

Codifying Game-Based Learning:

# The LEAGUE framework for Evaluation

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# Motivation

## Problems in the field of Game-based Learning (GBL) evaluation

- Most research focus on a single domain
- Different researchers use different evaluation criteria and methods
  - Makes it difficult to see patterns in the field
- Very few systematically decompose their findings
- Inconsistent definition, usage, scope and terminology
  - Complicates categorization of the literature
  
- Overall a messy field of research

# Goal

- Use directed content analysis to hieratically decompose into core dimensions, factors and subfactors.
  - Also find and categorise metrics and cross-dimension relations that can be used to evaluate GBL.
- Everything should be mapped to theoretical frameworks and constructs defined by GBL researchers

Result:

LEAGUE

# Game Based Learning

## Dimensions

Learning  
/pedagogy

Game  
Factors

Affective  
Reactions

Usability

User

Environment



# Game Based Learning

## Dimensions

Learning /pedagogy

Game Factors

Affective Reactions

Usability

User

Environment

L1. Learning objective

L2. Learning strategies

L3. Learning content

L4. Learning outcome

G1. Game definition

G2. Game narrative

G3. Game Mechanics

G4. Game Resources

G5. Game Aesthetics

G6. Game Play

A1. Enjoyment

A2. Engagement

A3. Motivation

A4. Flow

U1. Interface

U2. Learnability

U3. Satisfaction

US1. Learner profile

US2. Cognitive Needs

US3. Psychological Need

E1. Technical

E2. Context

Factors

Learning/Pedagogical	
Characteristics of an educational game that promote and facilitate learning.	(De Freitas and Oliver 2006; Yoon and Park 2013; Rêgo and de Medeiros 2015; Pappa and Pannese 2010; Omar and Jaafar 2010)
Game Factors	
Elements and features of a game environment (the game world) of a educational game that stimulate the users.	(Oprins, Visschedijk et al. 2015; Yue and Zin 2009; De Freitas and Oliver 2006; Yoon and Park 2013; Aleven, Myers et al. 2010; Zaibon and Shiratuddin 2010; Tan, Ling et al. 2007; Rooney 2012; Djelil, Sanchez et al. 2014; Liao and Shen 2012)
Affective Cognitive Reactions (ACR)	
Set of emotions, attitudes and feelings triggered by educational game.	(Rêgo and de Medeiros 2015; Zhang, Fan et al. 2010; Rooney 2012; Djelil, Sanchez et al. 2014; Annetta 2010; Pourabdollahian, Taisch et al. 2012)
Usability	
The extent to which an educational game is usable by the learners to accomplish specific goals (including how to learn, understand, control, and user satisfaction).	(Yue and Zin 2009; Rêgo and de Medeiros 2015; Zaibon and Shiratuddin 2010; Djelil, Sanchez et al. 2014)
User	
Characteristics of the target users/user group of an educational game to investigate if the game matches the indented users.	(Tan, Ling et al. 2007; De Freitas and Oliver 2006; Oprins, Visschedijk et al. 2015; Tan, Ling et al. 2007; Djelil, Sanchez et al. 2014)
Environment	
Conditions for practical use of GBL and accessibility of educational game in terms of its environment	(Zaibon and Shiratuddin 2010; Djelil, Sanchez et al. 2014; Pappa and Pannese 2010)

## Learning / pedagogy

L1: Goals and purpose for transfer of knowledge and skills by educational games to users.

L2: Pedagogical theories, learning models and approaches to achieve learning objectives.

L3: Educational material (facts, data and information) provided used for learning in educational games.

L4: Desired learning output (student achievements) from educational games.

**L1. Learning objective**

**L2. Learning strategies**

**L3. Learning content**

**L4. Learning outcome**

## Environment

E1: The accessibility and easiness of a user to enter the game world with the used technical criteria

E2: The particular context where GBL will take place using the educational game



**E1. Technical**

**E2. Context**



## Affective Reactions

A1: The extent of playing the educational game is considered pleasurable for an individual user.

A2: User activity absorption and interest in activity or task, and users' subjective acceptance of the games reality combined with degree of focus on this realism.

A3: Level of user involvement in participating and using an educational game by devoting additional time and effort.

A4: State of absolute absorption in an activity which represents an optimal experience.

**A1. Enjoyment**

**A2. Engagement**

**A3. Motivation**

**A4. Flow**

# Game Factors

G1: Game goals depending on appropriate set of game rules defining the gaming tasks in games.

G2: Describes what happens in the virtual world including character development and plot.

G3: Defines the functioning, operation and interaction with the game world.

G4: All resources provided to the player (should have both utility and scarcity).

G5: Audio-visual language selected, conceptualized and used (images, text, audio, video, animation and multimedia)

G6: Process by which user reaches the goal which define the set of challenges of problems the user face to win the game.

**G1. Game definition**

**G2. Game narrative**

**G3. Game Mechanics**

**G4. Game Resources**

**G5. Game Aesthetics**

**G6. Game Play**

# Usability

U1: Component through which users interact with a game.

U2: Capability of an educational game to enable the user to easily learn to use specific functions.

U3: Comfort and acceptability of an educational game to its users.



# User

US1: Attributes of a particular learner or group.

US2: Games should suit learners' cognitive development level.

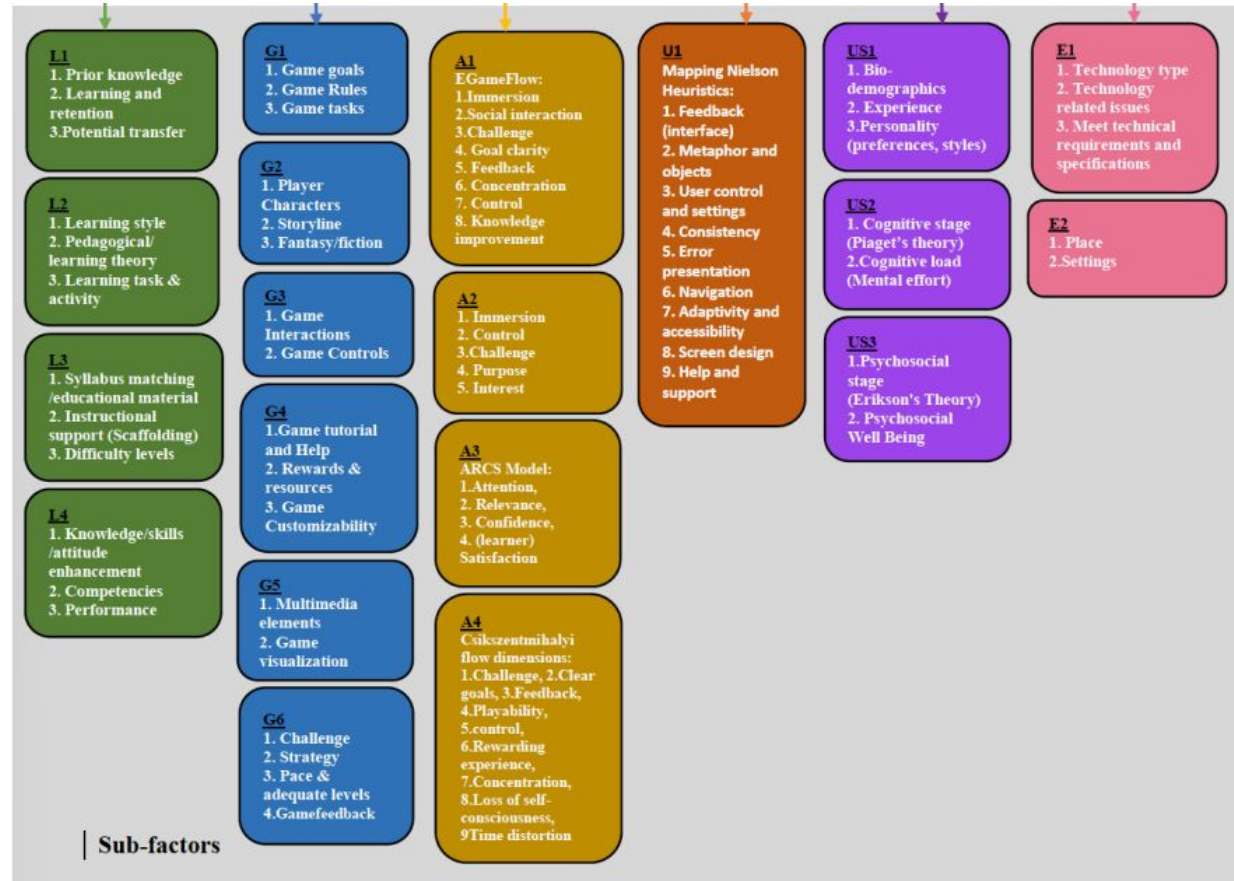
US3: Games should suit users' psychological needs.

**US1. Learner profile**

**US2. Cognitive Needs**

**US3. Psychological  
Need**

# Sub-factors



# Metrics

- Scores
  - Pre/post test, game performance, retention
- Time
  - Session time, learning time, completion time
- Number of occurrences
  - Problems
    - usability, navigation, failures
  - Levels played, attempts
- Rating
  - Likert scale, severity ratings, user task ratings
- Reviews/responses
  - Expert review, self-assessment, attitude statements, reviews based on (sub)factors, comments

# Relations & Interactions between Domains

