



Co-funded by
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Serious game and accessibility

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Serious game: learning, storytelling, gamification



Something to learn

A story to tell

A challenge to win



Serious game is the
third way between
two learning
methods

Two methods of learning

Symbols (language)

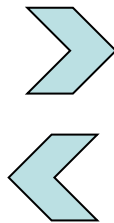


Direct **experience**

How we learn: a comparison

Symbols (language)

- lessons
- abstraction
- cognition
- solution
- passivity



Direct experience

- daily life
- concreteness
- emotion
- problem
- activity

How we learn: language

Advantages of language compared to direct experience

1. It is extremely **efficient**
2. It is extremely **precise**
3. It applies to **anything**
4. It encodes the experience **of others**



Disadvantages

1. It is not very **effective**
2. It involves **emotions** very little
3. It relies too much on **memory**
4. It makes the learner **passive**
5. It depends too much on the **teacher**
6. It can be **boring**

How we learn: experience

Advantages of experience compared to language

1. It is extremely **effective**
2. It involves **emotions**
3. The learner is **active**
4. It is interesting because it applies to already perceived **problems**



Disadvantages

?

The surprising Newton's Second Law of Motion (I)

$$\sum_i^N \vec{F}_i = m \vec{a}$$

Diagram illustrating Newton's Second Law of Motion:

- \sum_i^N : sum of forces
- \vec{F}_i : force vector
- $=$: equals
- m : mass of the body
- \vec{a} : acceleration

A body subjected to a constant **force** receives a constant **acceleration**

and, obviously, when the force stops being applied, it continues to move at a constant **velocity**

The surprising Newton's Second Law of Motion (II)



When will this bus start moving on its own at a **constant speed**?

How we learn: the problems with experience

1. Can be **misleading**
2. Is limited to the **tangible** and **immediate**
3. Mistakes can be **costly** or **dangerous**
4. It is difficult to perceive **cause-and-effect** relationships
5. It's **inefficient** for complex learning



How we learn: the third way

The **game** (serious game)...



a controlled experience
between **language** and
experience

A serious game



What is accessibility

Italy: Law 4/2004: «*Provisions to promote and simplify access for users, particularly for people with disabilities, to computer tools*)»

accessibility

«the ability of IT systems ... to deliver services and provide information that can be accessed without discrimination, even by those who, due to disabilities, require assistive technologies or special configurations»



Three objectives

1. Develop a fully accessible **serious game**
2. Provide a complete and satisfying experience even for the person with **blindness**
3. Not create an "accessible version," but a single learning object for **everyone**



The persons with blindness and digital content

Screen readers



Personal computer



Browser



Digital content



The persons with blindness use the **keyboard** as sighted people use their **eyes**

Accessibility and Usability

1. The **Web Content Accessibility Guidelines** (WCAG) published by the Web Accessibility Initiative (WAI), which is part of the World Wide Web Consortium (W3C)

An accessible content must be:

- **Perceivable**
- **Operable**
- **Understandable** (for less experienced users)
- **Robust** (working on different devices and technologies)

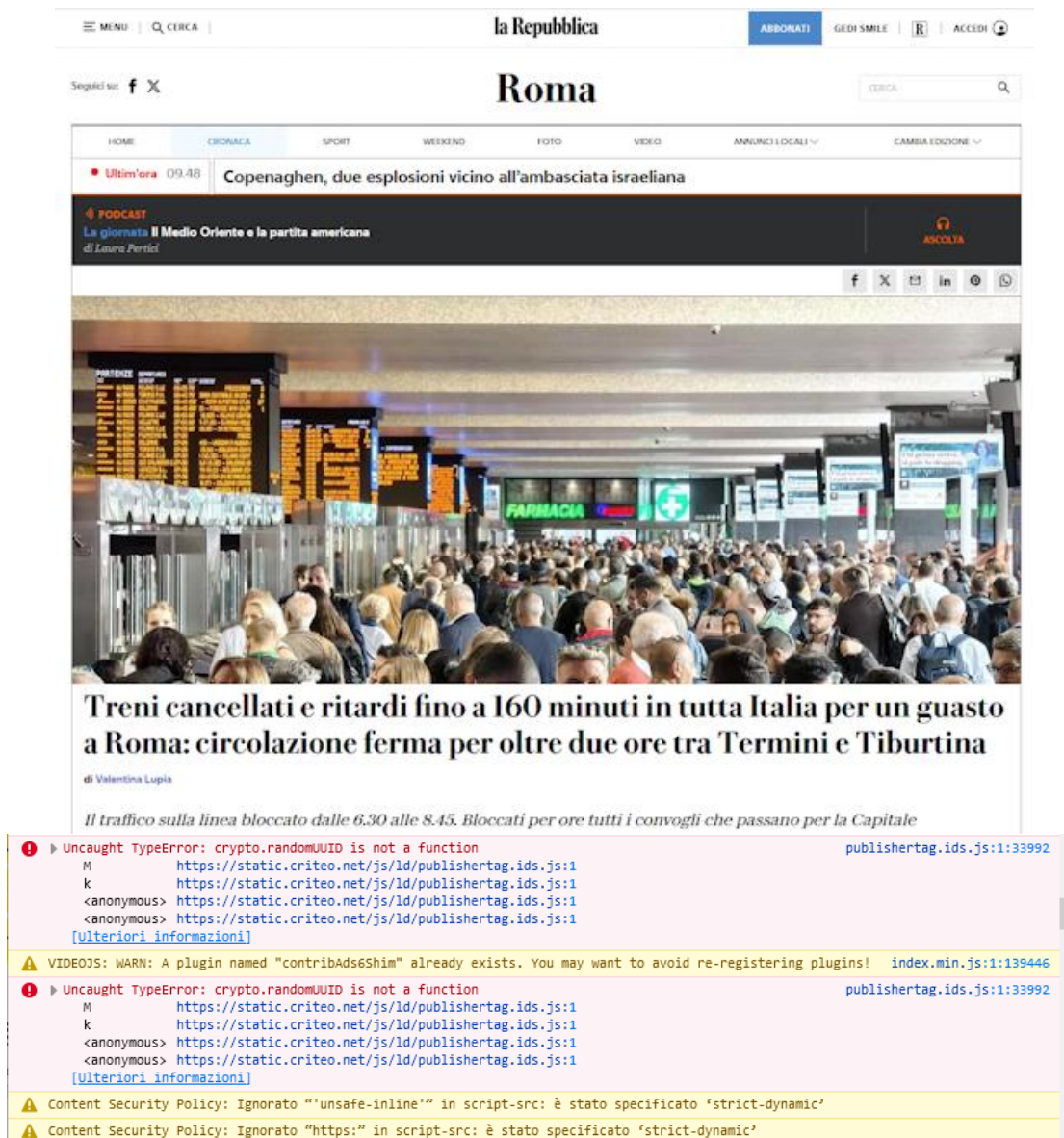
2. **Usability** criteria

A usable content must be:

- **Easy to use**
- **Satisfactory**

Accessibility of serious games: 1 - Correct HTML code

The HTML code must be **error-free**



The screenshot shows the la Repubblica website with the headline "Treni cancellati e ritardi fino a 160 minuti in tutta Italia per un guasto a Roma: circolazione ferma per oltre due ore tra Termini e Tiburtina". Below the article, the browser's developer console is open, displaying the following errors:

- Uncaught TypeError: crypto.randomUUID is not a function (publishertag.ids.js:1:33992)
- VIDEOJS: WARN: A plugin named "contribAds6Shim" already exists. You may want to avoid re-registering plugins! (index.min.js:1:139446)
- Uncaught TypeError: crypto.randomUUID is not a function (publishertag.ids.js:1:33992)
- Content Security Policy: Ignorato "'unsafe-inline'" in script-src: è stato specificato 'strict-dynamic'
- Content Security Policy: Ignorato "https:" in script-src: è stato specificato 'strict-dynamic'

browsers are **tolerant**, but screen readers are much less so

Accessibility of serious games: 2 – ordered content

Arrange
information in the
HTML code to
make it logical and
understandable

1 Teresa Battaglia

6

2

3

4

5

Nomina membro della commissione

☒ sì ☐ no

Anno di nascita 1989

Anno assunzione 2016

Titoli di studio:

- Diploma di Laurea in Scienze dell'Educazione e della Formazione.
- Diploma di Laurea magistrale in Scienze della Formazione.
- Master in Apprendimento cooperativo e comunità di pratiche.

Inquadramento:

- Dirigente di II fascia area "Attività formative" dal 2019.

Precedenti esperienze significative:

- 2023: Presidente commissione giudicatrice gara per la formazione dei docenti sulle tecnologie didattiche collaborative.
- 2014 - 2018: Ricercatore Istituto di Tecnologie Didattiche CNR, Genova.

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Accessibility of serious games: 3 – semantic elements (1)

la Repubblica ← newspaper name

Roma ← local news headline

HOME CRONACA SPORT WEEKEND FOTO VIDEO ANNUNCI LOCALI CAMBIA EDIZIONE ← menu

Ultim'ora 09:48 Copenaghen, due esplosioni vicino all'ambasciata israeliana ← breaking news

PODCAST La giornata in Medio Oriente e la partita americana di Laura Pertici ← podcast

f X t in ← share link

article image

Treni cancellati e ritardi fino a 160 minuti in tutta Italia per un guasto a Roma: circolazione ferma per oltre due ore tra Termini e Tiburtina ← article title

di Valentina Lupis ← author

Il traffico sulla linea bloccato dalle 6.30 alle 8.45. Bloccati per ore tutti i convogli che passano per la Capitale ← article subtitle

02 OTTOBRE 2024 AGGIORNATO ALLE 09:55 ← publication date and time

Ritardi fino a 160 minuti, cancellazioni, caos e proteste. A causa di un "guasto tecnico" alla linea – così lo definisce Trenitalia – dalle 6.30 la circolazione tra le due stazioni principali di Roma, Termini e Tiburtina, si è bloccata. Il traffico è ripreso intorno alle 8.45 ma la circolazione, scrive Trenitalia, resta "fortemente rallentata". Direttamente coinvolti i treni Alta Velocità e Intercity. Essendo Termini e Tiburtina dei nodi centrali sono interessate anche le altre stazioni e la rete dell'alta velocità, con cancellazioni e ritardi per tutti i treni che passano per la Capitale. Ai banchi delle informazioni centinaia di persone in fila. A Termini all'inizio della mattinata sono andati in tilt anche i monitor informativi, poi riattivati, con annunci che arrivavano solo attraverso l'altoparlante e via sms. ← article body

Regime amministrato e sede in Italia ← advertising

IG.COM

Accessibility of serious games: 3 – semantic elements (2)

Use **semantic tags and attributes**

Cosa risponde il Responsabile?

Ho capito, preparo subito i documenti per l'appalto. ☐

Ho capito, ma dimmi: qual è lo stanziamento? ☐

Ho capito, quindi bisogna affidare il progetto a qualcuno... ☐

```
<fieldset id="dia_daf_pagina" draggable="false...">
```

```
<legend id="dia_daf_pagina_titolo" ...>Cosa risponde il Responsabile?</legend>
```

```
<div id="dia_daf_pagina_0" ... >
```

```

```

```
<input id="dia_daf_pagina_0_input" type="radio" name="dia_daf_pagina_a...">
```

```
<label id="dia_daf_pagina_0_testo" for="dia_daf_pagina_0_input">...
```

Ho capito, preparo subito i documenti per l'appalto.

```
</label>
```

```
</div>
```

```
...
```

```
</fieldset>
```

Accessibility of serious games: 4 – add/hide

Optimize the content for screen readers

Le situazioni

Alessandro...

☐ è / ☐ non è sotto stress per il superlavoro

è responsabile del Ced, il cui organico è

☐ adeguato / ☐ insufficiente



Alessandro...
is/is not under stress
due to overwork



Is Alessandro stressed
due to overwork?

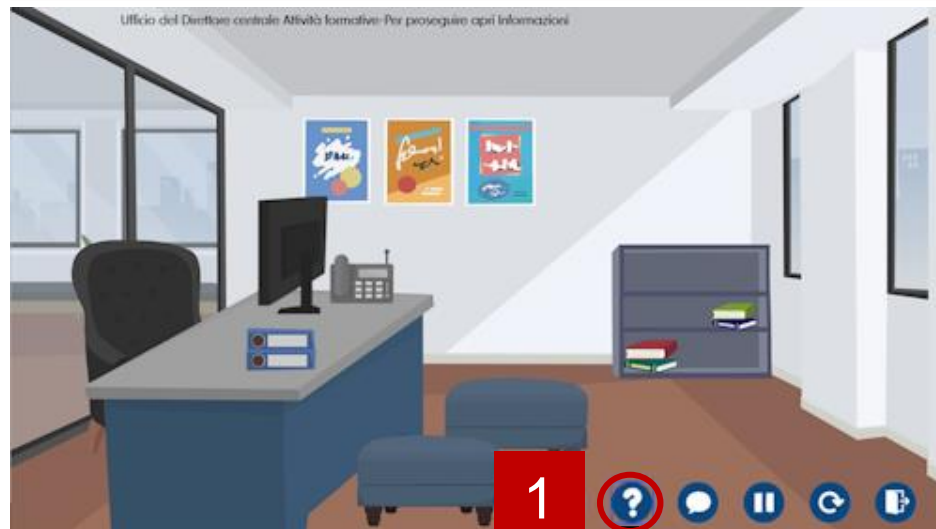
- yes
- not

Accessibility of serious games: 5 – manage events

Automatic events require prior
announcement and “**authorization**”

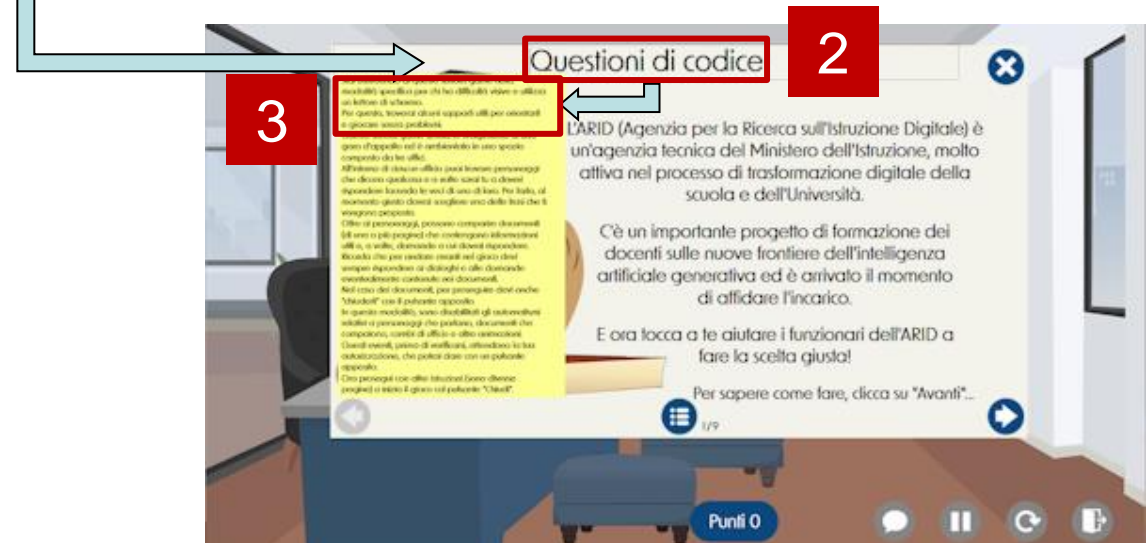


Accessibility of serious games: 6 – handle focus



Dynamically
shift **focus** to the most
relevant information

Browser automation
isn't always enough



An accessible serious game

