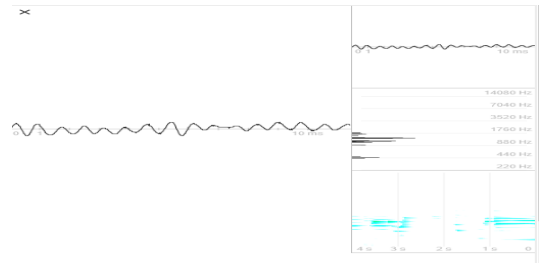


Title:	House of Chords		
Keywords:	frequency, sinusoid, equation, nodes, wave, wavelength, chords, harmonic chains, consonance, dissonance.		
Short Description:	In this scenario students understand how the idea of chords is being produced and how the combination of chords leads us to harmonic sequences. They investigate given consonances and dissonances of different tones according to ear and data analysis. Students experiment with the compilation of two, gradually three, tones produced in the tone synthesizer and analyze their observations using their ear in combination with the measurements taken from the workbench analyzing toolkit. With the help of their Music teacher, they draw a score of consonances or dissonances as a result of building chord sequences and finally they record it using the virtual instruments produced to play it.		
Lesson Plans included:	Chord construction, Introduction in Tonality, Chord Analysis in terms of Music, Chord Analysis in terms of Physics, Consonance and Dissonance, Harmonic progression performance	Date:	20/03/18
Educational Objectives:	Analysis of the chords and the Tonic system in Music.	Estimated Duration:	10 hrs
Author(s):	P. Stergiopoulos	Age Group:	15-17 (14-16)
Contributor(s):	-	Language:	English
Status:	Final	Difficulty Level:	High
Dissemination level:	Public	Special Needs Addressed:	No

Phases	Field	Time	Description	Activity	Remarks
Imagine	M	1	Students are starting to imagine why a do they like the songs they hear on youtube or on their favorite channel.	Students listen to a favorite song. Students ask music teacher to play a song in the piano. Alternatively students play a song using a guitar or a piano at school. Students analyze the song in chords or find the chords on the internet. Alternatively they ask their classmates who played the song, to write the chords down. Students record the whole song. Students record the tonic (fundamental) chord. Questions: Why do we like to hear the specific sequence of chords? What helps us “recall” a song?	With the help of their music teacher students discuss about the sequence of chords. Teacher helps them observe that the sequence of chords obey the fundamental rule of tonality.  <i>Figure 1: Using the analyzer to analyze the fundamental chord of a song</i>
Engage	M	1	The construction of chords (“Music” aspect).	The teacher reviews the recorded files of a chord	At this point the music theory behind the construction of chords is being introduced. Building a scale using

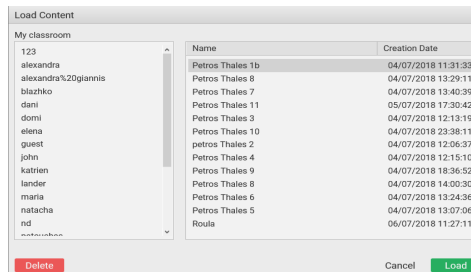


Figure 2: Downloading a file from the “save bin”

and asks students to reproduce it using the pitch wheel

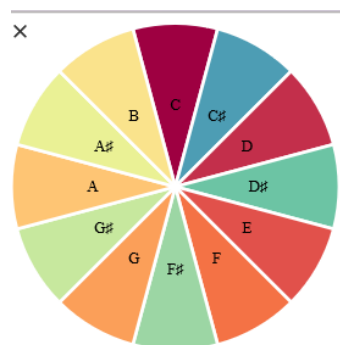


Figure 3: Using the pitch wheel to reproduce the sounds of chord

Music teacher asks the students to produce different chords and analyse their intervals.

Question: Are all chords the same? Are there

2M or 2m can be constructed when we follow a figure resembling the piano.

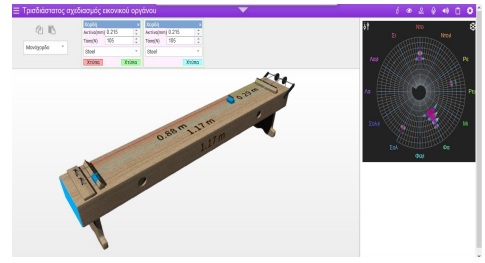
	Soiflege	Λατινική Ονομασία	Πιάνο
↑	...	...	
ανεβαίνουμε...	PE	D5	
	NTOf / PEb	C#5 / Db5	
1	NTOf	C5	↑
12	ΣΙ	B4	
11	ΛΑ# / ΣΙb	A#4 / Bb4	Ο
10	ΛΑ	A4	Κ
9	ΣΟΛ# / ΛΑb	G#4 / Ab4	Τ
8	ΣΟΛ	G4	Τ
7	ΦΑ# / ΣΟΛb	F#4 / Gb4	Λ
6	ΦΑ	F4	Λ
5	ΜΙ	E4	Β
4	ΡΕ# / ΜΙb	D#4 / Eb4	Β
3	ΡΕ	D4	Α
2	ΝΤΟ# / ΡΕb	C#4 / Db4	↓
1	ΝΤΟ	C4	
	ΣΙ	B3	
	ΛΑ# / ΣΙb	A#3 / Bb3	
κατεβαίνουμε...	ΛΑ	A3	
↓	...	...	

Figure 4: Introducing the basics of tonality

Music Teacher introduces intervals to students. asks students to identify intervals using the figure as the above. Students are focused on the intervals of 3rd and 5th.

Question: How can we build a chord?

A chord is produced when three pitches are sounding simultaneously. At this point pitches can be reproduced using three different computers running the pitch wheel.

				differences when examining one another? Music teacher asks the students to produce different chords and analyse their intervals.	Teacher can then guide the students to explore the major and minor chords produced within the Cmajor scale.  <i>Figure 5: Introducing the chords of the diatonic scale</i>
Create	S,M,E	1	Creating a chord (Physics aspect)	The class tries to reproduce the chord using the tone synthesizer  <i>Figure 6: Reproducing a chord with the tone synthesizer.</i> Teacher guides the students to observe the different parameters of consonance.	Each student chooses one chord and explores the ways to reproduce each pitch using the 3D Instrument Design environment  <i>Figure 7: Exploring the ways to produce a pitch using the string of a monochord</i>

				Questions: • Can you observe the curve of each sound using the colours of its graph? • What is happening on the nodes of each curves? • Can you observe signs of repetition?	By altering length, material or tension, students experiment with the production of one pitch as part of a certain chord at the diatonic scale.
Reflect	S	1	Consonance and dissonance. Students observe the differences of consonance and dissonance.	Physics teacher asks a group of students to reproduce a chord that doesn't obey the rules of 5th and 3rd (either m or M). E.g. : Analyzing chord F,G,A (Fa, Sol, La) in contrast with F, A, C (Fa, La, Do). Two computers might be used to demonstrate the two examples. Students observe the curves.	Both teachers help students understand the differences between a major (or minor) chord and a cluster (combination of successive notes). They also encourage them to experiment in various instances of the two kinds of consonances and dissonances .

What are the differences?



Figure 8: Reproducing FAC chord with the tone synthesizer.

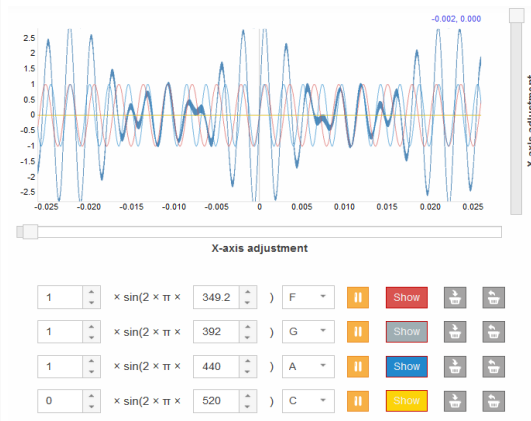


Figure 9: Reproducing FGA chord with the tone synthesizer.

Students observe the differences within the same visual range.

Create	E, M	1	Combining consonance and dissonance chords to make simple harmonic progressions.	Music teacher guides the students to produce a simple harmonic progressions such as: a) I-IV-V-I b) I-IV-II-V-I, (or I-VI-IV-II etc...) c) I-IV-II-V7-I. Question: - What is the difference between progressions b and c? - Can you observe the dissonance of V7 on progression c? Using different clusters of three computers in class, students form one or two harmonic steps . They use Tone Synthesizer and 3D visualization to make their observations.	Music teachers introduce basic elements of harmonic progressions  <i>Figure 10: Introducing simple harmonic progressions.</i>
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Reflect	S, M	1	What are the properties of the proposed harmonic progression scheme? Does it sound harmonically correct?	How can we reflect on our harmonic creation? As we analyze the differences between progressions b and c we observe that dissonant 7th (note F on V7) was prepared by the previous harmonic step. Question: How does the curve of “F” behaves through all the harmonic steps of the progression?	Music teacher displays the prepared 7th on dominant. Students reflect the role of dissonant 7th through all the chords of the progression involving this note.
Communicate	M	1	Produce simple harmonic progressions	Students reproduce harmonic progressions using the 3D Instrument interaction environment. Computers in class following the division made earlier, form groups of three single computers playing dissonant clusters, consonant chords or harmonic progressions. <i>Figure 11: The instrument producing one pitch of a chord of an harmonic progression</i>	Students under the guidance of their teacher, produce a score of their harmonic progression. They also record their progression at the Performance Sampler and produce an ostinato. <i>Figure 12: The instrument producing one pitch of a chord of an harmonic progression</i>