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A Gamification Requirements Catalog for Educational Software: Results from a Systematic Literature Review and a Survey with Experts

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ACM SAC - RE-Track'17

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Agenda

- Motivation
- Systematic Literature Review
- Survey
- A Gamification Requirements Catalog
- Final Considerations

Motivation

- Gamification is the application of game elements in a non-game context (Deterding et al., 2011; Werbach; Hunter, 2012).
- There is a difficulty in identifying
 - the elements/characteristics of gamification (Dichev et al., 2014).
 - and the gamification elements more suitable to a player's personality type.
- We performed a SLR to identify these gamification elements, and a survey to evaluate and prioritize them.

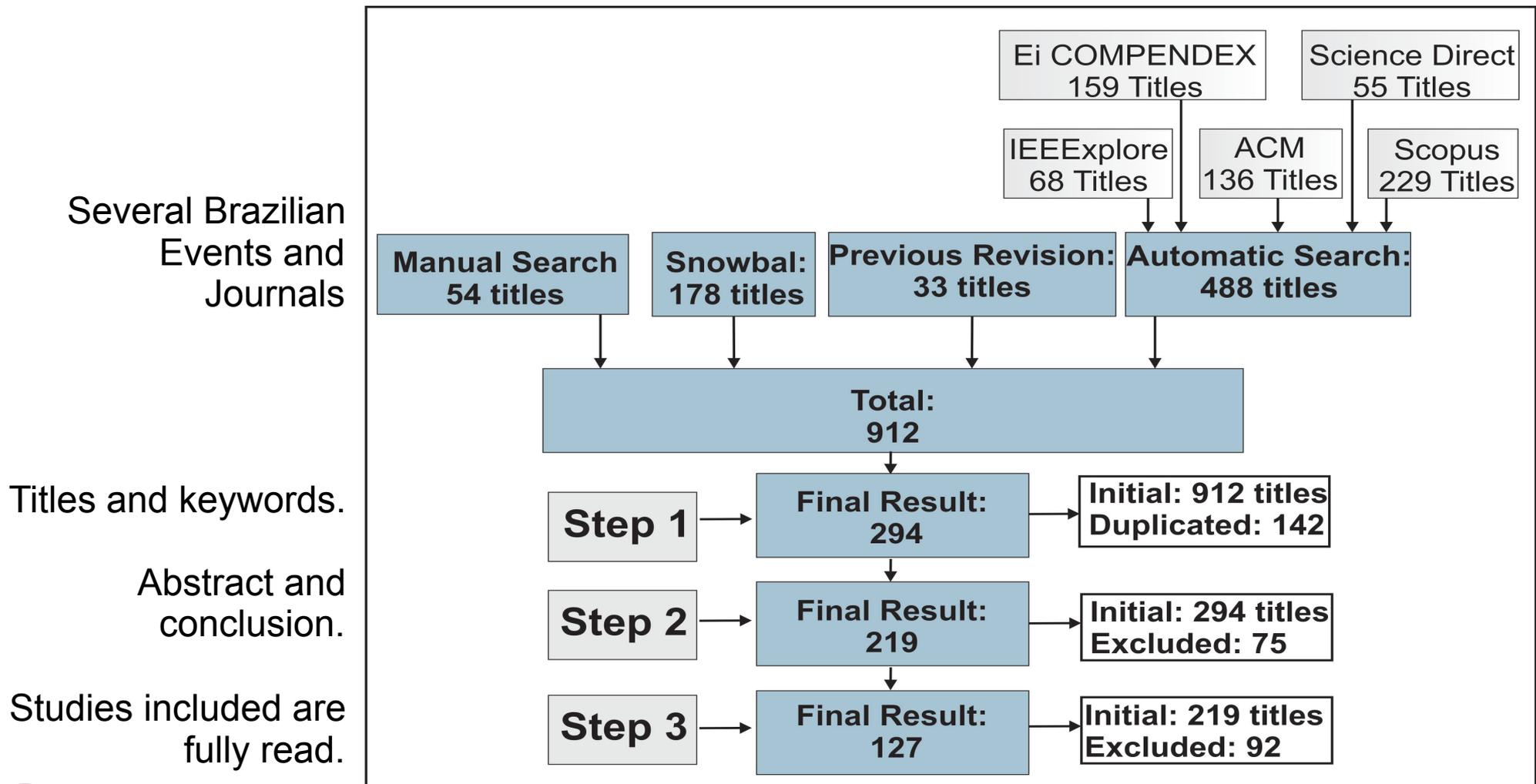
Systematic Literature Review - Protocol

- **Search Period:** Search and selection occurred between May and August of 2015.
- **Search String**

("Gamification" OR "Gamifies" OR "Gamifying" OR "Gamified") AND ("Educational" OR "Learning" OR "Educative") AND ("Requirements" OR "Characteristics" OR "Technique" OR "Method" OR "Methodology" OR "Process" OR "Strategy" OR "Software Engineering" OR "Theory" OR "Personality" OR "Style" OR "Software")

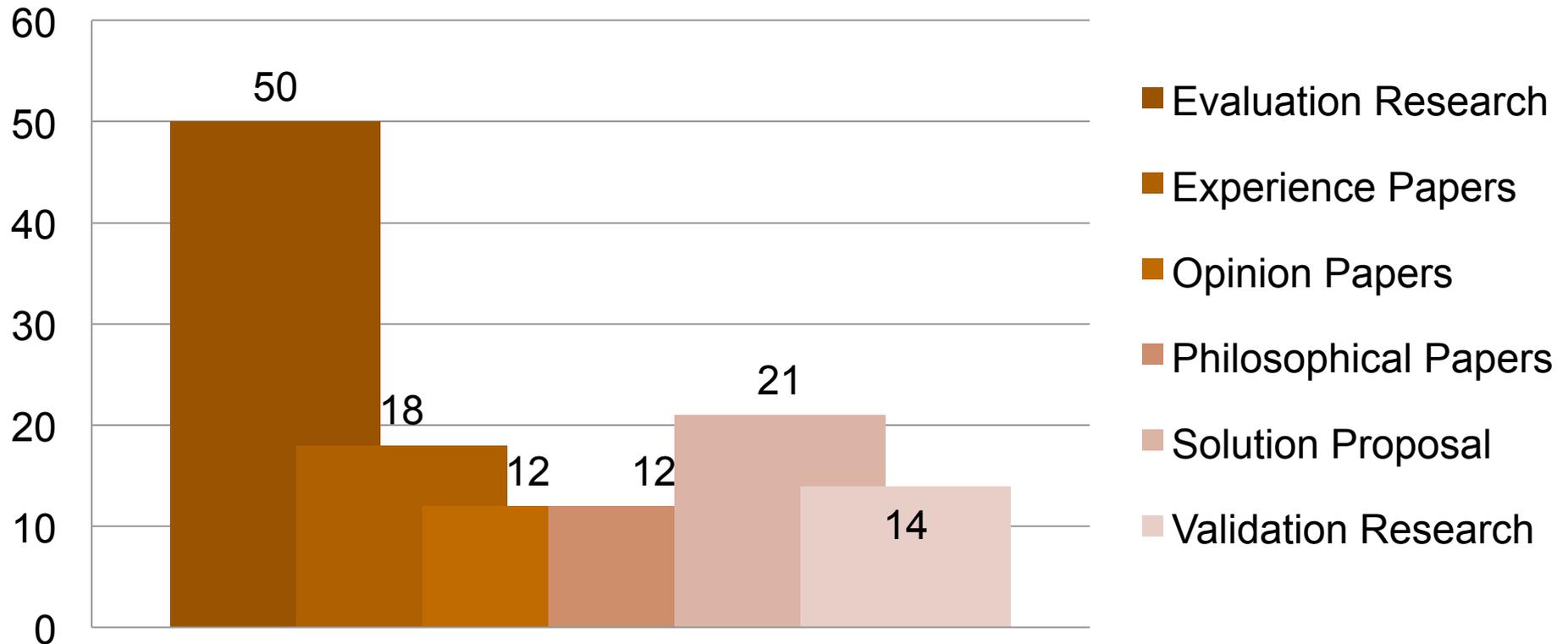
Systematic Literature Review – Protocol and Results

Figure 3: Selection Results.



RQ1- What types of research published about gamified software focused on education?

Figure 4: Research types .



RQ2 - What types of software, educational context and educational goals are intended to use gamification?

■ **Types of software:**

- new software (74), existing software (22), not informed (31).
- ES for mobile devices, ES for internet, ES for classroom, distance learning environment, learning management system, game and learning object.

■ **Educational context:**

- adult literacy (1), childhood education (2), informal education (6), college education (56), college education and graduate (6), elementary school (13), elementary and secondary education (2), secondary education (4) and graduate (4), not informed (33).

■ **Educational goals:** engage, motivate and involve.

RQ3- What are the main characteristics, in terms of requirements, for creating gamified software focused on education?

- ❑ 709 requirements reported;
- ❑ Requirements with different names, but with the same meaning were grouped
- ❑ The SLR resulted in the total of 232 requirements.

RQ4 - Is there any approach that considers the personality types of students in gamified software focused on education?

- Only 14 papers were found.
- Only one paper discussed the relation between the gamification elements and the player's personality types.

Survey

- To evaluate and prioritize the 232 gamification requirements
- Composed of quantitative questions
 - Step A: collecting personal data (step A) of the interviewees
 - Step B: discovering the requirements priorities with specialists
- Step B utilized a 10 points Likert scale, ranging from 1 “not entirely true for me” to 10 “totally true for me”.
- The requirements were organized in three levels:
 - dynamics, mechanics or components (pyramid of Werbach; Hunter, 2012).

Survey – STEP A - Personal Data

- 64 ANSWERS

Table 2: Age.

Variable	Frequency	Percentage
Age		
18 a 23	2	3.1 %
24 a 34	25	39.1 %
35 a 45	27	42.2 %
46 a 56	8	12.5 %
57 a 67	2	3.1 %
Total	64	100 %

Table 3: Educational Level.

Variable	Frequency	Percentage
Educational level		
Graduated	6	9.4 %
Master's degree	23	35.9 %
Doctoral degree	35	54.7 %
Total	64	100 %

Survey – STEP A - Personal Data

Table 4: Experience with Gamification..

Variable	Frequency	Percentage
Gamification Experience		
Theoretical	25	39.1 %
Practical	28	43.8 %
Theoretical and Practical	11	17.2 %
Total	64	100 %

Table 5: Years of experience.

Variable	Frequency	Percentage
Years of Experience		
Less than 1 year	6	9.4 %
Between 1 and 3 years	28	43.8 %
More than 3 years	30	46.9 %
Total	64	100 %

Survey – STEP B - Evaluation and Prioritization

- 3 requirements were excluded from the catalog due to low evaluations:
 - **Dynamics:**
 - Horror
 - Intrigue
 - **Mechanics:**
 - Pressure
- 26 were considered as little relevant: (+)
- 161 were considered as relevant: (++)
- 42 were considered as very relevant: (+++)
- The final catalog has 229 gamification requirements

Organization of the Gamification Requirements in the Catalog

- Dynamics
 - Sense of Competence (+++): The need to feel qualified.
 - Achievers
- Mechanics //pyramid of (Werbach; Hunter, 2012).
 - Challenges (+++): Create challenges tailored to the student's ... //description
 - Explorers //type of player's personality
 - Killers
- Components
 - Avatar (++): Shows user or character information.
 - Socializers

A Gamification Requirements Catalog for Educational Software

Requirement	Player Type			
	Achievers	Killers	Explorers	Socializers
Dynamics				
Progress +++	Y	Y	Y	N
Social Environment ++	N	N	N	Y
Mechanics				
Feedback System +++	Y	Y	Y	N
Rewards System +++	Y	N	Y	N
Cooperation ++	Y	Y	N	Y
Components				
Leaderboards ++	Y	Y	Y	N
Users Table ++	Y	N	N	Y
Medals ++	Y	Y	Y	N
Profile ++	Y	N	N	Y
Avatar ++	N	N	N	Y
Communications	N	N	N	Y

Final Considerations

- The gamification requirements catalog can be a first step to standardize requirements for gamified educational software.
- Future works include:
 - Defining a process to use the catalog;
 - Expanding the catalog by performing an extended SLR from August 2015 to present day;
 - Developing a tool to make it easier reusing the requirements;
 - Representing the requirements by using a standard language to model catalogs.



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