The use of Indie4all platform for Visually impaired students on the acquisition of learning objects with Computational Thinking Practices in Music, Math and Physics
Our Team

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Talk Outline

- Computational thinking
- Learning barriers by visually impaired students
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- Learning Objects
- Indie4all platform
- Micro:bit programming environment
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Computational thinking

- Computational Thinking (CT) is an analytical cognitive skill that draws on concepts from computer science.
- Fundamental skill useful for everyone.
- A topic of increased interest by educators, with emphasis on the most appropriate tools and on its relevance to STEM subjects.
- There is currently much research being undertaken into the methodology of providing the best inclusive CT curriculum that visually-impaired students can undertake.
Learning barriers by VI students

- Many access barriers that need to be overcome
- It is difficult for learners with visual disabilities because of its «tendency to rely on visual representations to convey abstract concepts»
- A blind person needs additional support from stimuli beyond vision to understand the environment
Universal Design for Learning (UDL)

- Universal Design for Learning (UDL) helps teachers design curriculums that meet the needs of all students from the beginning by providing a framework for understanding how to create such a curriculum.
- That framework is based on principles such as using multiple ways of representations using different methods of presenting information.
- The more appropriate combinations of content, media and technologies are offered, the greater the scope and accessibility of the content is created.
Learning Objects

- IEEE defines a learning object as “any entity, digital or non-digital, that can be used for learning, education or training” (Standard for learning object metadata, 2002)
- A learning object should be designed to utilize the abilities of each user
- Different guidelines and principles must be applied to be accessible and useful.
- Barriers can be reduced by the designer or assistive technology
INDie4All

INDie4all is precisely aligned with the recently released Digital Education Action Plan (2021-2027), which identifies two key goals:

- Educators and education and training workers who are digitally skilled and confident.
- Content of high quality, user-friendly tools, and secure platforms, complying to privacy and ethical norms.
The teachers, after being trained in the platform by specialists and researchers, they produce their own learning objects accessible to blind or visually impaired students, including students with other comorbidities.
You can upload and organize your primary content such as:

- Images
- Video clips
- Audio clips
- Subtitles
INDie4All

The platform gives the capability:

- Regenerated scenarios
  - (Edit unit)
- Scenarios form scratch
  - (Create new unit)
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To maintain student interest, INDIE4All’s rich online learning modules frequently feature several interactive activities.

Some activities, such as the drag and drop widget, are changed to make them more accessible and practical with the utilization of the screen reader.

Drag’n’drop widget
INDie4All

- A video element with Greek subtitles
- Subtitle can be read by a screen reader program so that visually impaired children can hear it (NVDA)
Micro:bit Programming Environment
An uploaded scenario in Indie4All platform based on computational thinking

Our first program – The Creation of musical instruments
The Micro:bit is a small programmable and embeddable computer designed, developed, and deployed by the BBC.

The Micro:bit Educational Foundation, a nonprofit organization founded in 2016 has taken the Micro:bit platform from a local educational experiment in the United Kingdom to a global effort sponsored by the Micro:bit Educational Foundation.
Micro:bit

- Over four million Micro:bit devices have been sold in more than 60 countries, with various hardware, content, and education partners involved.
- Students are being inspired to master essential computing skills in entertaining and creative ways because of this programmable computer which has the size of a credit card.
The above exhibition of the Micro:bit scenario in Indie4all platform has a twofold goal:

- The first goal is to teach blind students about basic abstract concepts in Physics via the enjoyable, entertaining, and constructive way of hearing music.
- The second goal is to teach these students the different sounds of notes, the scales, and different instruments.
Pilot study

- The research focused on the blind and visually impaired students who use the proposed platform and its differentiated scenarios, and they interact with the interface.

- That is why we tested similar applications to understand how consumers interact with various components of application interfaces.
Pilot study

- One of the most common themes in the teachers answers in the pilot tests was that the micro:bit is very simple for pupils to learn and transform concepts and tasks into engaging, motivating and accessible to all.

- Other opinions about the micro:bit were that it was good, entertaining, and didn't require any expensive components, and that it could develop as many projects as required.
Application design

- A visually impaired student needs special techniques to receive feedback from the device.
- Sensitive interfaces such as vibrations, synthesized voice and beep sounds are thus used to provide multisensory information to users.
Conclusions

- This study intends to help and stimulate the creation of new technologies to improve the computer learning education of students with visual impairments.

- In our implementation, we are using Indie4all platform.

- In this way, we are attempting to facilitate the learning process in order to ensure that young people with vision impairments have equal access to education.

- The benefits of accessibility and non-exclusion from digital learning objects provide a starting point by creating a new space that promotes opportunities for people with disabilities to participate in all areas of education.
References


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Any Questions?
Thank you for your attention!