Web-Based Serious Games and Accessibility

The entries consolidate the main concepts about serious web-based games; the characterization of serious games, accessibility, accessibility guidelines and types of disabilities, and the findings found after reviewing the literature.

Keywords: Accessibility ; Serious Games ; WCAG 2.1

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1. Serious Games

Serious games [1] are "games that do not have entertainment, enjoyment, or fun as their main objective." The main objectives of serious games [2] can be, among others, education, training, human resources management, and health improvement [3].

2. Web-based serious games

They are related to serious games that work on the web; they are a growing area thanks to the improvement of browsers and technologies used on the web [4], which have reduced the gap between desktop applications and those on the web.

Figure 1 shows the Google Trends search related to web applications, serious games, and mobile applications made on the Web in the last five years. We found that the term serious games and web applications began to intensify from 2019.
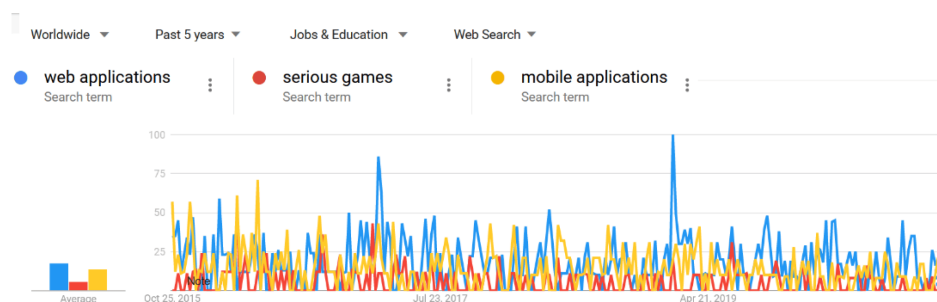

Figure 1. The trend of web-based serious games

3. Characterization of Serious Games

According to its final objective, [5] three categories are identified:

1. Edutainment or educational games, the game provides an ideal environment for training and knowledge.

2. Advergaming, game to promoting a product or market.

3. Facilitates learning represents a simplified model of reality that reproduce the study's process.

4. Accessibility

Accessibility [6] allows anyone to use serious applications or games regardless of the software, hardware, or assistive technologies they use.

5. Web Content Accessibility Guidelines

The Web Content Accessibility Guidelines (WCAG) 2.1 [6] is the latest version of the Web Content Accessibility Guidelines from the World Wide Web Consortium (W3C). On June 5, 2018, the final recommendation was published after an elaboration process of almost ten years since the publication of Web Content Accessibility Guidelines 2.0 on December

11, 2008. WCAG 2.1 incorporates a wide range of recommendations to make more accessible the Web's content that can be applied to any application, including serious games. Applying these guidelines will make content more accessible to many people, including people with disabilities such as blindness and low vision, deafness and hearing loss, limitation of movement, speech disabilities, photosensitivity, and combinations.

6. PICO

PICO [7] Was implemented as follows:

- Population: published studies.
- Intervention: accessibility, web-based serious games.
- Comparison: selected studies by disability, accessibility standard-based, type of research, assistive technologies, and use of external devices.
- Outcome: published studies on accessibility and web-based serious games.

7. PRISMA

The PRISMA [8] method is frequently used in health issues this method was adapted to identify studies related to accessibility and serious games. In PRISMA Checklist, we record the page number or pages in which compliance or non-compliance with the 27 items detailed in the seven sections can be evidenced: (1) Title, (2) Summary, (3) Introduction, (4) Methods, (5) Results, (6) Discussion, and (7) Funding.

8. Disabilities

In the study [9] we applied the following definitions:

1. **Cognitive:** or intellectual disability is a problem characterized by a delay in mental development that disrupts the learning process.
2. **Motor coordination**: or physical disability is a problem related to significant impairment of one or more parts of the body's movement abilities.
3. **Sensory:** this type of disability is related to 1) vision, which includes users with low vision and deafness; 2) hearing disability, which provides deafness and hearing loss.

9. Conclusions

Accessibility is an essential research area that emerges from the web. This study [9] highlighted current trends and outstanding issues in accessibility and applied guidelines for designing serious inclusive games using the results of existing primary studies published between 2000 and 2020. In this study, an SLR was conducted with a set of five research questions and five questions to validate the quality of the selected studies. We extracted a total of 476 studies; after a screening process with the help of the PRISMA [8] flowchart, we chose a group of 47 primary studies. As a result, serious games' limitations and problems regarding accessibility and possible solutions to generate more inclusive serious games were demonstrated.

Furthermore, we identified the status of serious gaming and accessibility related to disability. We identified research and contribution types that apply to serious gaming in cognitive, motor, and sensory disabilities. This study provides researchers and professionals with the status of serious games related to cognitive, motor, and sensory disabilities. For future work, we suggest 1) build a software tool that applies WCAG 2.1 [6] to support serious game developers; 2) define anti-rules to increase the accessibility of serious games.

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