
Gamification: Metacognitive Scaffolding Towards Long Term Goals

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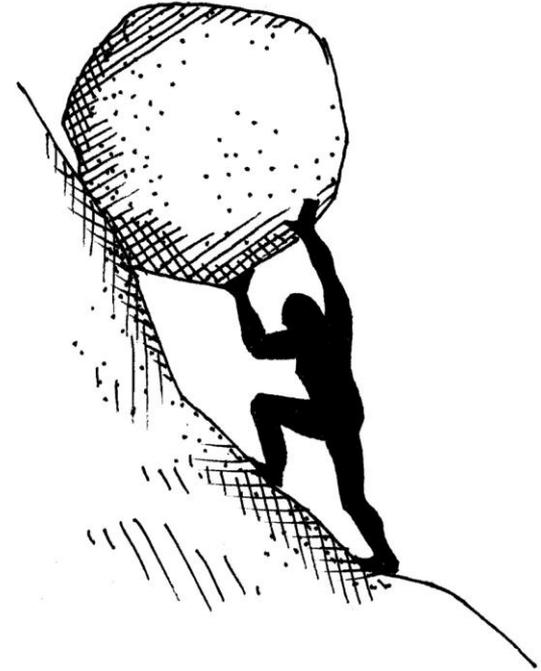
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Sisyphean Goals

Many learning objectives can be considered Sisyphean goals:

“they demand consistent, repeated effort over long periods of time” [1].



<http://www.esteeklar.com/category/research/>

[1] J. Kay and B. Kummerfeld, “Mneme: shifting control of pervasive infrastructure to the user for flexible, pervasive support of sisyphean goals,” in Workshop on Pervasive Intelligibility, Pervasive, 2011.

Current work – domain 1

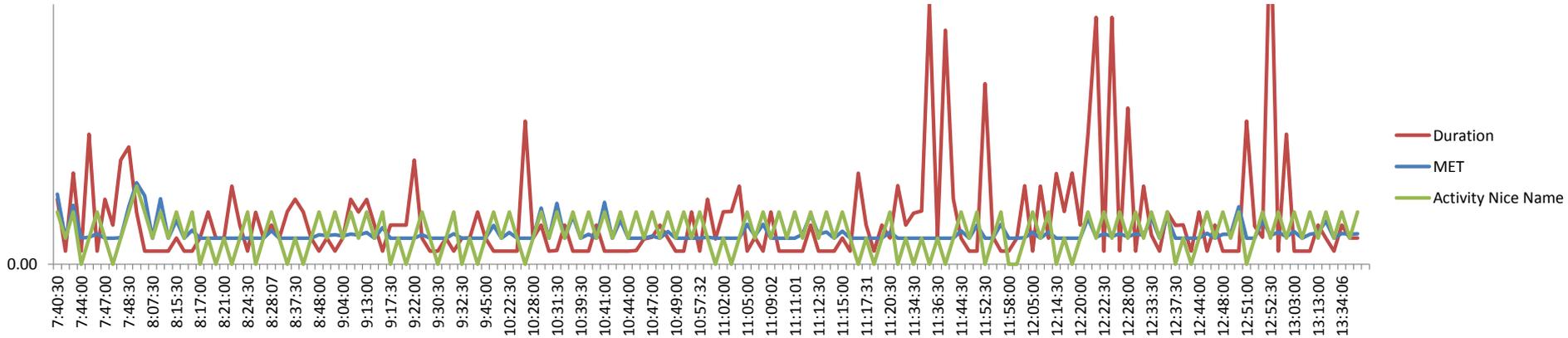
An industrial “TAFE” setting, 2 courses

- *mixed learning*
 - *and students have high dropout rate for online components and these require considerable time, in multiple sessions*
 - *and this is a major concern for our industry partner*
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Current work – domain 2

Long term goals for physical activity

- *Sensors: FitBit, smart cushion, desktop sensor, mobile phone app*
 - *Goal setting interface*
 - *Reflection interfaces*
 - *Next steps to add metacognitive scaffolding*
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Avocado Fitness output

Mneme

Managing Personal Lifelong Information

Goal View

Active Dashboard

Long-term Dashboard

Archive Browser

Trash

Log out

You are logged in as **Alex** and now in **Long-term Dashboard**. [What is Long-term Dashboard?](#)

Mneme is a research system. We welcome your feedback and comments.

Visualisation for Step Goal. Showing data from January 15, 2013 to February 14, 2013

If you want to remove data from the chart, you can either click on single data points over the green line or drag your mouse covering the points on the green line in the graph.

You met your goal 13 times during this period.
You did okay. But you need to be more active.

My daily target steps (orange line) My daily step counts (green line)



Math Pretest

Don't worry if you don't know some answers. Everything you get right is a bonus!

Your Pre-Test Results Are In!

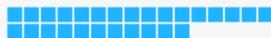
Your 104 Skills, Grouped by Estimated Familiarity.

less familiar → more familiar → most familiar

Practiced



Level One



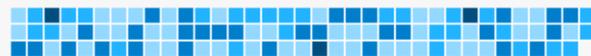
Level Two



Mastered



104 Skills Earned



Yay! Based on your assessment, we've filled some skills in your progress bar that we think you're familiar with.

Subtracting decimals 0.5

You Earned
LEVEL ONE

BADGES EARNED



Math Pretest Champion

You finished the math pretest in the learning dashboard. Good work!

Metacognition & Self Regulated Learning

Metacognition & SRL

- ❑ Metacognition: ability to reflect upon, understand, and control one's learning.
- ❑ Self regulated learning - guided by metacognition; student sets goals, monitors and regulates learning actions towards goals.
- ❑ High metacognitive awareness and self-regulation correlate with performance.

Metacognitive Scaffolding

- ❑ Computer assisted support to encourage and support student self regulated Learning (e.g., MetaTutor, Help Tutor).
 - ❑ Metacognitive scaffolding in MOOCs may improve motivation and ability to self regulate towards student learning goals. These techniques can contribute to personalisation.
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Gamification

“Use of game design and game thinking in a non-game context” [1]

Key Advantages:

Tools and techniques that help transform the way people think and perceive a particular tasks or goal!

Game techniques are personalised (i.e., based on individual skills, achievements, abilities, preferences and goals).

Gamification Examples

3 x Examples:

Football Manager, SimCity, Fold It

Users need to apply a variety of skills:

Goal setting,
time management,
resource allocation

But the tasks are what you would do at work?

e.g., analysing reports, Updating records,
resource decisions

What is the Key?

The players or users perceive this task differently...



<http://www.eurogamer.net/articles/2013-10-28-football-manager-2014-review>

<http://www.abandonia.com/games/393/download/SimCityClassic.htm>

<http://fold.it/portal/>

Opportunity

“Think” of gamification as form of metacognitive scaffolding.

“to use gamification to engage users in self regulated learning and metacognition to improve their ability to achieve long term goals.”

Difference is in the objectives:

- We propose to apply gamification to enhance a **personal skill or trait in learning** as an objective instead of engaging and motivating users on a particular task or behaviour.
 - e.g. typical role of gamification in applications is to make learning algebra fun ... so students use it more often and learn more.
 - We will engage users in setting appropriate long term goals, planning and defining strategies to achieve long term goals, monitor progress and adapt plan as needed.
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Planning & Goal Setting

Application of gamifications to encourage goal setting and planning:

- Target rewards for goal setting behaviour: # of goals set, frequency of goal setting behaviour, setting appropriate goals (e.g., SMART goals).
- Rewards for planning: scheduling, planning the learning environment, consider resources and learning strategies.
- Rewards for achieving goals and set new goals.
- Design challenges or puzzles for planning and goal setting strategies (e.g., A learner is limited in resource 1, 2 and 3 and has constraints A, B, C. If you can create plan for him you reach planning mastery level 1).

Note: these are for illustration only

Self Monitoring & Reflection

Application of gamifications to encourage self monitoring & reflection:

- Rewards for engaging in self monitoring tasks
- Rewards highlight importance of self monitoring
e.g., achievement badge for finding knowledge errors
- Rewards for engaging in reflection.
e.g., system detects user has self monitoring,
identify weakness in a key skill, this triggers an award.

This provides also an opportunity to highlight importance of self monitoring and reflection towards learning.

Self Evaluation & Assessments

Application of gamifications to encourage self evaluation & assessments:

- Similar to earlier tasks, design and apply rewards based on self evaluation and assessment (e.g., rewards on engaging in self evaluation questionnaires, self confidence assessments).
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Challenges

Challenges for applying gamification as metacognitive scaffolding in LMS/MOOC:

- What techniques are effective for whom?
 - e.g., not all techniques are appropriate for each user and context
 - in Gamification, design and application of the technique must consider many aspects such as type of users, motivation.
 - Detection of metacognition
 - e.g., when is users engaging in self evaluation?
 - User Modeling & long term goals
 - Metacognition and SRL are long term skills which transcends any single LMS/MOOC/OLI-object.
 - Tools that support and improve these skills require a “lifelong” user model, independent of a particular systems.
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Thank you & Questions!

Links between metacognition and gamification?
Secret sauce for scaffolding metacognition?
And for gamification for learning?
