Engineering Challenges in Developing an Informal Music Learning Game Environment

Walt Scacchi and Alex Szeto
Institute for Software Research
and
Institute for Virtual Environments and Computer Games
University of California, Irvine
May 2014
Overview

– A brief tour of SFSKids.org
  – highlighting innovations and competitive advantages
– Guided tour and walk-through of SFSKids
– Expanding the scope and reach of SFSKids to diverse, global audiences with multiple musics
  – through externally funded partnerships
Welcome!

Welcome to SFSKids – Fun and Games with Music! We're glad you're here. There's a whole world of symphonic music waiting for you to explore!

Start by choosing a location. Then jump right in and let the fun begin!

Let's Start!

Click here to start!
SFSKIDS.org: Portal for 8-13 year old students

Discover Music
Under the Sea of Knowledge.

Play with Music
Above the Musical Skies

Perform Music
In the Instrument Garden

Conduct Music
At the Symphony Hall

Compose Music
Atop the Mountain of Muses
Competitive landscape: who competes with SFSKids?

– Other orchestra portals?
  – NYPhil, Dallas, Nashville, (Carnegie Hall)?

– Online music education portals?
  – Music Learning Community, Piano Education, MTNA, World Music Daria, PBSKids?

– Games with/for Music?
Innovative challenges addressed in *SFSKIDS*

- Non-Functional Requirements
- Playful user interfaces
- Gesture control
- Real-time DSP in Web browser
- Persistence without storage
- Design for extensibility
Accommodating Non-Functional Requirements

– SFSKids must be *fun* for 8-13 year old students
-- SFSKids must operate on older or slower personal computers
  – enabling young people in underserved communities
-- SFSKids aligned with *National Music Education Standards*
Align with National Music Education Standards

NATIONAL STANDARDS FOR MUSIC EDUCATION

1. Singing, alone and with others, a varied repertoire of music.
2. Performing on instruments, alone and with others, a varied repertoire of music.
3. Improvising melodies, variations, and accompaniments.
4. Composing and arranging music within specified guidelines.
5. Reading and notating music.
6. Listening to, analyzing, and describing music.
7. Evaluating music and music performances.
8. Understanding relationships between music, the other arts, and disciplines outside the arts.
9. Understanding music in relation to history and culture.

Related Links:
- [Summary Statement](#) Education Reform, Standards, and the Arts—Summary Statement to the
- [National Standards for Arts Education: Introduction](#)
- [National Standards for Arts Education: A Brief History](#)
- [National Standards for Arts Education](#) (complete K-12 standards, hosted by ArtsEdge)
Playful user interfaces

Discover Music
Under the Sea of Knowledge.
Playful user interfaces (for stimulating neurocognitive attention management)

Amilcare Panchielli
_Dance of the Hours_
Playful user interfaces (for emotional recognition and reasoning)

...the music is soaring...
...this is fun and crazy...
...this is hushed and quiet...
What cheerful music...
...I sense excitement...

Franz Schubert
First Movement from Symphony No. 5

Back to Music List
Gesture control (without costly devices)

Perform Music
In the Instrument Garden
Gesture control (without costly devices)
Conduct Music
At the Symphony Hall
Real-time DSP/Music Processing in Web browser

Dance of the Hours

Follow

Let the master conductor guide you.
Follow the instructions perfectly to earn a high score!

Lead

The student has become the master.
Use everything you've learned to lead the orchestra!
Real-time DSP/Music Editing/Composing in Web browser

Moderato

Here is the second half of our solution, the decrescendo symbol.

Crescendo and Decrescendo
Crescendo and decrescendo smooth the journey from soft to loud, and from loud to soft!
Persistence without storage

SFSKids requires minimal service support: therefore **no** external database or content management servers employed/required

-- Users can export (via email) *encoded URIs* that embed *music compositions* or *music (video) animations*

-- Other users can receive and select encoded URIs, resume session, or modify user-created content
SFSKids.org, an instance of the *World of Music* platform, is designed for extension, modding, or customization of:

- Recorded music catalog
- Music history
- Music genres (Opera, Jazz, World,...)
- Musical instruments
- User-created music+imagery (“music videos”)
- Localization (internationalization)
- Integration with Science, Technology, Engineering, Arts, and Mathematics (STEAM) learning initiatives
Conclusions

- *Fun and games with music*: a challenging requirement!
- Technological innovations for youthful online music education
  - playful user interfaces; gesture control;
  - real-time music processing; persistence without storage, extensibility, etc.
- Enabling new (market) opportunities via a reusable music learning platform!
Acknowledgements

– The San Francisco Symphony
  – Ron Gallman, Education Director, and many others

– National Science Foundation, grants #0808783, #1041918, #1256593

– Contributors include: Craig Brown (SMU), Garnet Hertz (UCI-LUCI), Robert Nideffer (RPI), Pacific Conservatory (Brenda Eeds, Director), Kira Fluor-Scacchi (UCLA)

– No review, approval, or endorsement implied.