Interactive Music Science Collaborative Activities

Team Teaching for STEAM Education

Deliverable 6.5

Report on Teachers training communities

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Executive Summary

This document is a report describing the iMuSciCA offline and online community setup. The iMuSciCA community supports online resources of the final scenarios produced by the project along with localized project description and activities.

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Date	**Version No.**	**Author**	**Change**
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Disclaimer

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LIST OF ABBREVIATIONS

Abbreviation	Description
PU	Public Report
WP	Work Package
ATHENA	ATHENA RESEARCH AND INNOVATION CENTER IN INFORMATION COMMUNICATION & KNOWLEDGE TECHNOLOGIES
UCLL	UC LIMBURG
EA	ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE
IRCAM	INSTITUT DE RECHERCHE ET DE COORDINATION ACOUSTIQUE MUSIQUE
LEOPOLY	3D FOR ALL SZAMITASTECHNIKAI FEJLESZTO KFT
CABRI	Cabrilog SAS
WIRIS	MATHS FOR MORE SL
UNIFRI	UNIVERSITE DE FRIBOURG
ODS	Open Discovery Space

1. Introduction

This document describes the offline and online community of iMuSciCA at the Open Discovery Space portal. A description on the iMuSciCA community structure and activities developed during the project's lifetime is included. Instructions on how to further expand the existing network of communities in the future is included as an annex to this document. A full introduction to the Open Discovery Space objectives and goals can be accessed through the following link:
http://portal.opendiscoveryspace.eu/content/ods-short-828191

2. Creating the iMuSciCA online community

2.1. What is Open Discovery Space

Open Discovery Space is an open educational online platform that was funded by the Competitiveness and Innovation Project framework (CIP). The platform supports the need for teachers to disseminate and exchange good practices covering a wide variety of disciplines and interests including Sciences and the Arts.

Moreover ODS promotes community building between numerous schools of Europe and empower them to use, share and exploit unique resources from a wealth of educational repositories, within meaningful educational activities. In addition, it gives the opportunity to eLearning resources to meet the educational needs of these communities, supported by a European Web portal: a community oriented social platform where teachers, pupils and parents discover, acquire, discuss and adapt eLearning resources on their topics of interest.

The creation of the online project-community encouraged content development in an hierarchy-shape approach as the initial community was formed (with content in English) followed by the sub-communities in Greece and Belgium.

Teachers community in Belgium

In Belgium two secondary school teacher communities were formed during the project lifetime: the first one during piloting phase B1 (16 teachers from 7 different schools) and the second one during piloting phase B2 (5 teachers from 3 different schools). The aim of these communities was to:

- present the project, the workbench, the available scenarios to the participants,
- collect feedback on the developed material to improve it,
- co-create lesson plans and scenarios with the teachers.

The first community met four times between June 2017 and June 2018. The second community met

four times between September 2018 and June 2019. Two of the teachers participating during the first piloting period (B1) also took part in the second community during phase B2.

Figure 1a: A picture taken during one workshop of the teacher communities in Belgium.

Further to these communities, in Belgium also two groups each of 5 teacher students were formed: one in the period 2017-2018 and one in the period 2018-2019. These teacher students also co-created iMuSciCA scenarios under the guidance of the teacher educators at UCLL. Their bachelor thesis was dedicated to iMuSciCA.

Teachers community in Greece

The educational communities in Greece comprised from: i) the teachers who took part in professional development during the school year through in person sessions, ii) teachers who have attended remote sessions via teleconference, and iii) teachers who followed the implementation approach via control group.

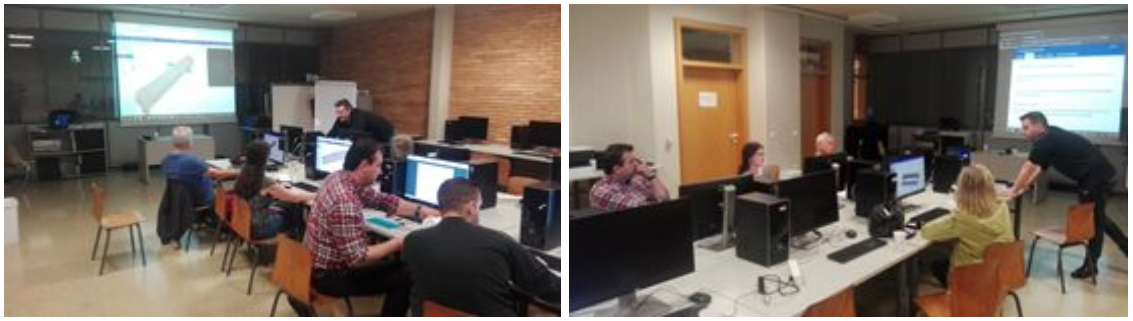


Figure 1b: Pictures taken during one workshop of the teacher communities in Greece

The Teachers' Community in Greece started a few months after the launch of iMuSciCA's Parent Community and served as the main hub for dissemination and localization of iMuSciCA information

in Greece. The announcements of seminars, competitions and translations of the platform implementation progress- details in real class environment were published through the community portal.

Teachers community in France

In France, the pilot experiments created an opportunity for teachers of the school from various subject matters to work together and to interact: maths, physics, music and technology teachers for the pilot in year 2018 and maths, music, physics and biology teachers for the second pilot in 2019.

Other teachers belonging to different teaching institutions (including a music school) have been introduced to the STEAM approach using the workbench through webinars and face-to-face presentations.

A national tender calling for digital resources in scientific domains was won by Cabrilog which proposed among other resources the use of Cabri activity books integrating the workbench. These resources are proposed to schools covering 55% of the total population of French students.

2.2. The iMuSciCA online Community Structure

iMuSciCA community is built around the necessity of delivering project-related content, mainly teaching scenarios, that is useful to teachers. The main community-page here holds a description of the project's objectives and the purposes that the community is committed to fulfill.

Figure 2: iMuSciCA online community structure

An iMuSciCA community allows community members to exchange localized content useful for implementing iMuSciCA according to individual needs. Community members are allowed to upload their own scenarios and download every initial scenario designed by the pedagogical team. iMuSciCA

scenarios are regarded as part of the project's educational resources and they are kept at the corresponding digital space of the community.

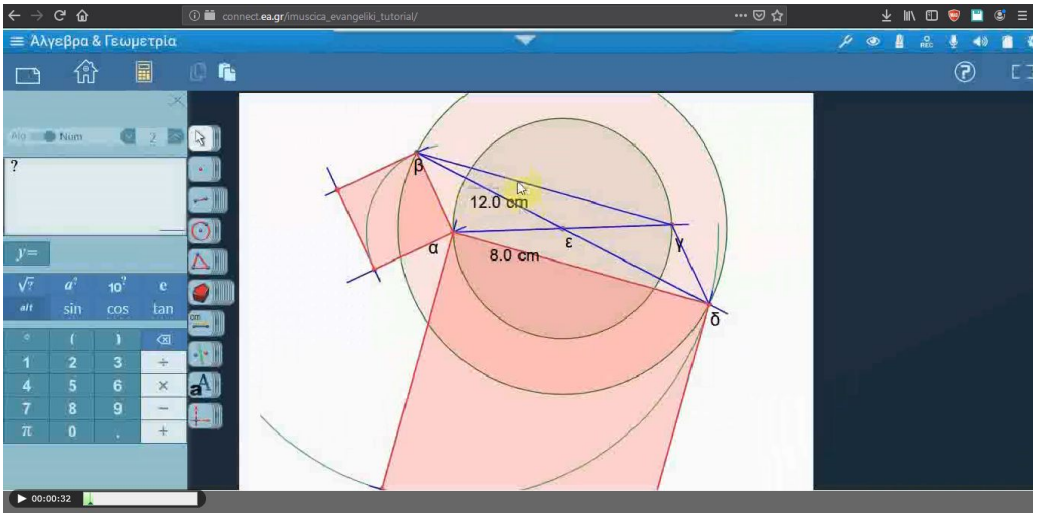


Figure 3: Screenshot from the video tutorial following the adapted scenario for Evangeliki Scholi Neas Smyrnis, shared at the community

A series of localized events, such as webinars, was announced using the particular online feature of the ODS portal. Scheduled webinars were described and announced online through the community.

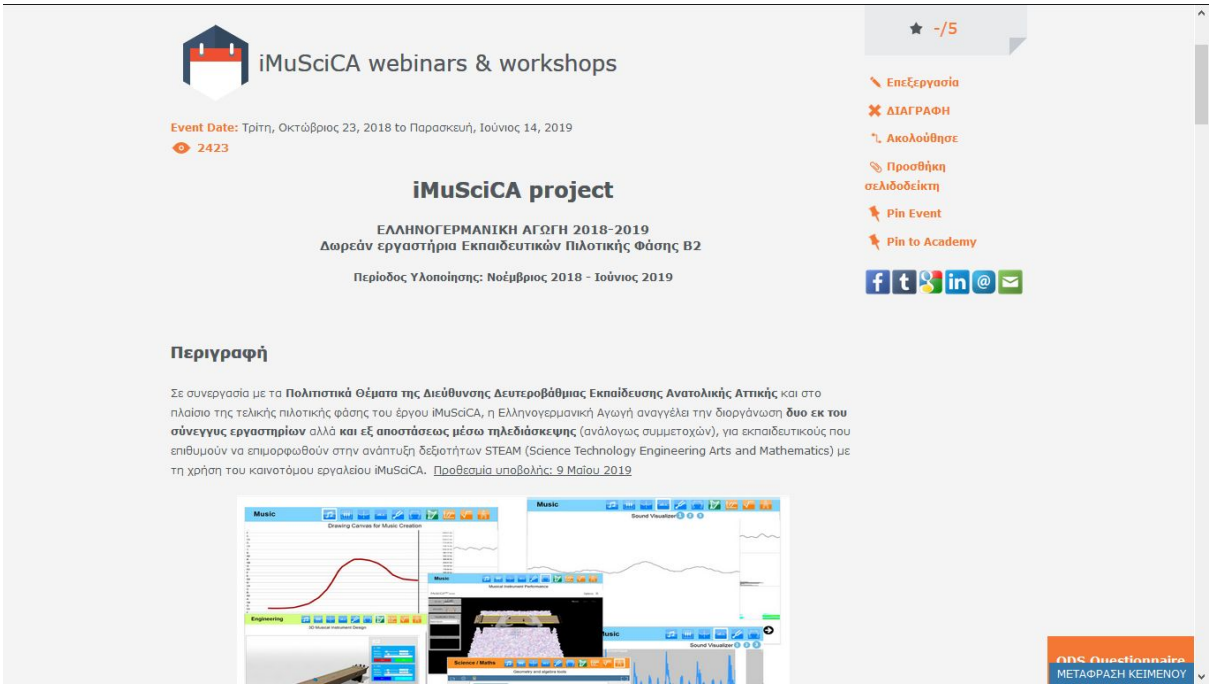


Figure 4: The iMuSciCA announcement for training events (physical and virtual) at the iMuSciCA subcommunity in Greece

The community's announcement on teachers' professional development training events was disseminated through social media and other authorized dissemination channels, such as the list of schools in a region (e.g the Secondary Education Directorate of Eastern Attica, Greece).

3. Community Content

3.1. The iMuSciCA community repository and features

Belgium

Generally each workshop of the teacher communities started with a presentation of the status of the project, of the existing scenarios and of the workbench by the teacher educators at UCLL. Teachers could then work in groups at the presented scenarios: they were asked to note their feedback on both the scenarios and the workbench. At the end of each workshop the collected feedback was discussed within the community. The collected feedback was then used by the consortium to improve the scenarios and the workbench. Between one workshop and the following one the teachers had the possibility to implement part of the activities in their classes: in general they adapted the existing activities to their specific class situations. During the next workshop they could present their findings collected while implementing iMuSciCA in their classes. This community format was very useful for the exchange of information between teachers and for the further improvement of the developed material (scenarios and workbench).

In order to facilitate the exchange of material, the iMuSciCA scenarios were uploaded on the iMuSciCA Moodle (https://lms.imuscica.eu/moodle/course/index.php?categoryid=1). The teachers participating in the communities had to create an account to have access to the material. Also a Belgian iMuSciCA sub-community was created on the ODS portal thus giving one more place where to share material between teachers and teacher educators.

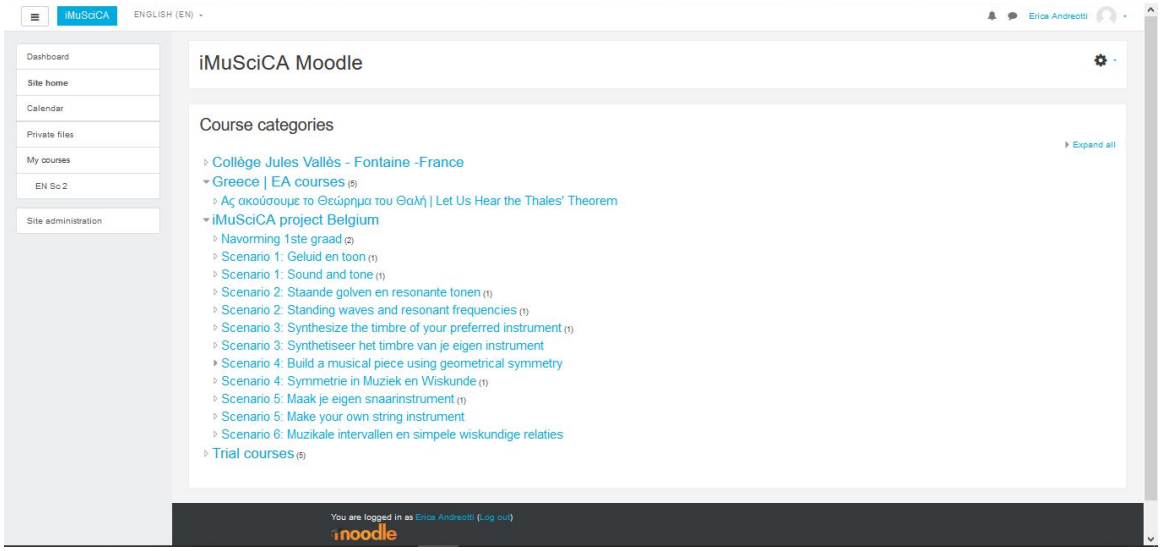


Figure 5: A screenshot of the iMuSciCA Moodle with the scenarios shared with the Belgian teachers communities.

In most cases teachers used the existing material as a starting point to develop their own scenarios adapted to their specific context. For example teachers from higher grades (with students 17-18 y.o.) used the activity books of scenarios 1 and 2 as a starting point, as these lessons are aimed at younger students (12-14 y.o.) and they developed their own activities around e.g. timbre using the tone synthesizer. One physics teacher from the school Sint-Theresiacollege at Kappelle-op-den-Bos dedicated his 'seminary hours' (2 hours per week) from January to June 2019 to iMuSciCA: he adapted the existing material to the level of his students (17-18 y.o.) and he even evaluated his lessons by creating specific questionnaires. More information about the work done by this teacher is available in D6.4. A music teacher from the school Mosa-RT (Maaseik) adapted the existing activities to her students of the 2nd grade (14-16 y.o.) of a professional field of study. These students have typically more difficulties to understand and become engaged in math and physics. The teacher made a very interesting work in order to adapt the level of the scenarios (e.g. *scenario 4: Create a piece of music using geometric symmetries)* to these students. Also interesting is the work done by a physics teacher from the school Stedelijk Lyceum Waterbaan in Antwerp. The students are in the third grade (17-18 y.o.) and many of them of foreign origin as the school is located in a poorer suburb of the city, where in fact many foreigners live. He also adapted the iMuSciCA lessons to this specific group of students and could find ways to motivate them for science. This teacher is scientix ambassador in Belgium. He became also an iMuSciCA ambassador by co-participating in national workshops together with the UCLL teacher educators, like e.g. in the workshop at the Velewe (Flemish Congress of Science teachers) on 17/11/2018 in Leuven.

In order to formalize the participation to the iMuSciCA communities a certificate was created and assigned to the participants at the end of each trajectory. An example is shown in the figure below.

ATTEST VAN DEELNAME

Hierbij verklaart

UC Leuven-Limburg | Navorming voor leraren
Groep Lerarenopleiding, Campus Diepenbeek
Agoralaan, Gebouw B, Bus 4, Blok R
3590 Diepenbeek

dat

Jordens An

de hieronder vermelde navorming heeft gevolgd:

"iMuSciCa en PI: slotdag"

op vrijdag 10 mei 2019

Gegeven te Leuven, 10/05//2019

Figure 6: A snapshot of the participation certificate assigned to the teachers in Belgium.

Greece

The presentation of the online community in Greece started with the presentation of iMuSciCA at the training conference held in Thessaloniki in March 2018. The workshop participants shared their views and learned about the educational scenario-contest for teachers with a free prize stay and attendance of the iMuSciCA Summer School held in Marathon in July of the same year.

Figure 7: A snapshot of the Teacher Competitions Announcement page in the community

As a result of the dissemination of the community, four scenarios of teachers were selected which met the selection requirements. During the iMuSciCA Summer School for Teachers, a separate educational community was created made up of Greek and foreign participants. The online

community of the professional development event helped educators from Belgium and Greece to share the results of their participation in an online repository.

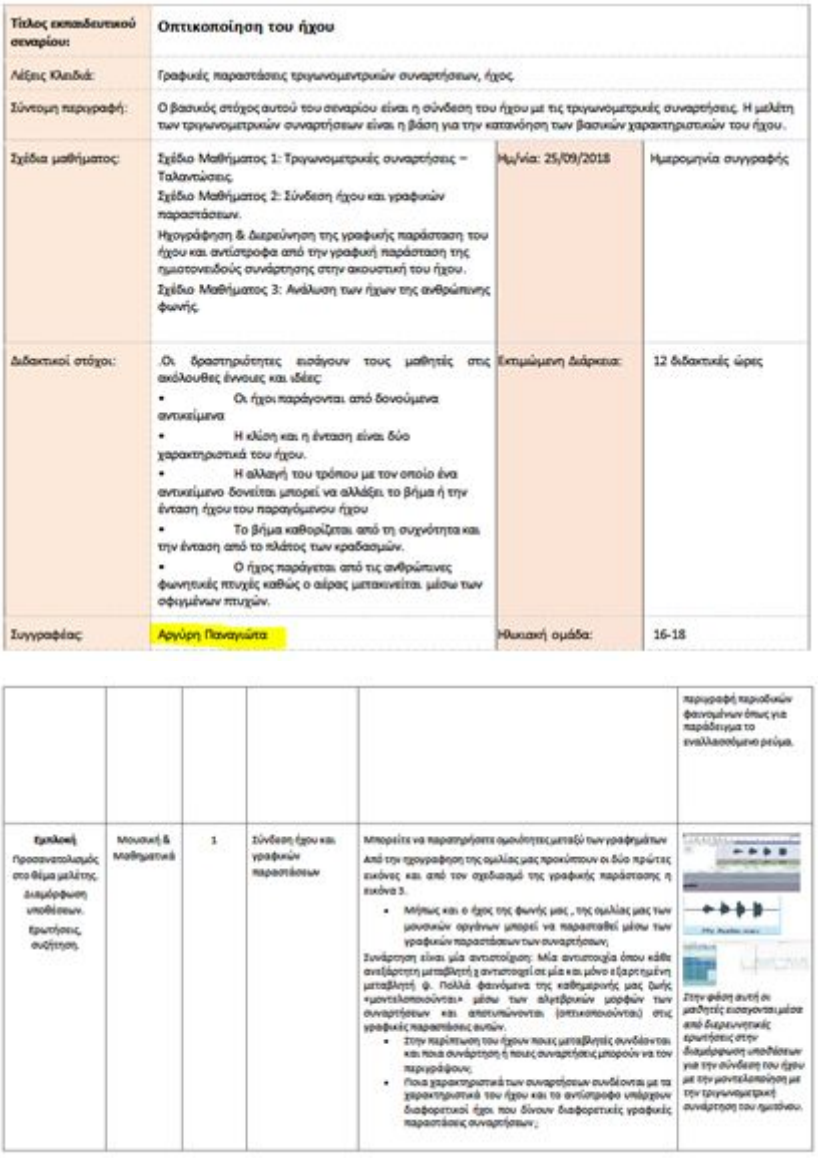
Figure 8: The iMuSciCA 2018 Summer School community

Along with the participation of teachers from Greece, the community was a safe field of exchange of educational standards useful to future members of the community from Greece and abroad. All scenarios created during the 5-day workshop were uploaded to the resources of the community repository.
The material of this special repository of resources, [was uploaded here](#) so as to encourage other teachers to exchange implementation practices.

Figure 9: Localized content within a community repository

The community helps disseminate project goals and practices in order to obtain a living repository of

original educational material. Original implementation scenarios written by teachers who have adapted their practices following professional development sessions, help the community to develop further specialized content tailored to the community's educational needs.



Τίτλος εκπαιδευτικού σεναρίου:	Οπτικοποίηση του ήχου		
Λέξεις Κλειδιά:	Γραφικές παραστάσεις τριγωνομεντρικών συναρτήσεων, ήχος.		
Σύντομη περιγραφή:	Ο βασικός στόχος αυτού του σεναρίου είναι η σύνδεση του ήχου με τις τριγωνομετρικές συναρτήσεις. Η μελέτη των τριγωνομετρικών συναρτήσεων είναι η βάση για την κατανόηση των βασικών χαρακτηριστικών του ήχου.		
Σχέδια μαθήματος:	Σχέδιο Μαθήματος 1: Τριγωνομετρικές συναρτήσεις – Ταλαντώσεις. Σχέδιο Μαθήματος 2: Σύνδεση ήχου και γραφικών παραστάσεων. Ηχογράφηση & Διερεύνηση της γραφικής παράστασης του ήχου και αντίστροφα από την γραφική παράσταση της ημιτονοειδούς συνάρτησης στην ακουστική του ήχου. Σχέδιο Μαθήματος 3: Ανάλυση των ήχων της ανθρώπινης φωνής.	Ημ/νία: 25/09/2018	Ημερομηνία συγγραφής
Διδακτικοί στόχοι:	Οι δραστηριότητες εισάγουν τους μαθητές στις ακόλουθες έννοιες και ιδέες: • Οι ήχοι παράγονται από δονούμενα αντικείμενα • Η ελάτη και η ένταση είναι δύο χαρακτηριστικά του ήχου. • Η αλλαγή του τρόπου με τον οποίο ένα αντικείμενο δονείται μπορεί να αλλάξει το βήμα ή την ένταση ήχου του παραγόμενου ήχου • Το βήμα καθορίζεται από τη συχνότητα και την ένταση από το πλάτος των κραδασμών. • Ο ήχος παράγεται από τις ανθρώπινες φωνητικές πτυχές καθώς ο αέρας μετακινείται μέσω των σφιγμένων πτυχών.	Εκτιμώμενη Διάρκεια:	12 διδακτικές ώρες
Συγγραφέας:	Αργύρη Παναγιώτα	Ηλικιακή ομάδα:	16-18

					περιγραφή περιοδικών φαινομένων όπως για παράδειγμα το εναλλασσόμενο ρεύμα.
Εμπλοκή Προσανατολισμός στο θέμα μελέτης. Διαμόρφωση υποθέσεων. Ερωτήσεις, συζήτηση.	Μουσική & Μαθηματικά	1	Σύνδεση ήχου και γραφικών παραστάσεων	Μπορείτε να παρατηρήσετε ομοιότητες μεταξύ των γραφημάτων Από την τροχοφορεση της ομάδας μας προκύπτουν οι δύο πρώτες εικόνες και από τον σχεδιασμό της γραφικής παράστασης η εικόνα 3. • Μήπως και ο ήχος της φωνής μας , της ομάδας μας των μουσικών οργάνων μπορεί να παρασταθεί μέσω των γραφικών παραστάσεων των συναρτήσεων; Συνάρτηση είναι μία αντιστοίχιση: Μία αντιστοιχία όπου κάθε ανεξάρτητη μεταβλητή χ αντιστοιχεί σε μία και μόνο εξαρτημένη μεταβλητή ψ. Πολλά φαινόμενα της καθημερινής μας ζωής «μοντελοποιούνται» μέσω των αλγεβρικών μορφών των συναρτήσεων και αποτυπώνονται (απεικονίζονται) στις γραφικές παραστάσεις αυτών. • Στην περίπτωση του ήχου ποιες μεταβλητές συνδέονται και ποια συνάρτηση ή ποιες συναρτήσεις μπορούν να τον περιγράφουν; • Ποια χαρακτηριστικά των συναρτήσεων συνδέονται με τα χαρακτηριστικά του ήχου και το αντίστροφο υπάρχουν διαφορετικοί ήχοι που δίνουν διαφορετικές γραφικές παραστάσεις συναρτήσεων;	 Στην φάση αυτή οι μαθητές εισάγονται μέσα από διερευνητικές ερωτήσεις στην διαμόρφωση υποθέσεων για την σύνδεση του ήχου με την μοντελοποίηση με την τριγωνομετρική συνάρτηση του ημιτόνου.

Figure 10: Example of a teacher's scenario in Greek at the Evangeliki Scholi Neas Smyrnis that is now part of the community's resources repository

Despite the limited target group of teachers that participated in the implementation phases, taking in account the fact that the project is using cutting edge technology, communities sought outreach to teachers outside of Attica.

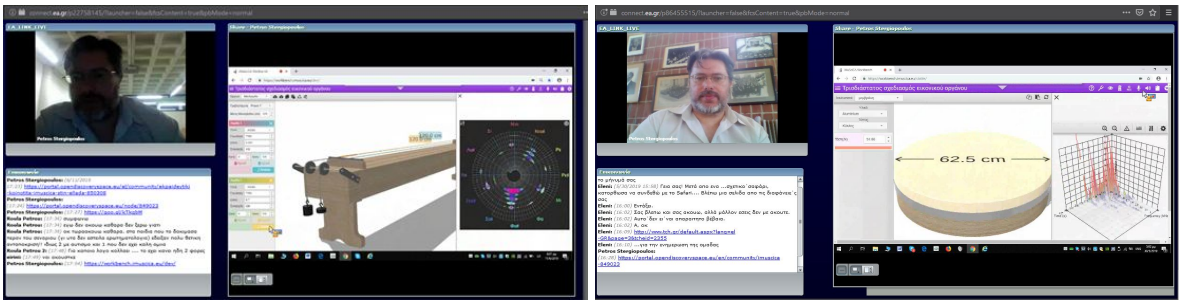


Figure 11: Online training with MuSiCA

Teachers from Santorini, Tripoli and Ioannina participated in the call for training events that were announced as a series of webinars in the iMuSciCA community at Open Discovery Space.

France

Following the national tender calling for digital resources a group of teachers is currently developing such activity books based on the iMuSciCA STEAM approach. This collection of digital resources embedding the workbench is likely to be used by a large number of teachers.
One part of the curriculum “Enseignement scientifique” (which is compulsory for all students of grade 11) addressed by this collection of digital resources is devoted to a STEAM approach of sound and music very close to the scenarios developed by the iMuSciCA project: notion of sound as a physical phenomenon of vibration and of frequency, interrelations between music and mathematics (interval between notes, Pythagorean scales).

4. Related Communities and Conclusions

Individual communities allow specialized provision of localized content tailored to the needs of teachers in their corresponding countries. The iMuSciCA community at Open Discovery Space looks forward to creating a grid of communities in which the content is similar or close to the project.

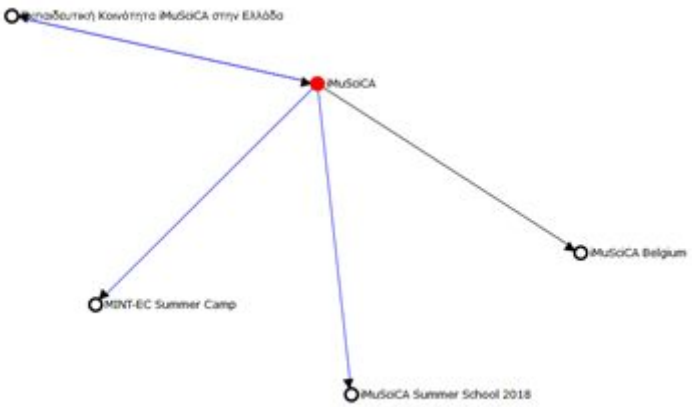


Figure 12: Outline of the communities that start building around the main iMuSciCA community

For the time being, the communities built around the project are closely related to the purposes of the project. As time progresses, a more dense list of online communities related to STEAM education is expected to be related to the project.

References

Conole, G. and Fill, K., 2005. A learning design toolkit to create pedagogically effective learning activities. *Journal of Interactive Media in Education*, 2005(1), p.Art. 9. DOI: http://doi.org/10.5334/2005-8

Annex 1 - Guidelines on “How to expand the iMuSciCA community network”

The expansion of an existing network of iMuSciCA communities starts with a new subcommunity committed to the project or by creating a new one related to the existing. The first step in this procedure is to register at the ODS portal.

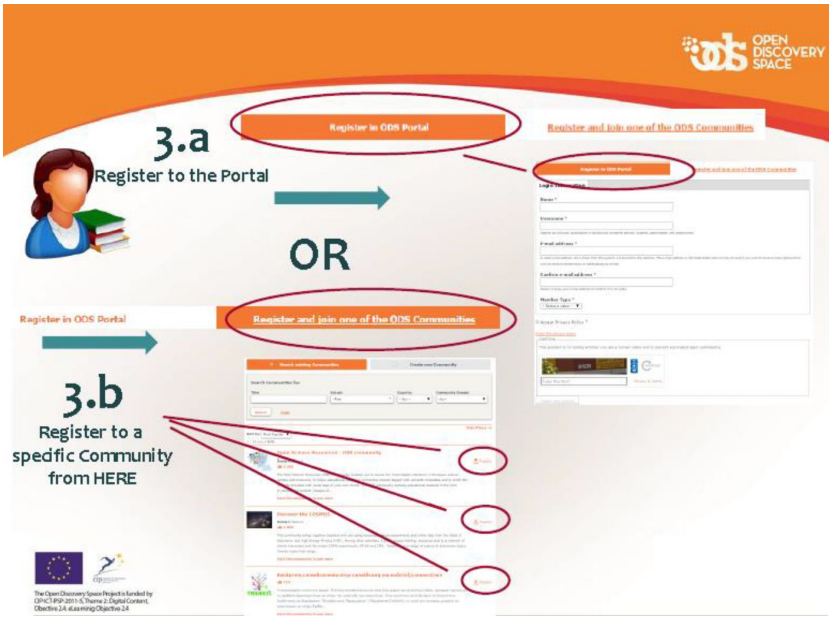


Figure 13: Registering at the ODS platform

Useful information for this procedure is thoroughly described in the following document:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Registration.pdf

Building the user profile

It is essential to note that the user profile for the iMuSciCA network of communities can be made either by a person (personal profile) or a school (school-profile). Disclosure of credentials to many recipients for the management of a school profile is not required as this can be achieved later through co-management and administration of the communities.

Figure 14: Accessing the user profile

For more upon the creation and management of profiles you can download a special guide within the following link:
http://ortal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Admin_Profile.pdf

Creating communities

The communities of the project can be created in the following cases:

1. around a school that develops implementation practices based in the project. In this case a distinction between “national” or “international” may be useful depending on the target group.
2. around iMuSciCA practices that have already been implemented
3. around interdisciplinary school activities

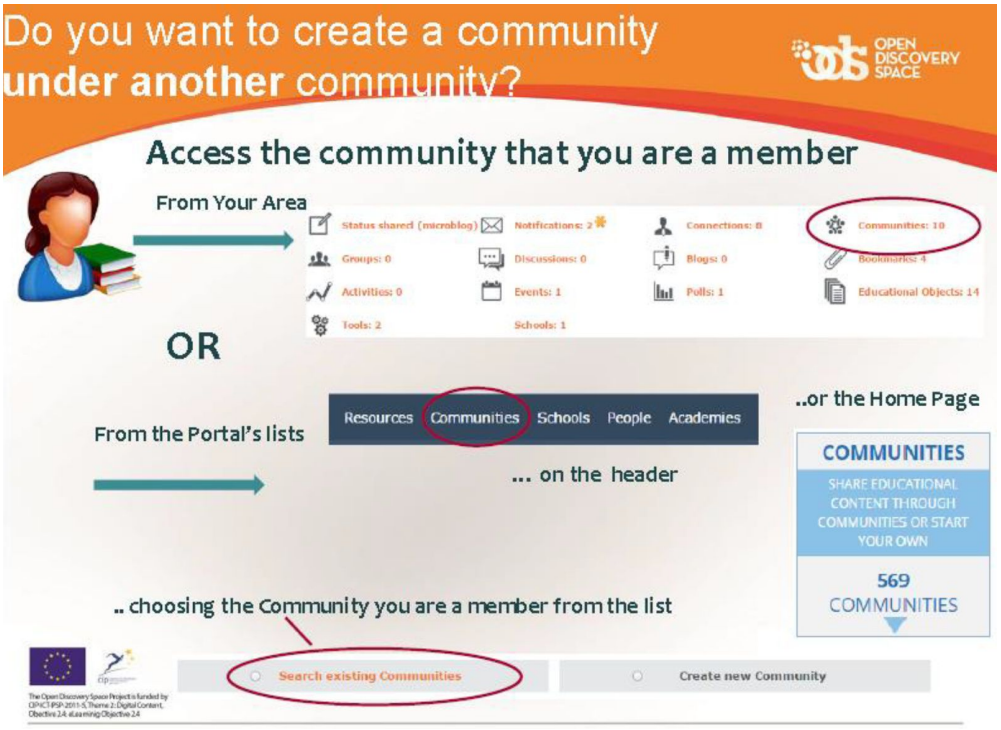


Figure 15: Creating a community

For more information about the creation of communities/sub-communities and their management please consult the document below:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Create_Community.pdf

Uploading educational objects or lesson plans and integrating modules within an iMuSciCA community

A variety of tools allow iMuSciCA communities to interconnect with social networking platforms. Digital repository of educational objects and lesson plans whose properties can be shared to all members and visitors of the community is an important tool for enhancing an iMuSciCA community.

An important factor for enhancing the activity of a community and its content is the capability for uploading educational resources in the form of educational objects or lesson plans. The tool allows the tagging of content using either standard metadata features or without social tagging capabilities, commentary and content evaluation. The teacher has the option either to choose from among the available scenarios-describing standards/lesson plans that illustrate standard teaching approaches of a certain manner, following the model LARM (Conole & Fill, 2005), or to work without their use.

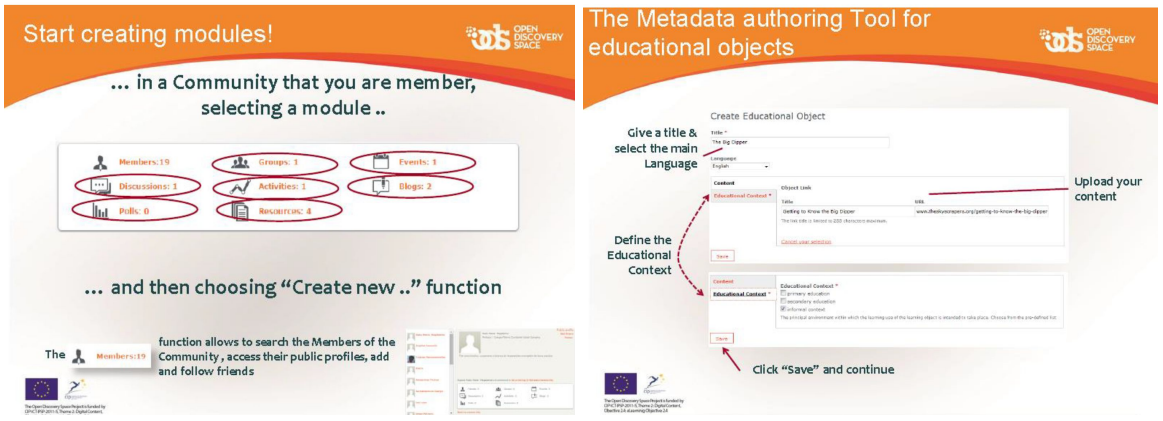


Figure 16: Community modules and uploading educational objects

For more information about enhancing the resources of a community please consult the document below:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Share_Resources_in_Community_Tch.pdf

For more information about the integration of modules within a community please consult the document below:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Create_Modules_in_Community.pdf

Content management and teachers network

Along with the use of modules described above, content management plays an important role in enhancing the digital resources of an iMuSciCA community for the teachers. The iMuScicA network of communities is to be built through the dissemination of the existing communities into groups of school teachers introduced at the iMuScicA workbench and their respective networks.

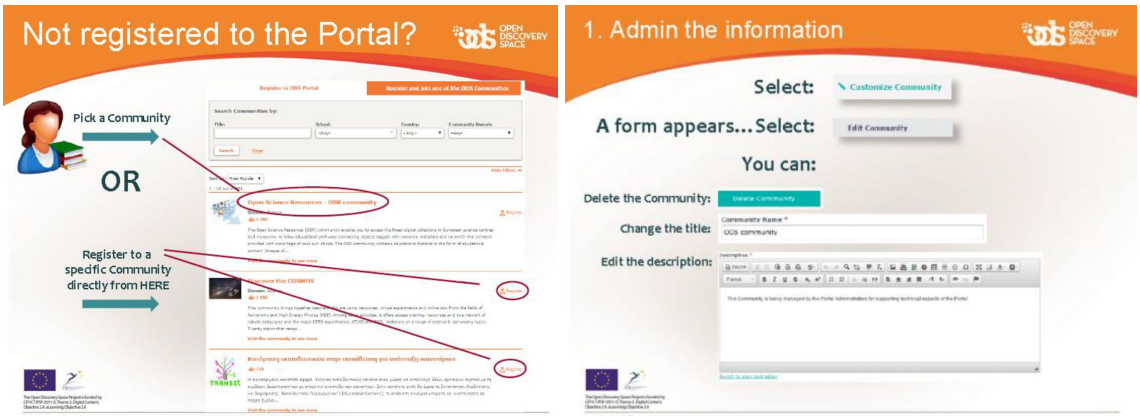


Figure 17: Joining a community and content updating

For more information about registering and joining a community please consult the document below:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Join_Community.pdf

Useful content-management information is included in the following document:
http://portal.opendiscoveryspace.eu/sites/default/files/manual/en/ODS%20Portal_Manage_Community.pdf

Annex 2 - Useful Links

iMuSciCA educational online communities

- The main iMuSciCA educational community (content in English): https://portal.opendiscoveryspace.eu/en/community/imuscica-849023 .
- The iMuSciCA Summer School 2018 community (content in English): https://portal.opendiscoveryspace.eu/en/community/imuscica-summer-school-2018-850769.
- The community has announced all resources by participant teachers on https://portal.opendiscoveryspace.eu/en/search-resources-in-community/850769
- The iMuSciCA community in Greece (content in Greek): https://portal.opendiscoveryspace.eu/en/community/ekpaideytiki-koinotita-imuscica-stin-ellada-850308. The Greek community has announced: i) an open competition for teachers to participate at the iMuSciCA Summer School 2018 (best iMuSciCA scenario). https://portal.opendiscoveryspace.eu/en/event/diagonismos-ekpaideytikoy-senarioy-imuscica-850448) ii) its resources: https://portal.opendiscoveryspace.eu/en/search-resources-in-community/850308 and iii) an **open webinar** here:
- https://portal.opendiscoveryspace.eu/el/node/851288