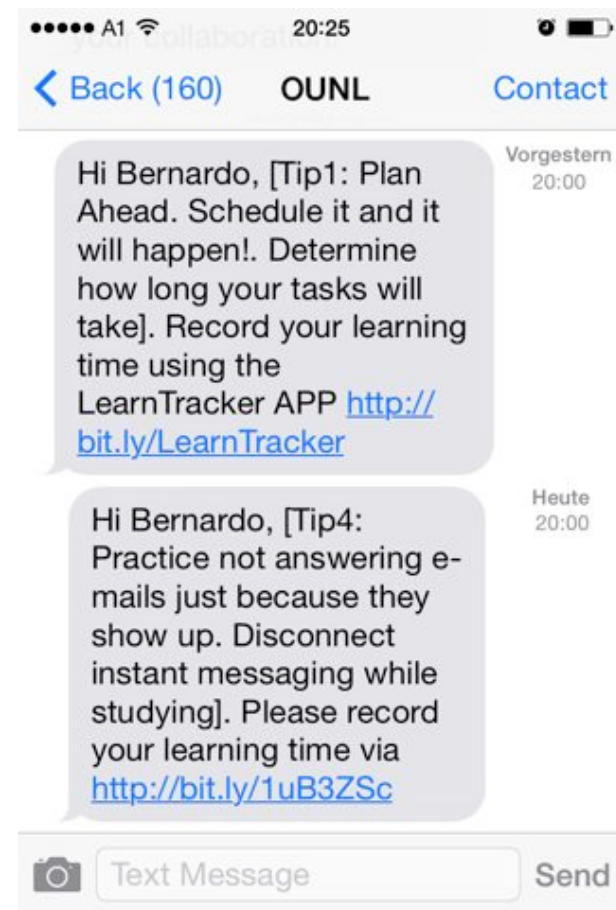
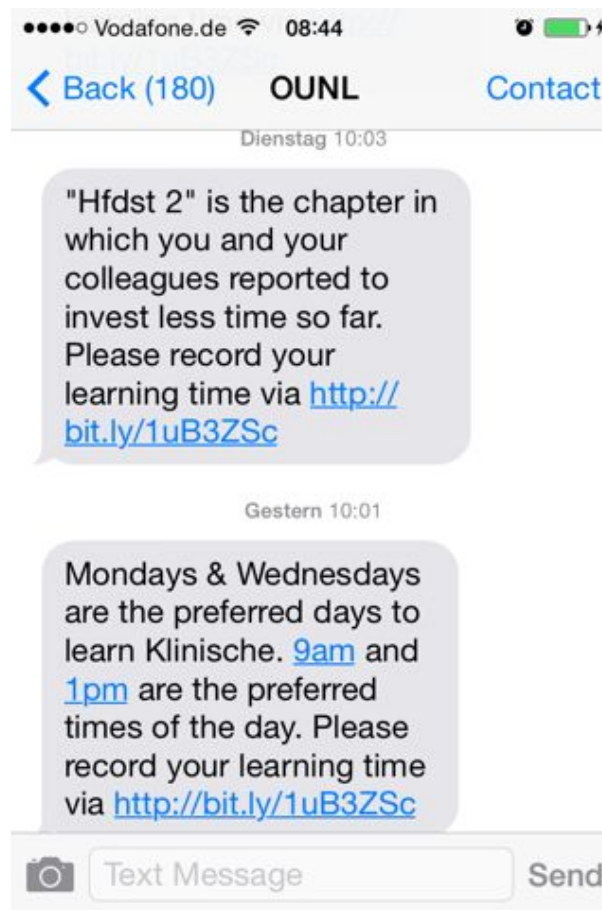
**Treatment 1**  
OUNL Scheduled Time  
VS  
My Time

**Treatment 2**  
Colleagues AVG Time  
VS  
My Time



# Studielast

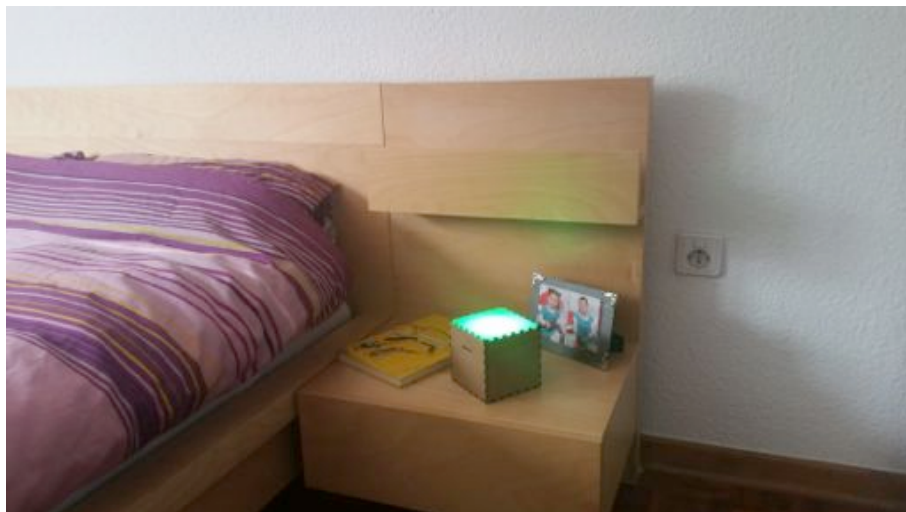
## Learning Analytics: via SMS Notifications



# **Future work**

# Ambient learning displays

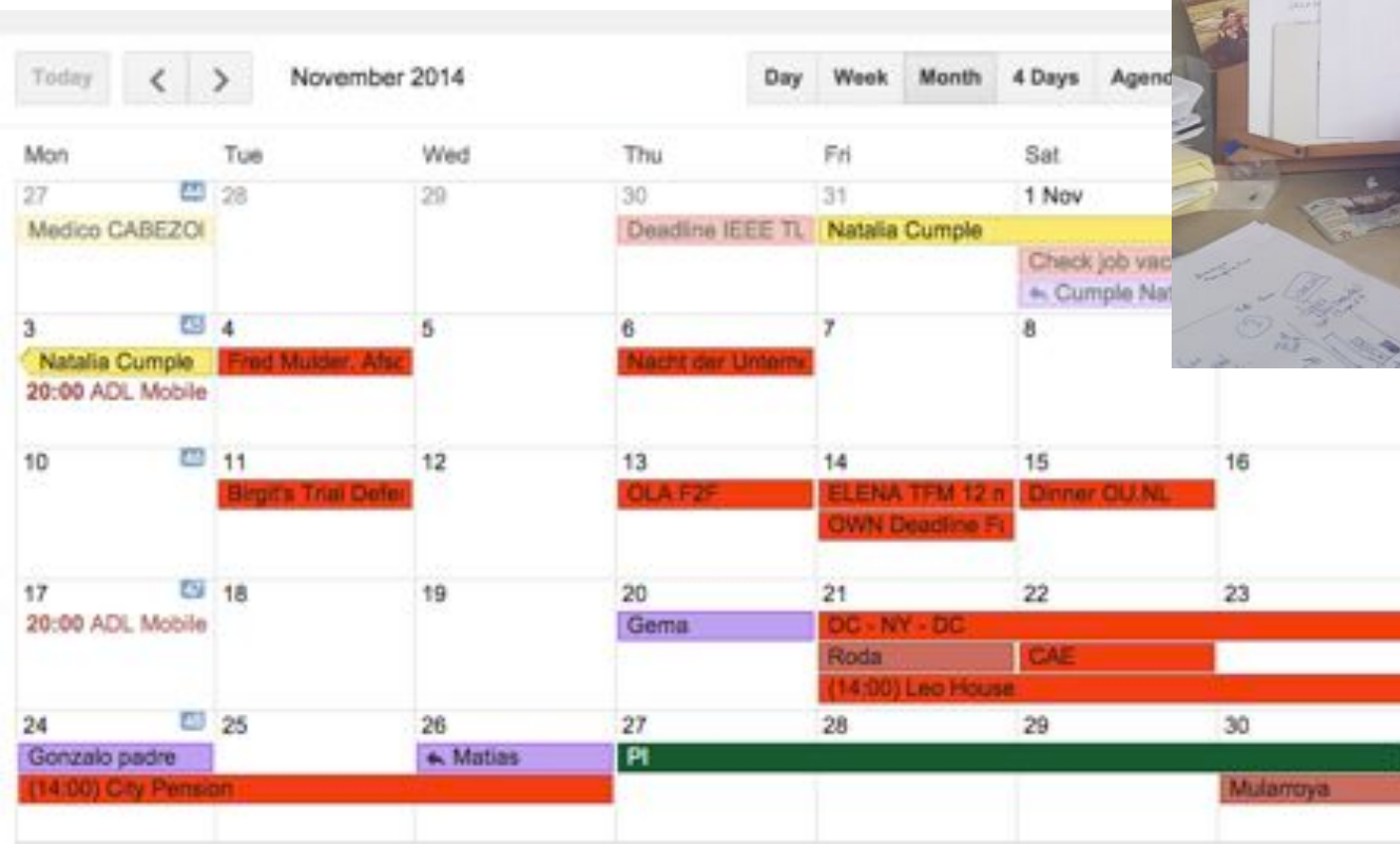
## Feedback Cube



Börner, D., Tabuenca, B., Storm, J., Happe, S., & Specht, M. (2015). Research and development of tangible interactive ambient display prototypes to support learning scenarios. In Proceedings of the 9th International Conference on Tangible, Embedded and Embodied Interaction. (In Press)

# Feedback via ambient learning displays

Next learning task



# Questions?



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[@bernardtabuenca](https://twitter.com/bernardtabuenca)



# References

- Tabuenca, B., Ternier, S., & Specht, M. (2013). Supporting lifelong learners to build personal learning ecologies in daily physical spaces. *International Journal of Mobile Learning and Organisation*
- Tabuenca, B., Kalz, M., Börner, D., Ternier, S., & Specht, M. (2014). Where is my time? Identifying productive time of lifelong learners for effective feedback services. In *International Computer Assisted Assessment (CAA) Conference. Research into E-Assessment*. Zeist (The Netherlands).
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