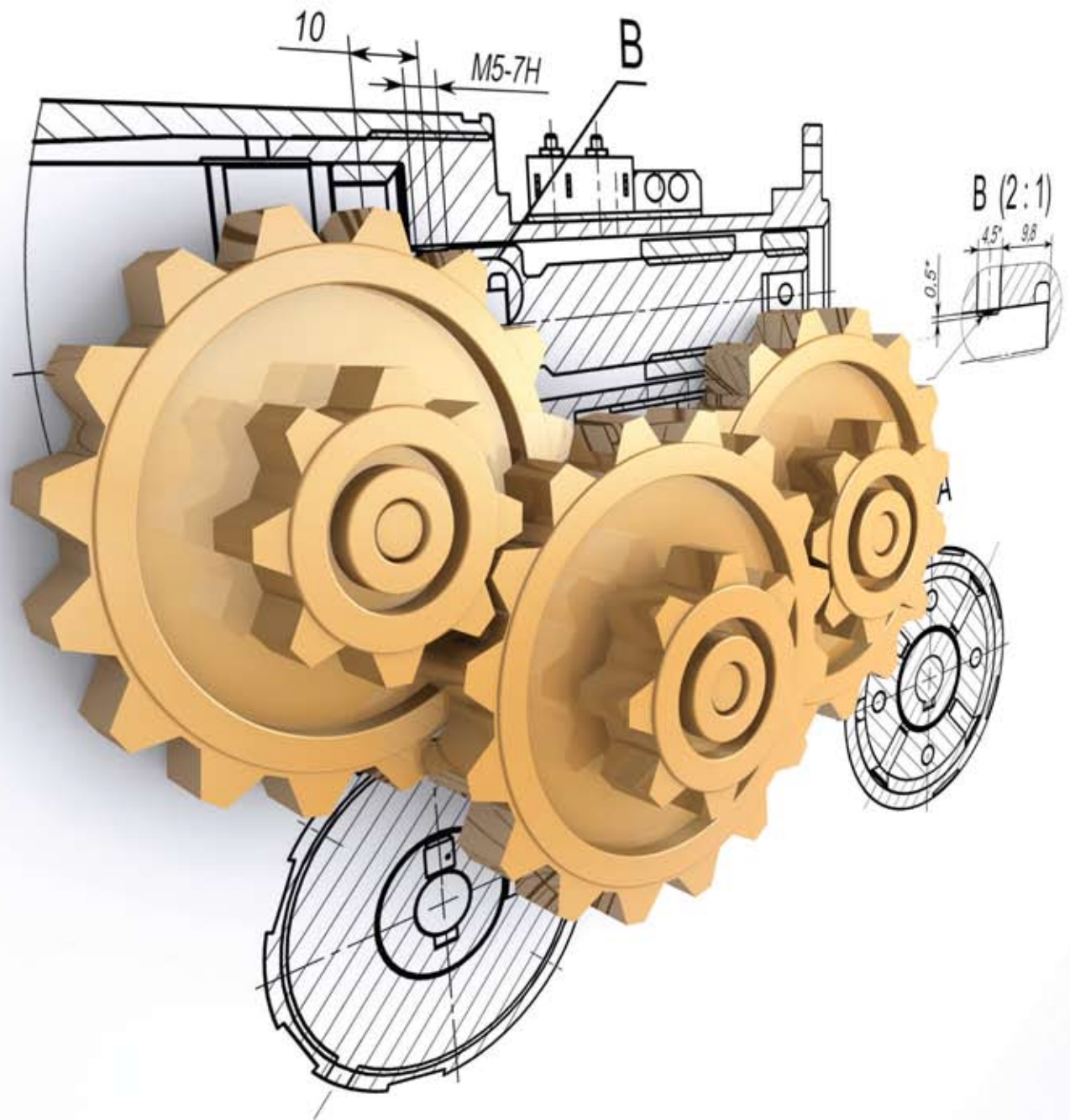




GO-LAB

GLOBAL ONLINE SCIENCE LABS
INQUIRY LEARNING AT SCHOOL



Guidelines for the design of Go-Lab Inquiry Learning Spaces

Guidelines for the design of Go-Lab Inquiry Learning Spaces



Go-Lab: Global Online Science Labs
for Inquiry Learning at School



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Dear teacher,

We would like to welcome you in the Go-Lab community of schools! Your experience in teaching with online labs using the Go-Lab portal and your feedback on the use of the tools and services provided are of great value for the Go-Lab team. Your feedback will help us update the provided tools and services and build an effective portal for the use of online labs that will be tailored to your needs and serve your expectations. Below you may find a brief guide that will facilitate you in the making of Inquiry Learning Spaces using the prototype of the Go-Lab authoring environment.

1. Creating an Inquiry Learning Space in Go-Lab

The Go-Lab project proposes an approach to organize inquiry based activities that include the use of online labs. The tools offered by the Go-Lab portal, along with the proposed methodology allow users to create their own lesson plans using the Go-Lab authoring environment and the Go-Lab online labs. The sections that follow present the Go-Lab Inquiry Cycle template which aims to guide teachers to create their own lesson plans. A step-by-step guide that helps users to build their own Inquiry Learning Spaces (ILSs) using the Go-Lab authoring environment is also presented. Within the Go-Lab project, we refer to a lesson plan as a Go-Lab activity which follows the proposed inquiry cycle template instantiated for a specific domain which has specific learning goals, and is designed for specific learners. The Inquiry Learning Space (ILS) is the part of the lesson plan which is visible not only to the teacher but also to the student. The lesson plan also contains - in addition to the ILS - information on offline (possibly collaborative) activities as well as accompanying materials for the teacher (for example an answer key).

2. The Go-Lab Inquiry Cycle Template

The Go-Lab Inquiry Cycle is graphically presented in the following image. The contributor of an ILS can choose to follow different inquiry pathways, as defined by the arrows in the image, depending on the level of complexity of the activity she/he plans to create. In the template below, a brief explanation and some general guidelines are presented for each phase of the inquiry cycle.

When you wish to create a new ILS it is advisable that before you start working in the Go-Lab authoring environment you create a lesson plan using this template and that you gather all your materials (images and resources).

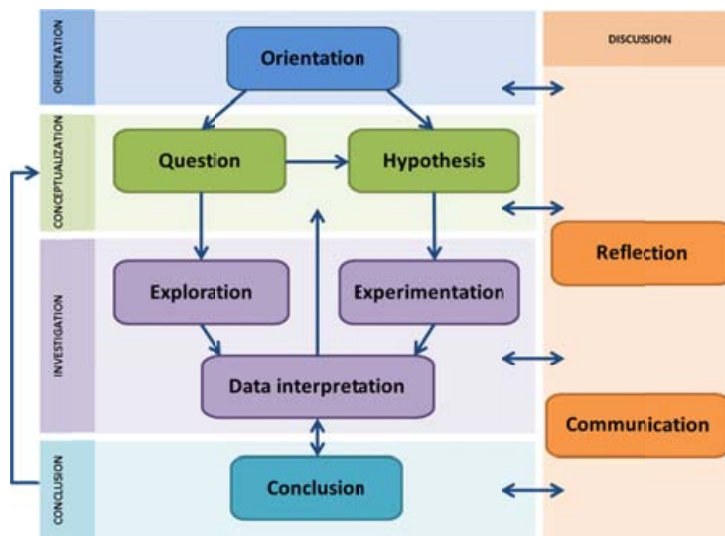


Figure 1. The Go-Lab inquiry cycle

The three main possible inquiry pathways are indicated with arrows as seen in the image above:

- a) Orientation—Question—Exploration—Data Interpretation—Conclusion;
- b) Orientation—Hypothesis—Experimentation—Data Interpretation—Conclusion; and
- c) Orientation—Question—Hypothesis—Experimentation—Data Interpretation—Conclusion.

The “Discussion” phase can be seen as a process that is “optional” in the inquiry cycle, while in the individual learning process inquiry outcomes can be reached without any discussion. However, the quality of the whole inquiry and related learning gain can depend on the discussions in each inquiry phase and/or after completing all other phases. Below you may see a brief explanation and some guidelines for each phase of the inquiry cycle.

Orientation

Orientation is focused on stimulating students’ interest and curiosity towards the problem at hand. During this phase the learning topic is introduced and the main variables are identified. You may introduce the topic by adding materials like for example videos, photos or images that would initiate a discussion and that the students can use in order to familiarize themselves with the problem at hand.

Conceptualization

Conceptualization is a process of understanding a concept or concepts connected to the problem that has been presented. It is divided into two (alternative) sub-phases, Question and Hypothesis whose outcomes have similar components. Encourage your students to identify all the concepts that are related to the problem under discussion and make the correct connections between them. They can do that by creating a concept map.

Tip: Do not point out any mistakes students might make. Students are supposed to discover these mistakes themselves and correct them. Alternatively, you may note them down and bring them back to their attention at a later stage.

Sub-phase 1: Question

Question is a process of generating research questions based on the stated problem. After the students have identified all the related concepts guide them to formulate their questions on the subject.

Sub-phase 2: Hypothesis

Hypothesis is a process of generating hypotheses on the stated problem based on theoretical justification. After the students have identified all the related concepts guide them to make specific hypotheses which they will later set out to investigate.

Investigation

Investigation is where curiosity is turned into action in order to respond to a stated research question or hypothesis. Students design plans for experiments, investigate by changing variable values, explore and interpret outcomes. Investigation has three-sub phases; Exploration, Experimentation and Data Interpretation. In this phase the teacher must introduce the on-line the students are going to use.

Sub-phase 1: Exploration

Exploration is a systematic way of carrying out data manipulation with the intention to find indications for a relation between the variables involved. In Exploration there is no specific expectation of the outcome of the data manipulation and it naturally follows the Question phase.

Encourage your students to propose ways to explore the questions they have set and try to retrieve information.

Sub-phase 2: Experimentation

Experimentation concentrates on developing and applying a plan for a data manipulation with a specific expectation of the outcome in mind and naturally follows the Hypothesis sub-phase. Encourage your students to make an investigation plan and put it in action in order to investigate the hypotheses they have set. Ask them what kind of tools they will need to deploy and what parameters they will have to investigate.

Tip 1: Make sure students understand the connection between the investigation and the hypotheses they have made. In other words make sure they understand why they are doing every single step.

Tip 2: Students also have the tendency to change variables in an uncoordinated way. Guide them so as to make their investigation as systematic as possible by changing only one variable at a time and by keeping notes not only for their data but also about the process itself.

Sub-phase 3: Data interpretation

Data interpretation is needed to make meaning out of collected data and synthesizing new knowledge. Guide your students to propose ways on how they may make use of their data. Propose to them different options like making graphs, deploying mathematical equations and formulas. You may also guide your students to check and make use of the relative theory.

Conclusion

Conclusion is a phase for drawing the basic conclusions based on the data that have been collected and processed during the investigation that was carried out. In this phase learners address their original research questions or hypotheses and consider whether these are answered or supported by the outcomes of their investigation. It leads to new theoretical insights – a more specific idea is created on the relation between variables (following Question) or whether the hypothesis is supported by the results of the study (following Hypothesis).

Guide your students to draw their conclusions and ask them to compare them to their original hypothesis. If the students had made any mistakes in the previous stages, make sure you bring them back to their attention so as to correct them. Depending on the activity you might also need to ask your students to compare their findings with the respective bibliography or theoretical values.

Discussion

Discussion is about sharing one's inquiry process and results. It involves the process of describing, critiquing, evaluating and discussing the whole inquiry process or a specific phase. In each step of the inquiry cycle, generate a discussion by asking questions so as to stimulate your students and provoke their curiosity.

Sub-phase 1: Communication

Communication can be seen as the process where students present and communicate their inquiry findings and conclusions, while listening to others and articulating their own understandings. Encourage your students to put together a report which will describe every step of their experimentation. The report does not necessarily have to be an essay-type report. Encourage your students to come-up with creative ways to communicate their work. For example they can do a small

video out of it, a prezi, a PowerPoint presentation or a poster like those presented by scientists during conferences.

Sub-phase 2: Reflection

Reflection is defined as the process of reflecting on the success of inquiry while proposing new problems for a new inquiry and suggesting how the inquiry process could be improved. Reflection is also defined as receiving feedback from students themselves, teachers or peers so as to improve this (sub-)phase or the whole inquiry process in a next trial.

Generate a discussion among the students to talk about their results. Try to identify alternative explanations and point out the strong and weak points of their work. Encourage the students to propose corrective moves and refinements of the experimentation process.

3. Getting started with the Go-Lab authoring environment

The Go-Lab authoring environment is called “Graasp”. In order to use it you will first need to create an account. Visit the following address: <http://graasp.eu/> and create an account. In order to finalize your account you will need to check your e-mail for a verification mail. Please make sure to also check the “Spam folder” in case the verification mail has been sent there. Once you create your account, you will be directed to your Graasp profile page.

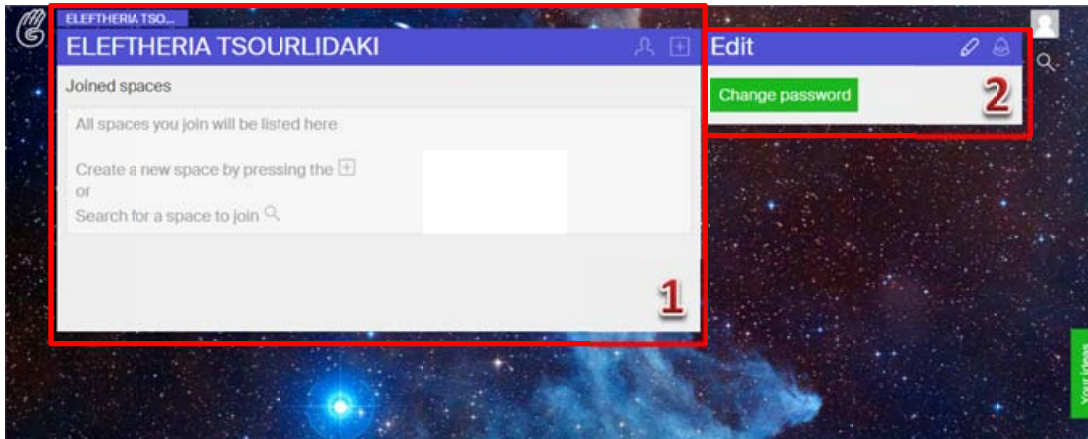


Figure 2. A new Graasp profile

In the main box (1) of your profile you will find all the spaces you will create from now on as well as those that you will join. On the top right of the main box there are two options. The profile option (avatar icon) allows you to edit your profile by adding a picture and a brief description of yourself. The “+” icon allows you to create a new space or a new Inquiry Space.

In the side box (2) another two options are available: Edit (pencil icon on the right) which allows you to change your password and Notifications (bell icon on the right) which allows you to view the recent activities of other users on spaces that you have created or joined.

After creating and joining a few spaces, they will all be displayed in your profile page as presented below.

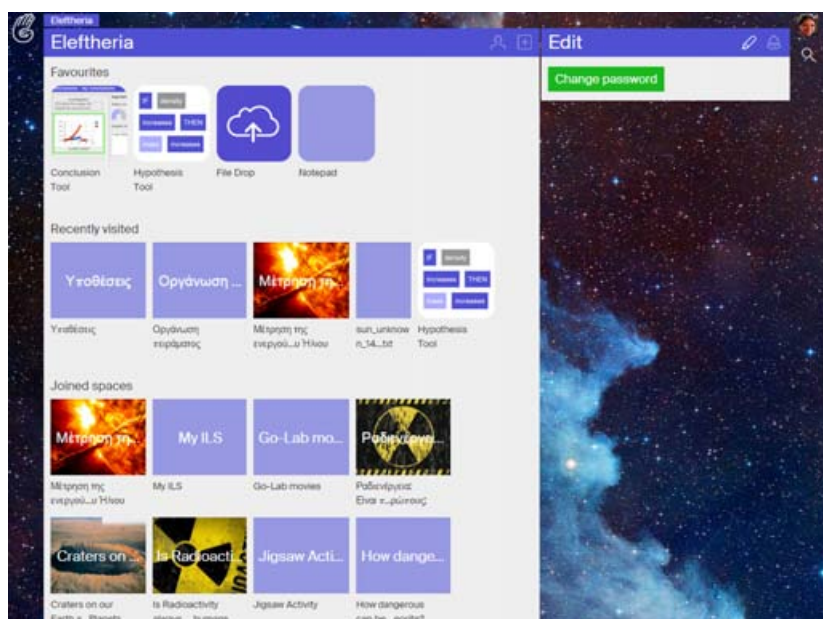


Figure 3. A Graasp profile

a. Creating a new Inquiry Learning Space

In order to create a new Inquiry Learning Space (ILS) click on the “+” button on the top right corner of the main box in your profile page and select “Create Inquiry Space” (2). The “Create Space” option (1) allows you to create a new space which is completely empty.

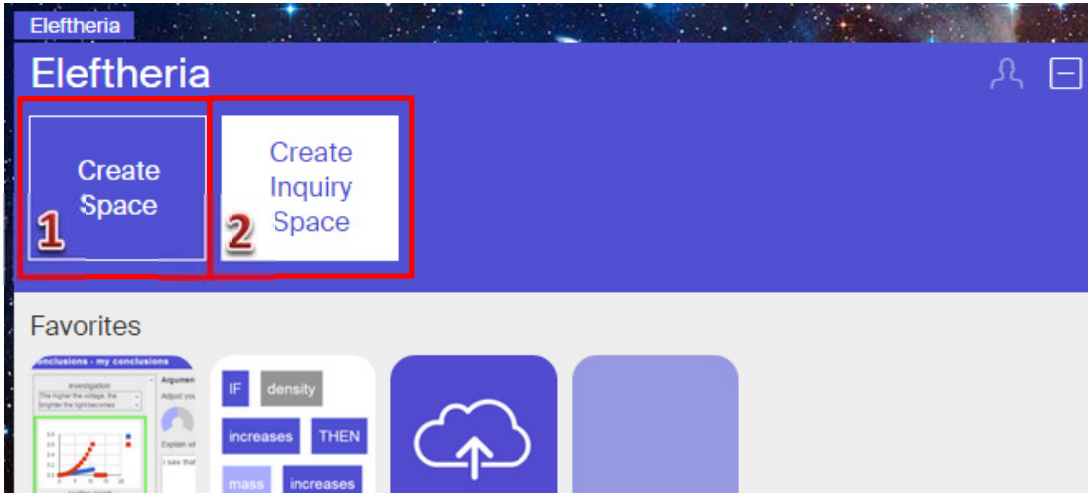


Figure 4. Create a new space or inquiry space options

After you have click in the “Create Inquiry Space” button, add a name for your ILS (in this case “My ILS”) and click on “Create ILS”.



Figure 5. Create new Inquiry Learning Space

The new ILS will appear in the form of a thumbnail at the bottom of your profile page (Figure 6).

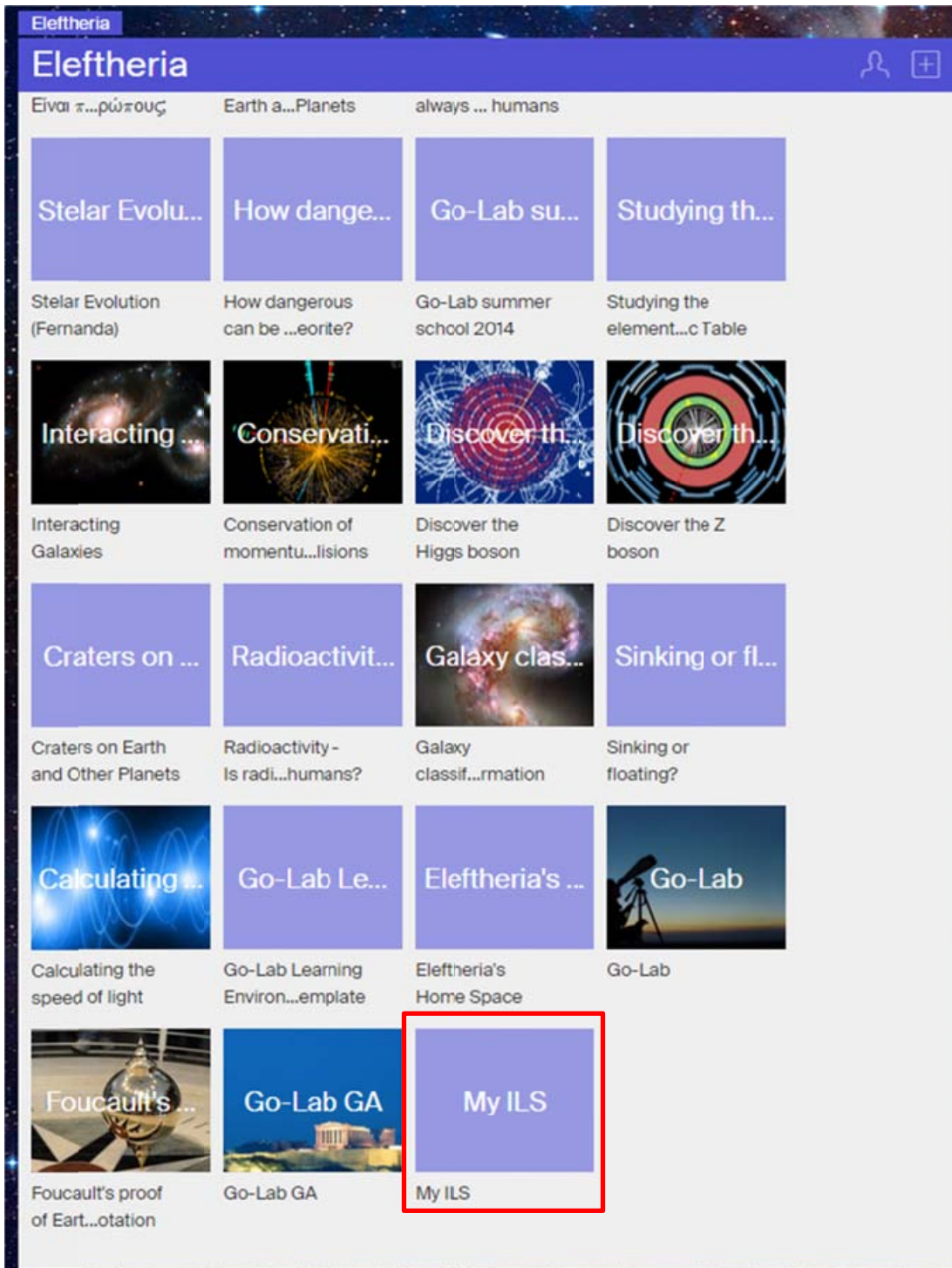


Figure 6. Thumbnail of the newly created inquiry space

Alternatively you may also choose to create an “Inquiry Space” from GoLabz. To do so, go to GoLabz (<http://www.golabz.eu/>) select the online lab you wish to use and click on the “Create an Inquiry Space” button (Figure 7). In this case, the system will again create an empty Inquiry Space in your profile page. The difference is that now the lab from whose page you generated the inquiry space will appear automatically in the “Investigation” space.

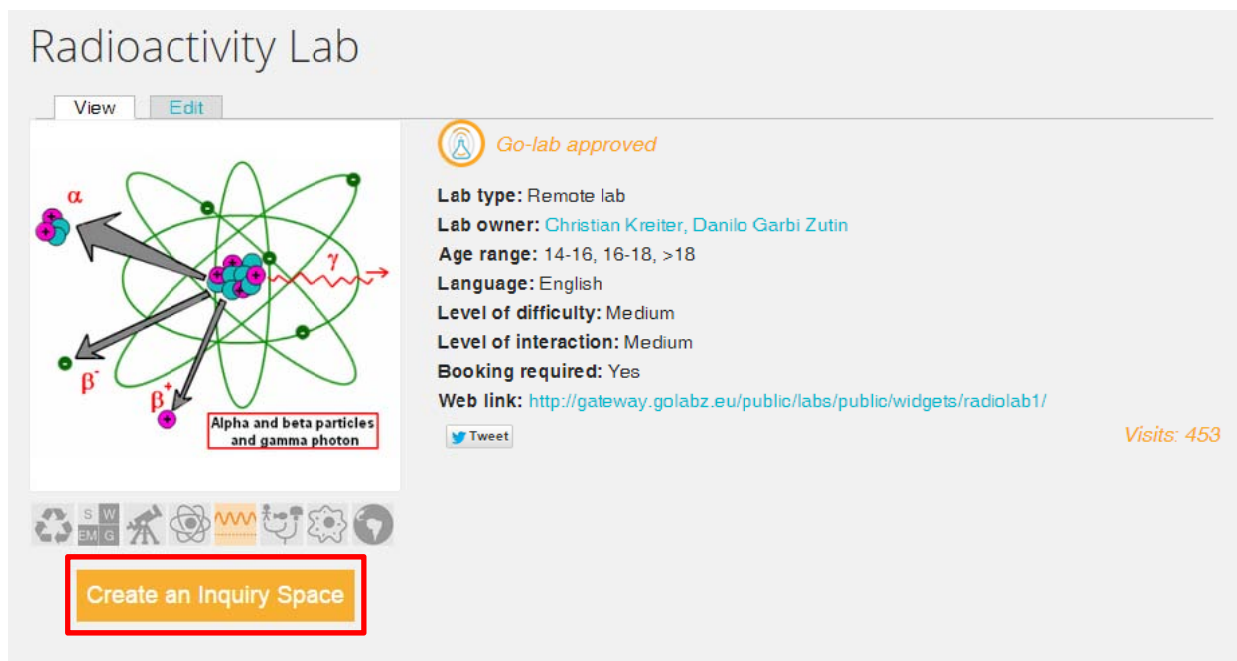


Figure 7. Create a new inquiry space from GoLabz

You are now ready to start working on the different phases of the ILS. An activity in Go-Lab stems from a lesson plan that the teacher has previously prepared, preferably using the Go-Lab inquiry cycle template that has been discussed in chapter 2. For additional guidance on how to prepare an activity before starting to work in the Go-Lab authoring environment please check the “Prepare” tab in the “Go-Lab tutorial” section here <http://www.golabz.eu/spaces/go-lab-tutorial>. An activity in Go-Lab (what the students see and use during the lesson) is called an Inquiry Learning Space (ILS). Aside from the part that the students see (ILS), a lesson plan may also include additional resources for the teacher (like answer keys), notes and proposals for off-line activities.

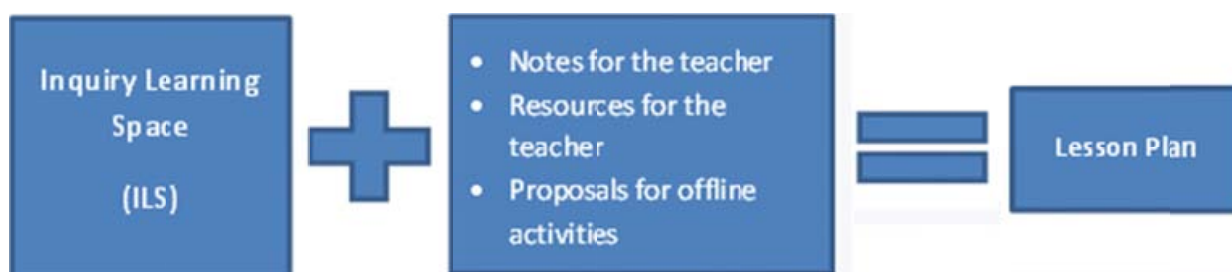


Figure 8. The components of a lesson plan

As depicted in Figure 9 below, each inquiry space created in Graasp includes seven spaces. The first five spaces are the five phases of the Go-Lab inquiry cycle while there are two additional spaces called “About” and “Vault” (1). When a teacher sees the ILS he/she has created, from within the authoring

environment, in addition to the inquiry phases he/she will also be able to see a side box (2) which is not visible to the students through the standalone view. This side box is separate for each space. In addition to other functions, in this side column a teacher can add the notes for the teacher, links to additional resources and offline activities. So, when looking at an inquiry space in Graasp the teacher can view the ILS as well as the lesson plan in total.

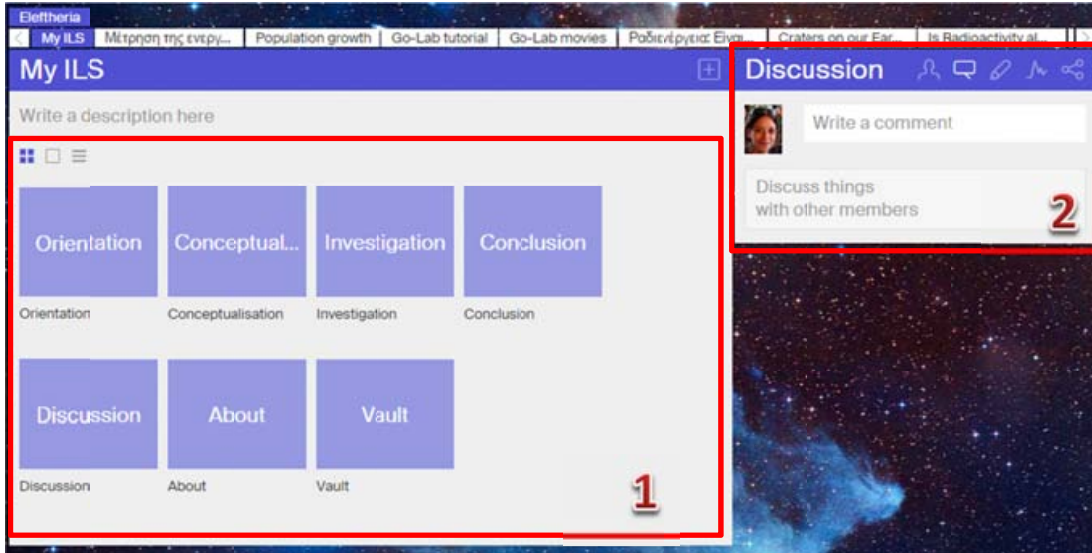


Figure 9. The main space of an inquiry space

b. Side box

As seen in the image above, there is a side box in all spaces in Graasp. In this box 5 options are available: Members, Discussion, Edit, Activity and Sharing.

Members

The avatar icon (1) represents the “Members” section (Figure 10). In this section you can choose to share your ILS with other teachers who are users of Graasp. In order to add another person, add their Graasp username in the “Add member” section (3). Once a person is added you can choose to change their rights between ‘owner’, ‘editor’ and ‘viewer’ by clicking on their current status which is depicted below their name (5).

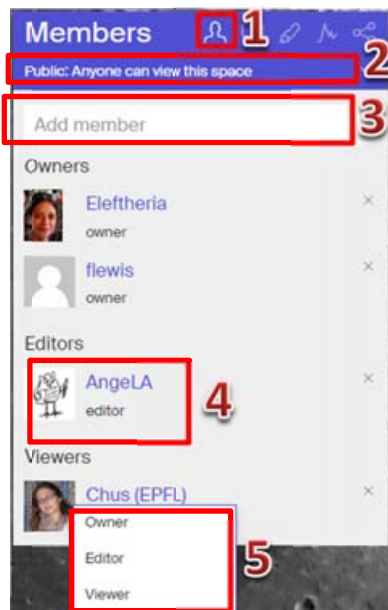


Figure 10. The "Members" section of the side box

When you first enter an inquiry space you might notice that beside yourself there is also one more member present called “AngeLA” (4). This is a default user of the system which allows you to keep track of your students’ performance. As long as “AngeLA” is a member of an ILS, it will record and send activity traces to the learning analytics back-end for analysis. You can have access to this information through the monitoring applications of Go-Labz (see chapter 4/section f). If you remove “AngeLA” from an ILS your students’ activity will no longer be recorded.

In addition to adding people, you can also decide whether you wish this particular space to be “Public” or “Private” (2). The public option means that this space will be displayed in the ILS when displayed through the standalone view while the private option means that only the members of this space can view it through the authoring environment.

Discussion

The bubble icon (1) represents the “Discussion” section (Figure 11). In order to write a comment, type your message in the “Write your comment” section (2) and hit enter. In this section you can add notes and tips for the teacher, as well as hyperlinks to additional resources in the form of comments (3). As this side section is separate for each inquiry phase, you have the option of adding separate notes and resources for each phase of the inquiry cycle.

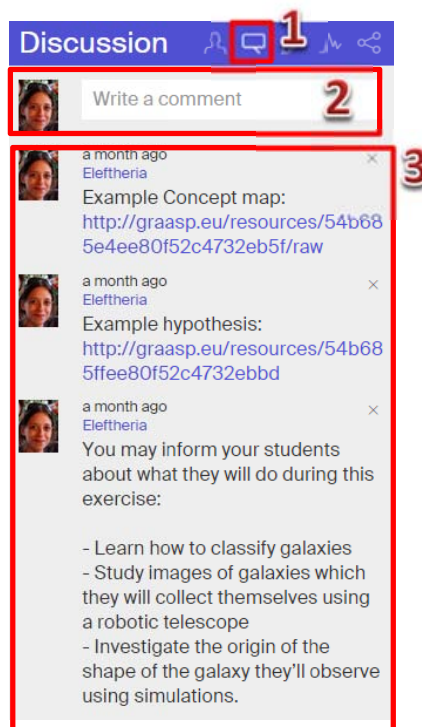


Figure 11. The "Discussion" section of the side box

Edit

The pencil icon (1) represents the “Edit” section (Figure 12). In this section you can choose to change the background of each phase (2) as well as the background of the phase’s thumbnails (3).

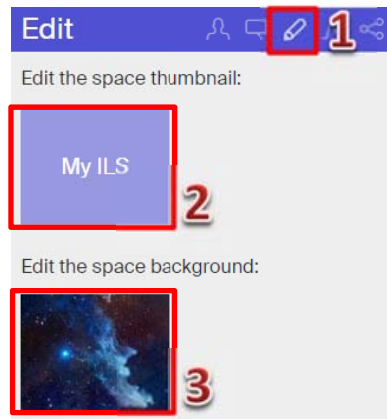


Figure 12. The "Edit" section of the side box

An example ILS where the backgrounds of the phases and of the thumbnails have been changed is presented below.

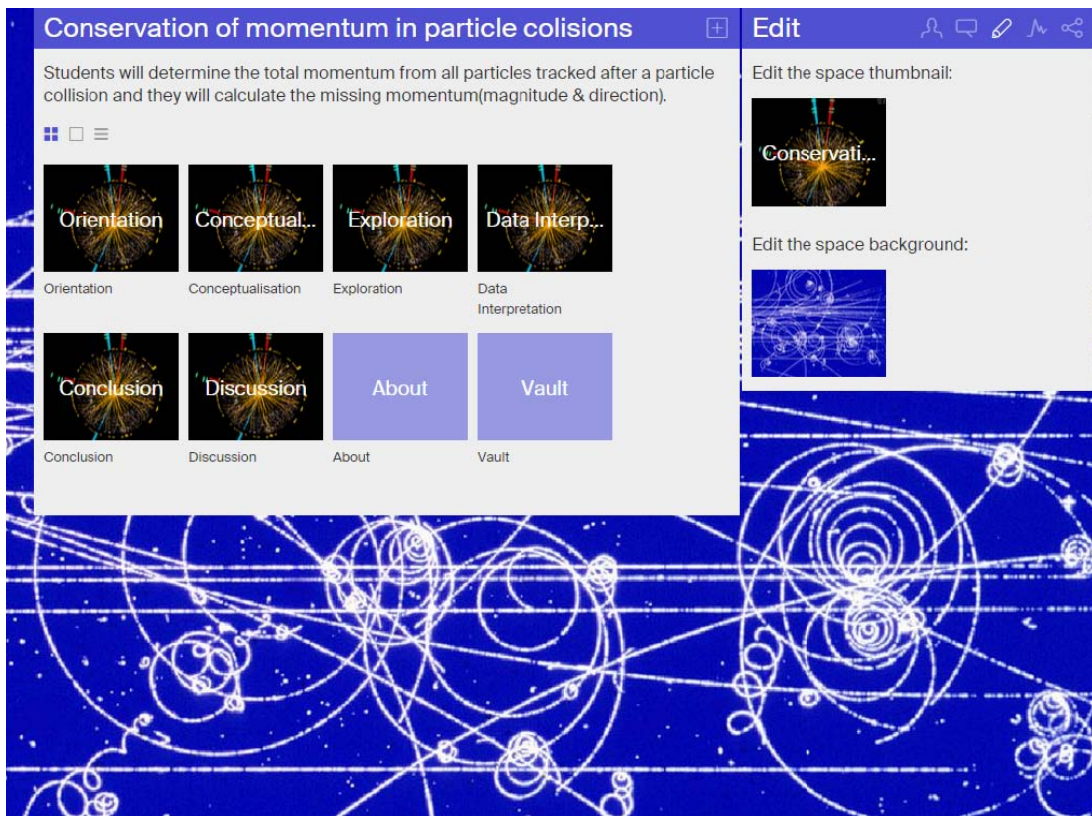


Figure 13. An inquiry space with changed background and thumbnails images

Activity

The graph icon (1) represents the “Activity” section (Figure 14). In this section you can see the current activity of all members of the ILS.

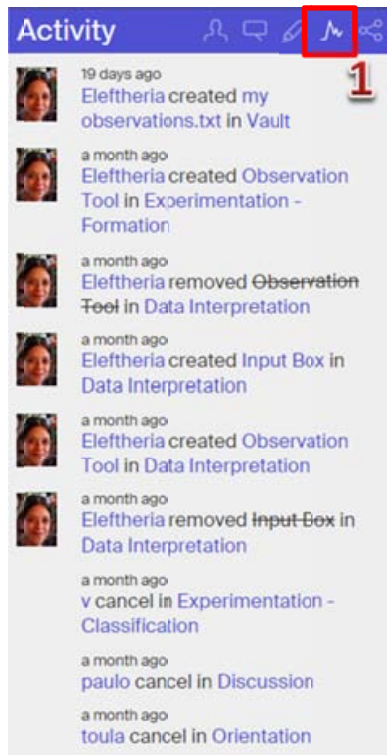


Figure 14. The "Activity" section of the side box

Sharing

The share icon represents the “Sharing” section (Figure 15). This section allows you to share your ILS with your students as well as other viewers.

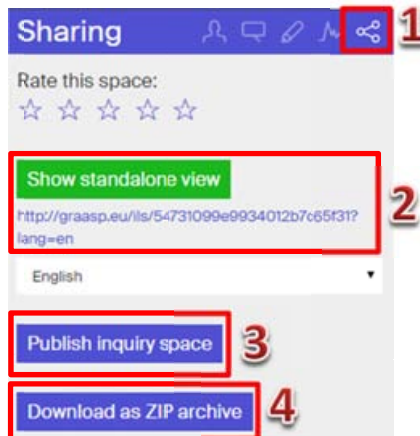


Figure 15. The "Sharing" section of the side box

By clicking on the standalone view button (2) or on the URL underneath it, a separate tab will open on your browser displaying the ILS. You can use this URL to communicate your ILS to your students or fellow teachers without having to publish it in the GoLabz repository. The ILS will function fully.

If on the other hand you wish to publish your ILS in the GoLabz repository you can click on the “Publish Inquiry Space” button (3). You will be then redirected to a separate page that will allow you to add some additional information about your ILS and then publish it.

The last option of this section is the “Download as ZIP archive” (4) option which allows you to download the ILS in a zip format to have as a backup in your computer.

c. “About” and “Vault” spaces

The “About” and the “Vault” spaces of an inquiry space are two extra spaces that are part only of the teacher’s view. Unlike the five spaces that represent the five steps of the Go-Lab inquiry cycle (which are by default set to “Public”) these two spaces are set by default to be “Private”.

The “About” section is an empty space where teachers can store all their resources, both those which are meant only for the teacher and those which they wish their students to use but at the same time they don’t wish to have the whole document appearing inside a phase. In addition, in the description of this space teachers can put some general information and some preparation guidelines.

The “Vault” section (Figure 16) is literally the vault of the ILS. All data that are inserted by the students in any of the supportive apps (in all phases) of the ILS are automatically stored in the Vault. Thus the teachers can later have access to all the materials created by the students.



Figure 16. The Vault after the completion of a lesson using the ILS

4. Building your own Go-Lab Inquiry Learning Space

a. Building a phase

The sections below demonstrate how to fill in and complete a single inquiry phase space. In order to complete an ILS you may repeat the same steps in every inquiry phase space. Teachers may create an activity using the Go-Lab authoring environment and use it with their students. The product of what the teacher makes in the Go-Lab authoring environment is what the students will be able to see through Go-Lab and as mentioned above it is called an Inquiry Learning Environment (ILS).

Once you have created a new ILS following the steps above you are ready to start working on it. Click on the icon of the ILS you want to work on (in this case “My ILS”) to view the different inquiry phases of the ILS.

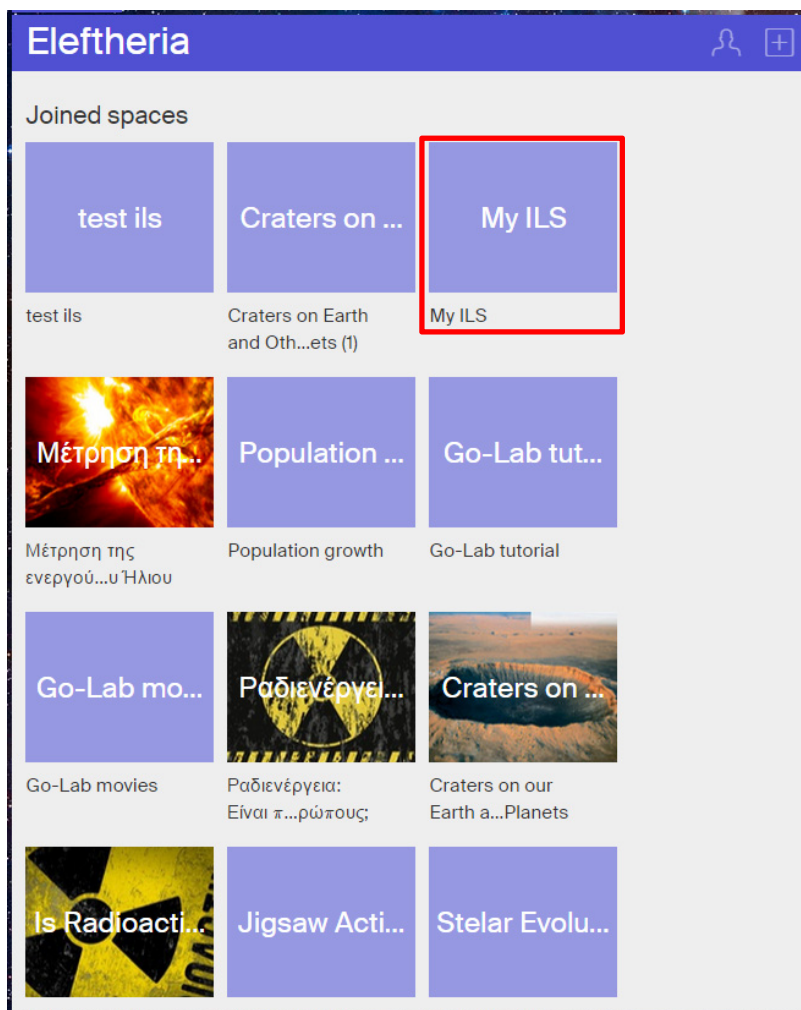


Figure 17. The Graasp profile displaying all the ILS available to the user

In the authoring environment, every phase of the ILS is presented by a space that is titled with the name of the inquiry phase, namely: Orientation; Conceptualization; Investigation; Conclusion; Discussion. There are two more spaces; “About” and “Vault”. “About” is the space where the contributor adds some general information like a brief description of the activity and any resources there might be. The “Vault” is a space where the data coming from apps are stored.

Note that when viewing the central space of an ILS (Figure 18) on the top of the page there is a bar (1) where the titles of all your ILSs are displayed. The ILS you are currently viewing is in blue. You can switch

between different ILSs using this tab. In order to get started, click on the first inquiry phase space of the inquiry cycle named “Orientation” (2).

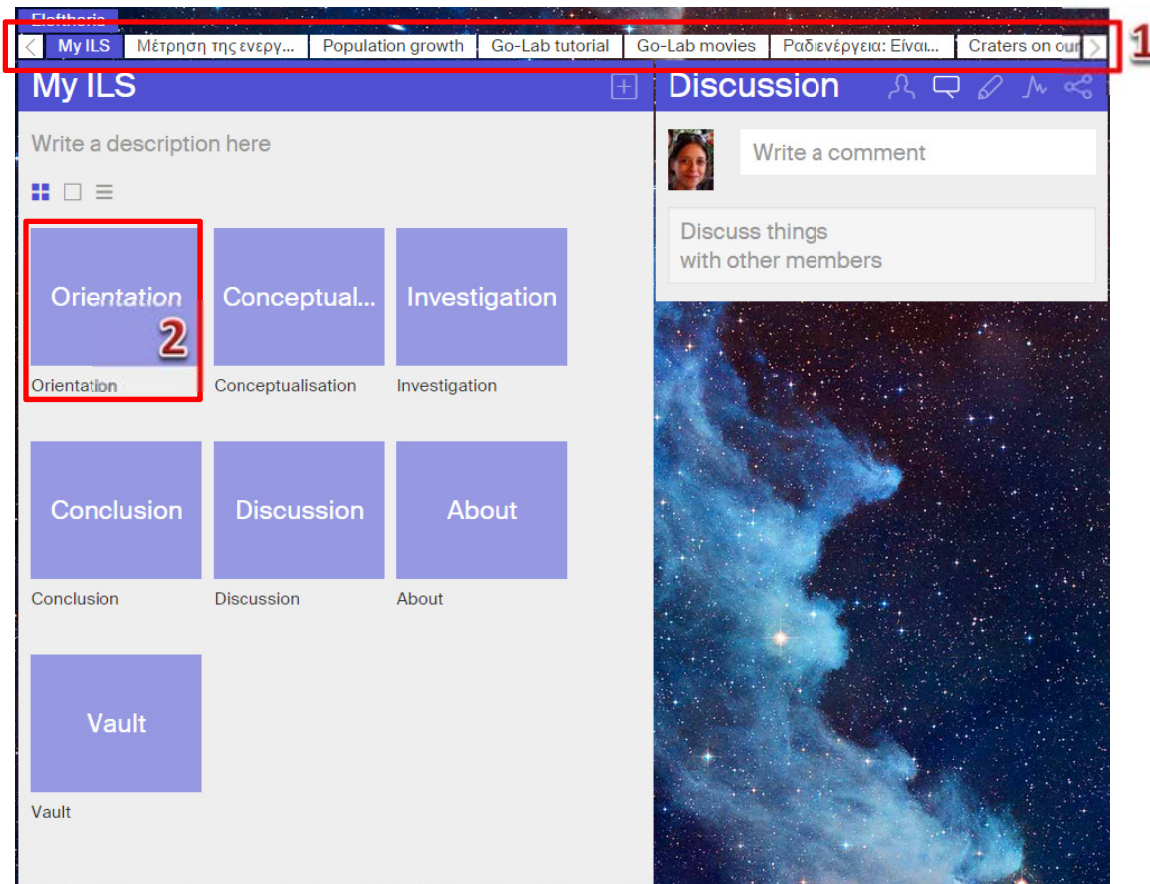


Figure 18. The center space of an ILS

Note that now, as shown in figure 19 there are two bars instead of one on the top of the page (1). The top bar displays your ILSs as before while the second bar displays the spaces that are part of this specific ILS. You can switch between spaces using this second bar.

When entering a phase space for the first time all you will see is a brief descriptive message (4). You can choose to keep, delete or alter this message. You may also choose to change the name of the phase by clicking on its name (2).

You can now start building your activity by adding different items. In Graasp, the building of each phase is based on adding different items to each space. So let’s say for example, that in a phase the teacher wishes to include some introductory text, then a video, then some more text, then an image, and then a supportive app. These, are three (3) different items (a video, an image and an app) that have to be added. Texts in between items can be added in the descriptions of each item as explained below (section d). In case extra text is also needed this can also be added in the form of a resource as explained below (section d). When working in a phase it is advisable to first add all the different items you wish to add and then continue with adding the relative texts between them.

In order to begin adding items in the Orientation phase click on the “+” button (3).

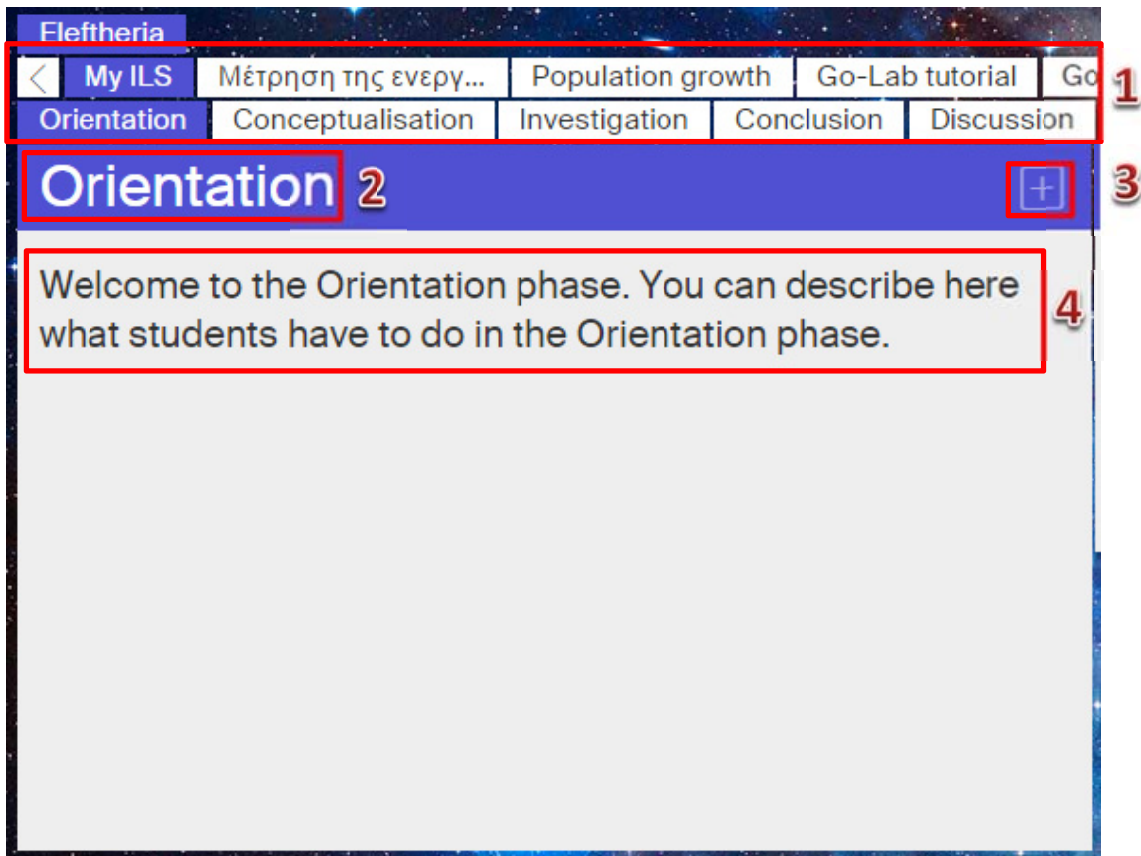


Figure 19. The Orientation phase space

Once you click on the “+” button, four different options will appear. An item in Graasp can be any of these four types.

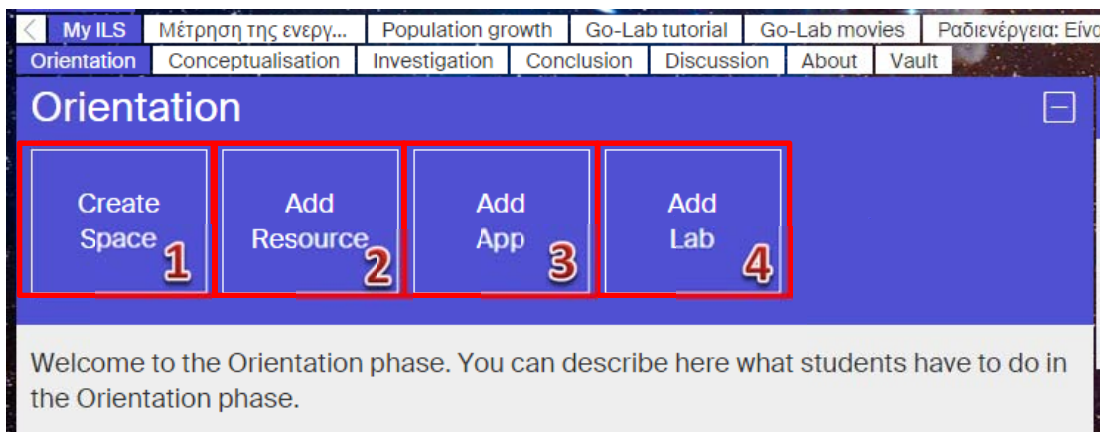


Figure 20. Add item options

In Figure 20, option “Create Space” (1) allows you to create a sub-space inside the space you are currently in. Option “Add resource” (2) allows you to integrate any kind of resource in this space. A video, an image or a pdf file are examples of such resources. Option “Add App” allows you to add a supportive app to your ILS either from the GoLabz repository or from an external source. In order to add apps successfully in your ILS if you choose to add one from an external source keep in mind that the format of such applications needs to have a ‘.xml’ extension. Finally, option “Add Lab” (4) allows you to add an online lab from the GoLabz repository.

b. Adding items to your ILS

When building a phase the three types of items you will mostly use are resources, apps and labs. More or less all these three types work the same way.

Resources

Let's start by adding resources. You can choose to add a resource in your ILS by clicking on the 'Add resource' button as shown in the picture above (Figure 20). Once you do that Graasp will ask you to give a name for the resource (1) and add the resource URL (2) or upload the file of the resource (3).

Figure 21. Add resource option

You can choose any kind of resource you wish to add, like videos, images, pdf files or animations. For example let's say we wish to add a YouTube video. Add the name of the video in the "Name" box (1). Copy the URL of the video and paste it in the "Resource URL" box (2). Then click on the "Add resource" button (4) and the video will appear beneath the introductory description of the phase (Figure 23).

Figure 22. Add an online item as a resource

The video we just added appears in the ILS in the form of a thumbnail.

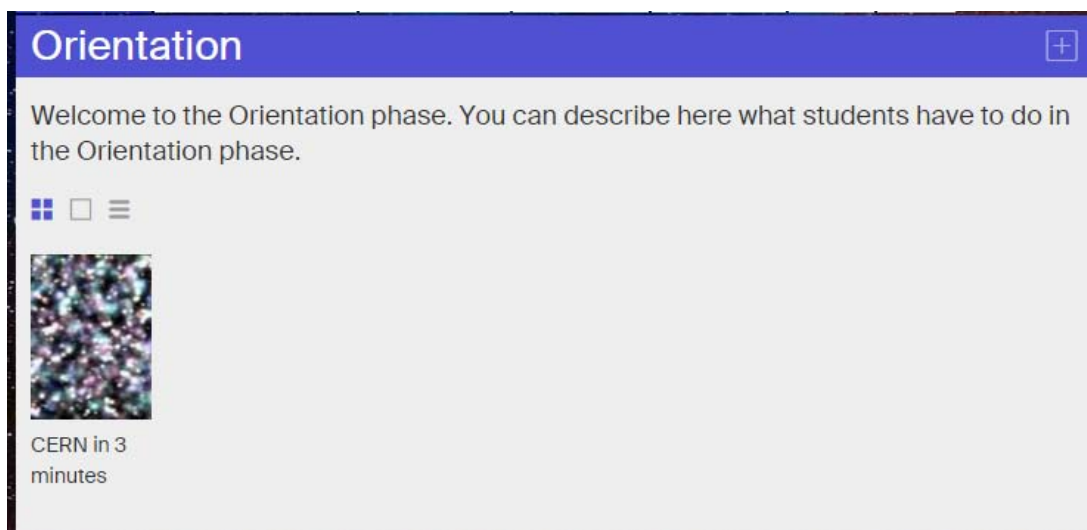


Figure 23. The Orientation phase including a resource

Now let's say that we also need a picture under the video which is stored in our computer. Click on the "+" button again and then click on "Add resource" again. This time, instead of adding a name and a URL click on "Upload file" button and select the image you wish to add from your computer. Once you select it, the image will appear in the form of a thumbnail next to the video's thumbnail (Figure 24).

When it comes to adding items from your computer you may also drag files from their original folder in your computer and drop them in the item section below (Figure 24). This drag and drop feature can be very handy when you wish to add multiple items; as it allows you to add them all together as a group.

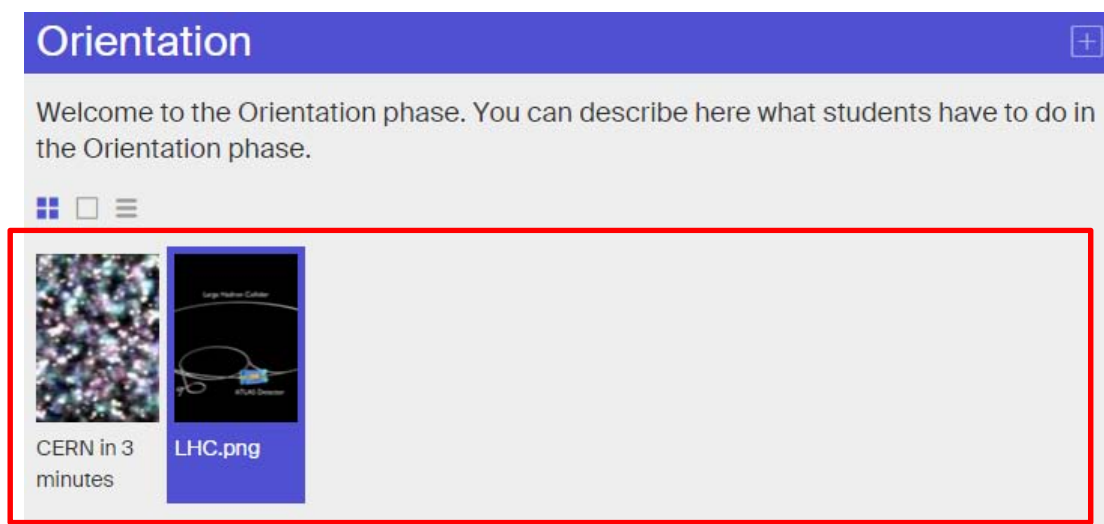


Figure 24. The Orientation phase including two new resources

So far we have added a video and an image to our space. So if we now click to see the standalone view from the "Share" option of the side box the ILS will look as displayed in the image below (Figure 25). Note that the description of the video (right above the video) was added automatically from YouTube. You can choose to delete, edit or keep this description as is.


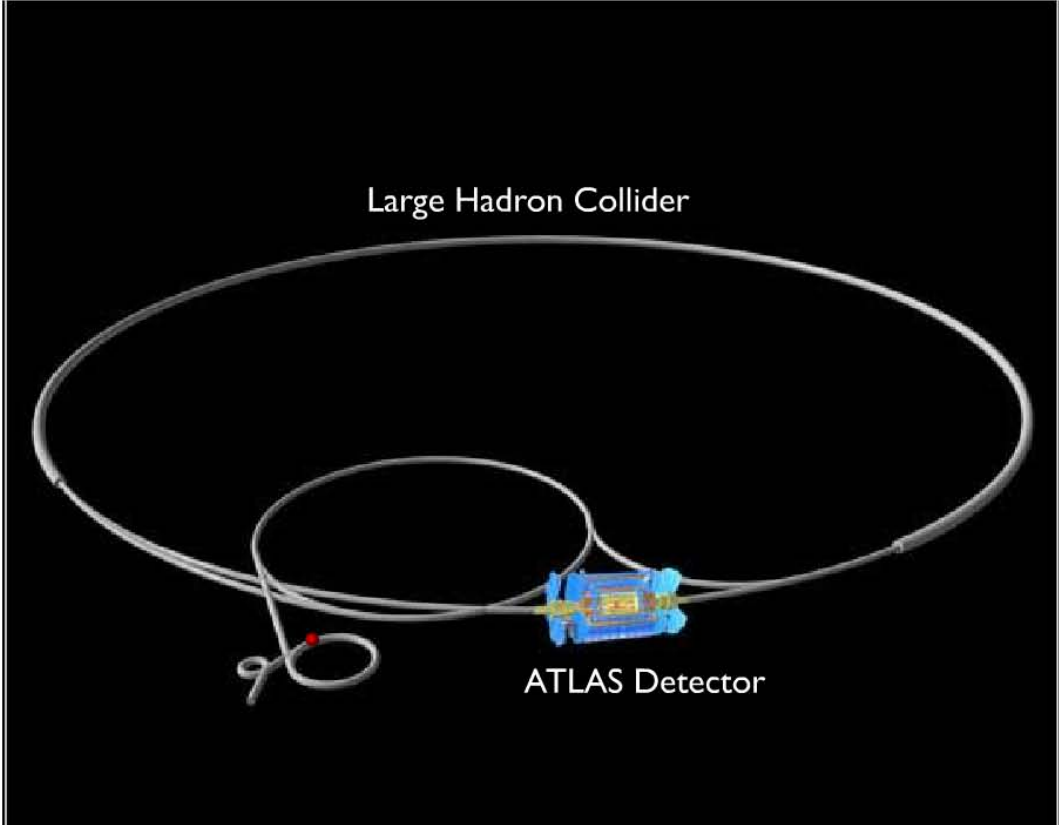
My ILS ET

Orientation **Conceptualisation** Investigation Conclusion Discussion

Welcome to the Orientation phase. You can describe here what students have to do in the Orientation phase.

A 3 min tour of CERN and its research facilities Oct 2009 update.

CERN in 3 Minutes (2009)

Large Hadron Collider

ATLAS Detector

Figure 25. Standalone view of an ILS under construction

In case you choose to add a resource whose format is not supported yet by the system you will receive a relative message in the standalone view (Figure 26). Such resources could be for example MS office or Open office documents that cannot be displayed online or some websites like for example Facebook. In any case, the notification message will also include the original URL of the resource or a direct link to the uploaded resource. Such files can also be added as hyperlinks as it will be explained later on (sections d and e)

[The file format of Related Theory.docx is not yet supported. You can access the resource in the following link: <http://graasp.eu/resources/54f48c96696726244a94f814/raw>]

Figure 26. Notification message for not supported file formats

Supportive Apps

Now let's say that underneath our image we would like to add a supportive app; in this case a concept map. Supportive Apps or simply Apps are web based software applications supporting specific learning or teaching goals and tasks in online labs. Click again on the "+" button (Figure 20) and this time click on the "Add app" button (Figure 20). Click on the "Select App" option and a list of all the applications available in GoLabz will appear (Figure 27).

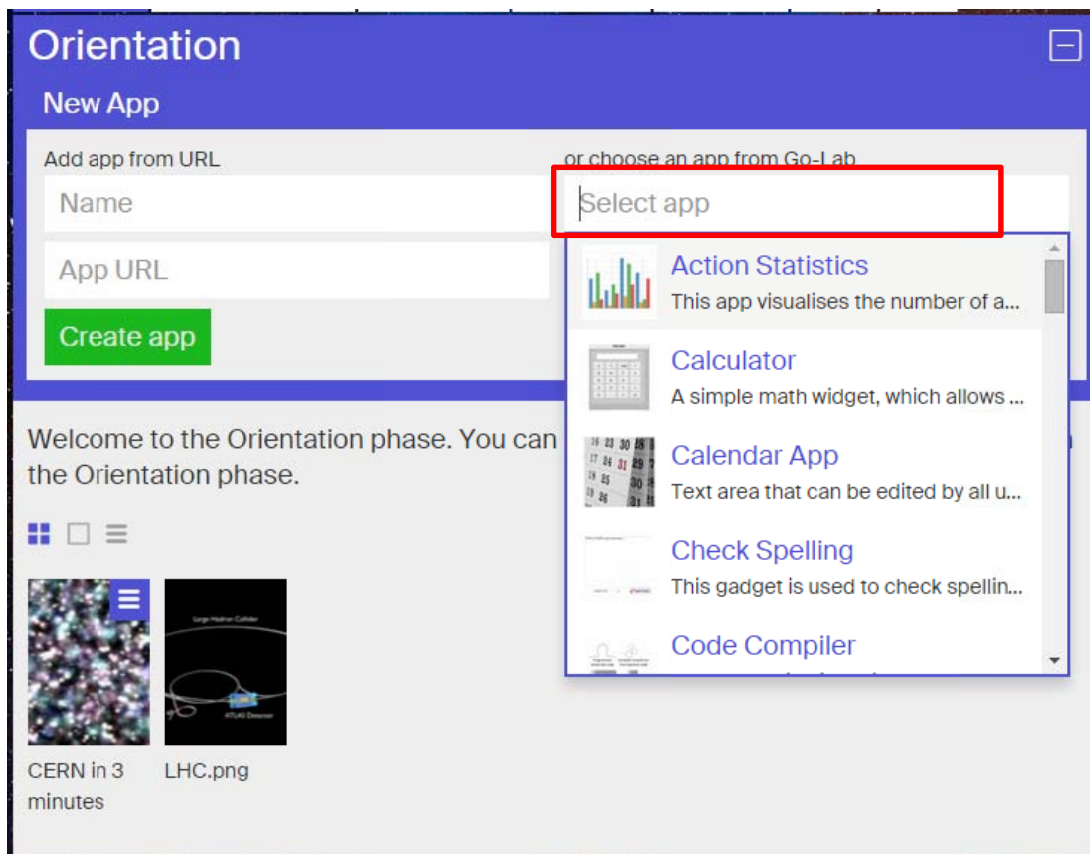


Figure 27. Add supportive application option

Select the app you want. The selected app will now appear next to the thumbnail of the image which we previously added (Figure 28).

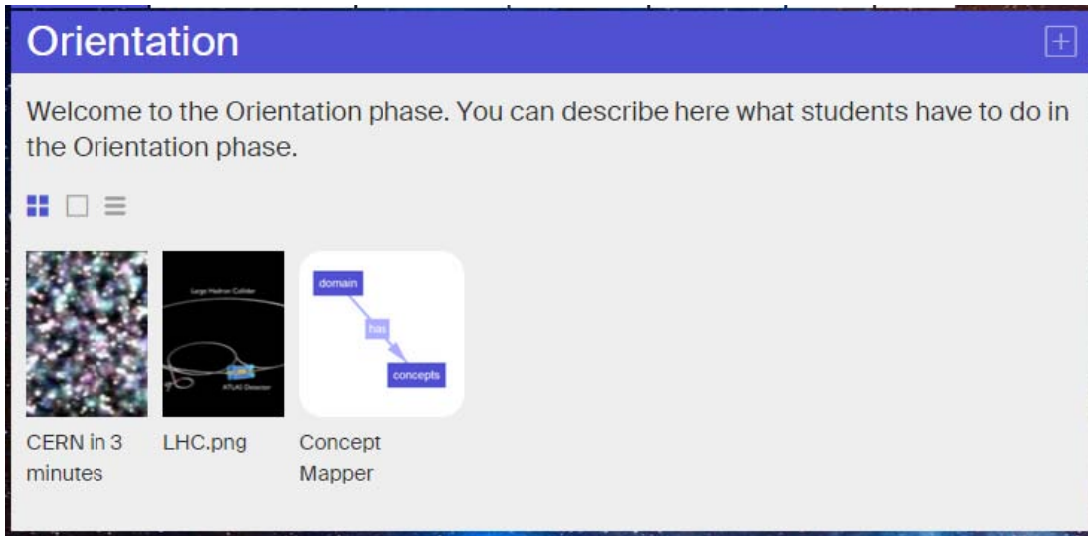


Figure 28. Supportive app added to the Orientation space

Online lab

Finally, let's say that after the concept map we also wish to add an online lab. Click on the "+" button again and this time select the "Add lab" option (Figure 20). Click on the "Select lab" box and choose the lab you wish from the list that appears (which includes all the labs of GoLabz).

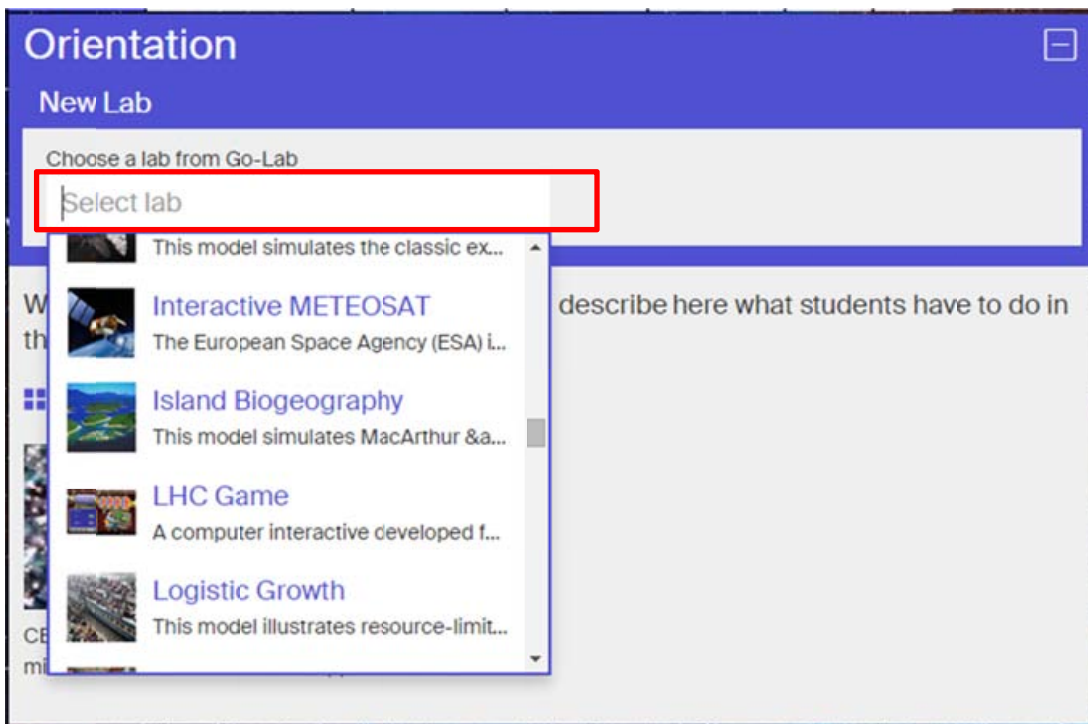


Figure 29. Add online lab from GoLabz option

The inserted lab will now appear next to the thumbnail of the item previously added.

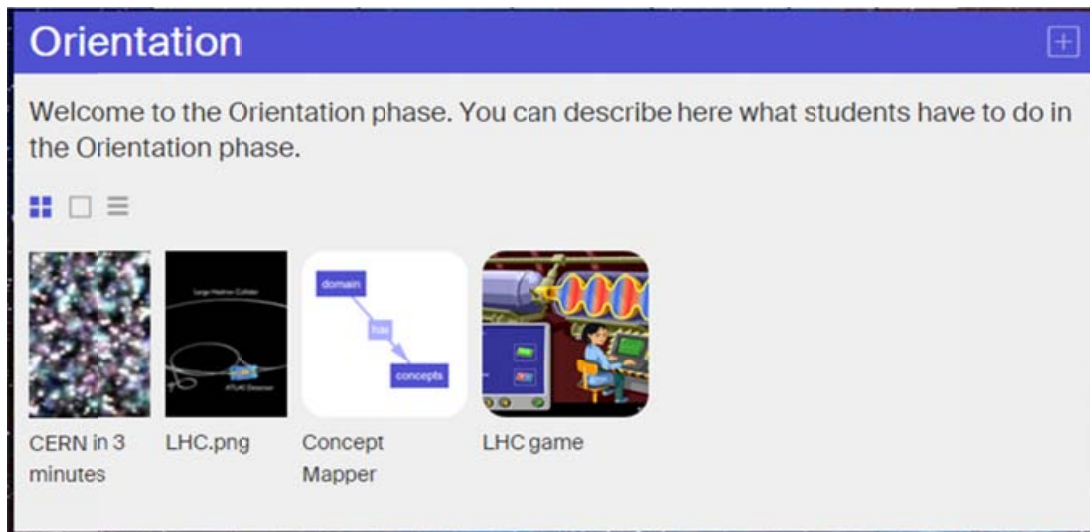


Figure 30. Lab added to the Orientation space


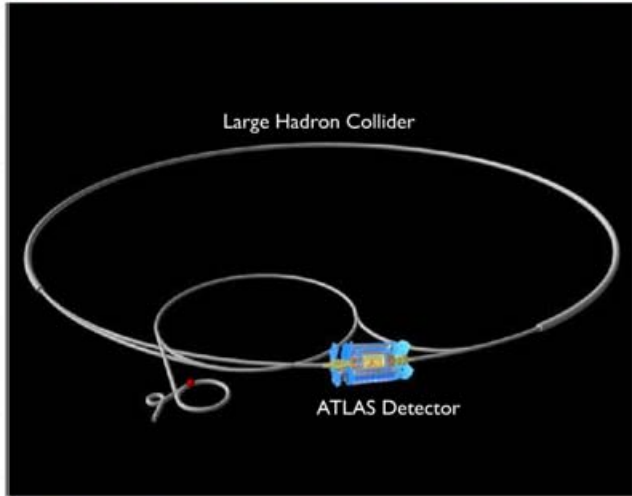
So now we have added four (4) items, two (2) resources (a video and an image), one (1) app (the concept map) and one (1) online lab (the HYPATIA lab). In the standalone view, these items will appear one under the other as shown in figure 31.

My ILS ET

Orientation **Conceptualisation** Investigation Conclusion Discussion

Welcome to the Orientation phase. You can describe here what students have to do in the Orientation phase.
 A 3 min tour of CERN and its research facilities Oct 2009 update.

CERN in 3 Minutes (2009)

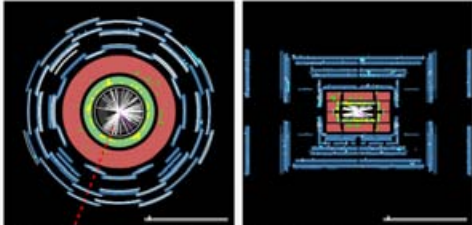
Large Hadron Collider

ATLAS Detector

Concept Map - concept Map

File Edit View Help ?

concept



Event: 158 (1980314177047) 2
 ETMax: 12.43 GeV p: -1.94198

Trx	xi	p [GeV]	py [GeV]	phi [rad]	theta [rad]
Trx	-	28.64	20.15	0.634	0.700
Trx	+	4.77	1.93	2.632	0.219
Trx	-	4.49	1.96	-0.590	-2.903
Trx	-	87.87	42.39	1.922	2.495
Trx	-	2.41	1.57	0.752	2.436
Trx	-	6.91	3.39	-2.109	-0.514
Trx	-	3.18	2.61	0.258	2.176
Trx	-	3.93	3.49	-1.733	-2.049
Trx	-	1.65	1.36	-1.842	-2.178
Trx	-	7.45	3.57	0.951	2.643
Trx	-	1.72	1.56	1.729	1.979
Trx	-	2.24	1.67	-1.681	-0.836
Trx	-	2.26	1.93	-1.406	-2.609

Figure 31. Standalone version of an ILS under construction

c. Viewing Options

While working in Graasp, there are three (3) different ways to view the items of any phase. You can switch between the three options by using the little buttons right under the introductory message of the phase (Figure 32).

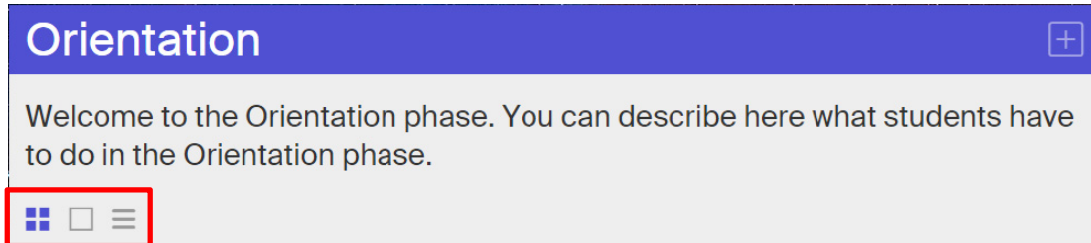


Figure 32. Viewing options

Thumbnail View

The first option is the thumbnail view (Figure 33). In this view you can see all your items as little tiles or thumbnails one next to the other.

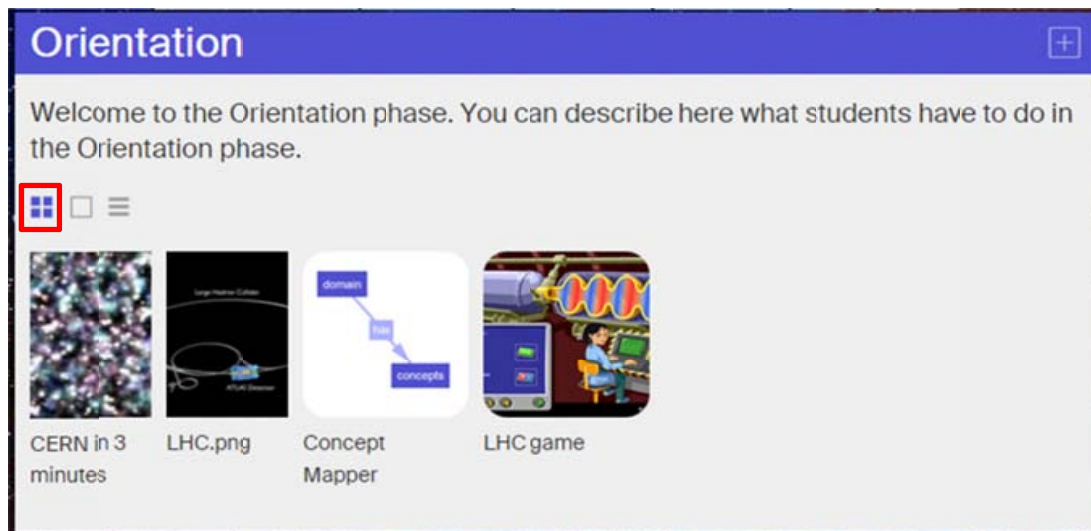


Figure 33. Thumbnail view

You can choose to open, move to another phase, download, add to favorites or delete any given item by clicking on the top right corner of its thumbnail (Figure 34).

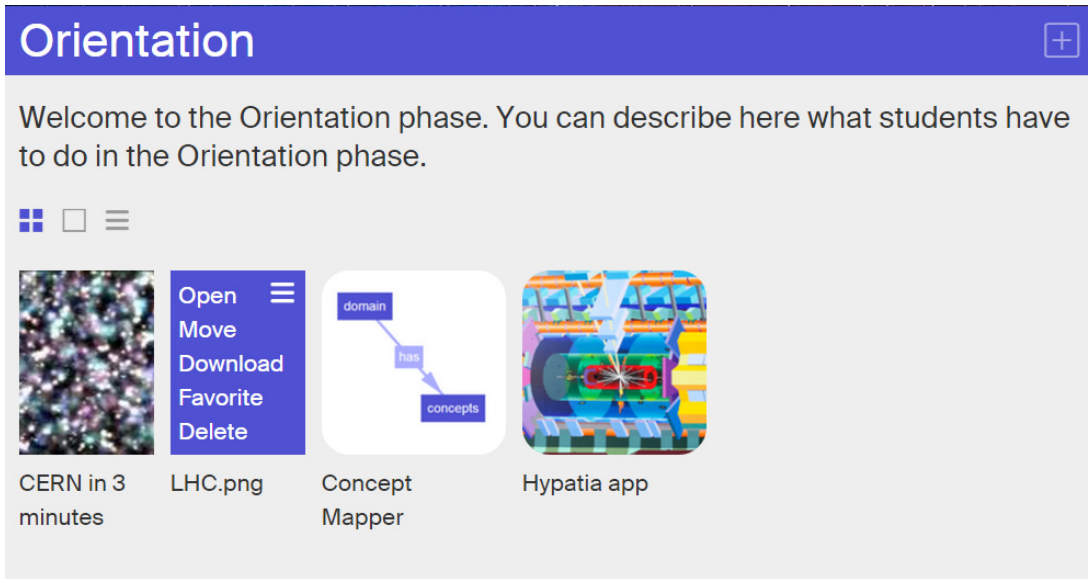


Figure 34. Orientation space a displayed through the thumbnail view

You may also rearrange the order of the items by dragging and dropping them to a new place (Figure 35).

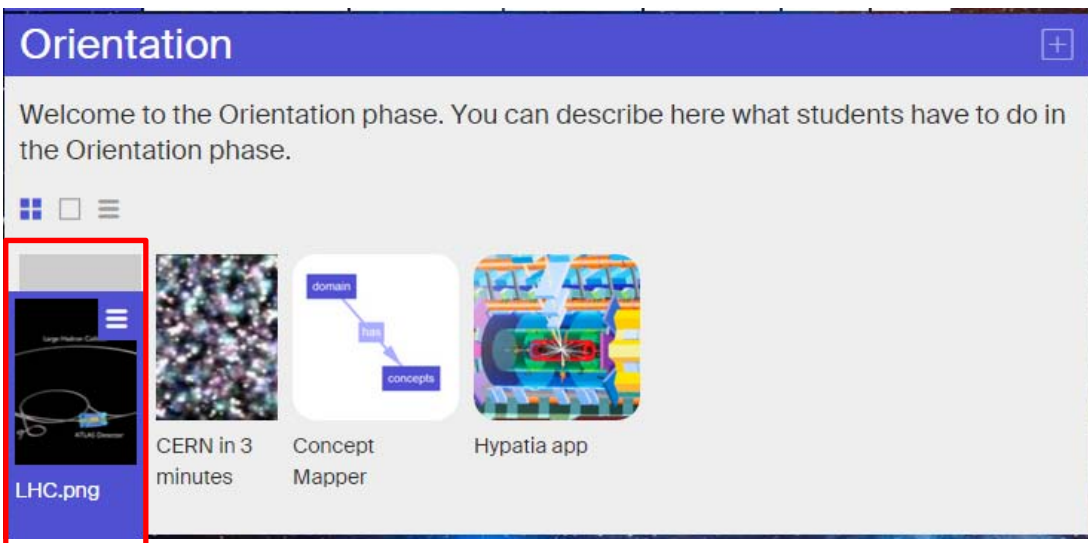


Figure 35. Drag and dropping a resource to change its position

Long View

The long view allows you to see all items opened one under the other (Figure 36). This view is ideal when working on the different items of your ILS and especially when adding texts.

The screenshot displays a vertical stack of three items in a 'Long View' interface. The top item, titled 'Orientation', has a blue header and contains the text: 'Welcome to the Orientation phase. You can describe here what students have to do in the Orientation phase.' Below the text is a red square icon with a white window symbol inside, which is highlighted with a red box. The middle item, titled 'LHC.png', has a blue header and contains the text: 'Write a description here'. Below the text is a large image of the Large Hadron Collider (LHC) with the ATLAS Detector highlighted in blue. The bottom item, titled 'CERN in 3 minutes', has a blue header and contains the text: 'A 3 min tour of CERN and its research facilities Oct 2009 update.' Below the text is a video player showing a 3-minute tour of CERN.

Figure 36. The long view of a space

As shown in figure 37, for every item there is a blue bar (1) on top (which is not displayed in the standalone view) which includes the name of the item. Right under this blue bar there is a description box (2). This box will be used later on to add our texts. Under the description box you can also see the item itself.

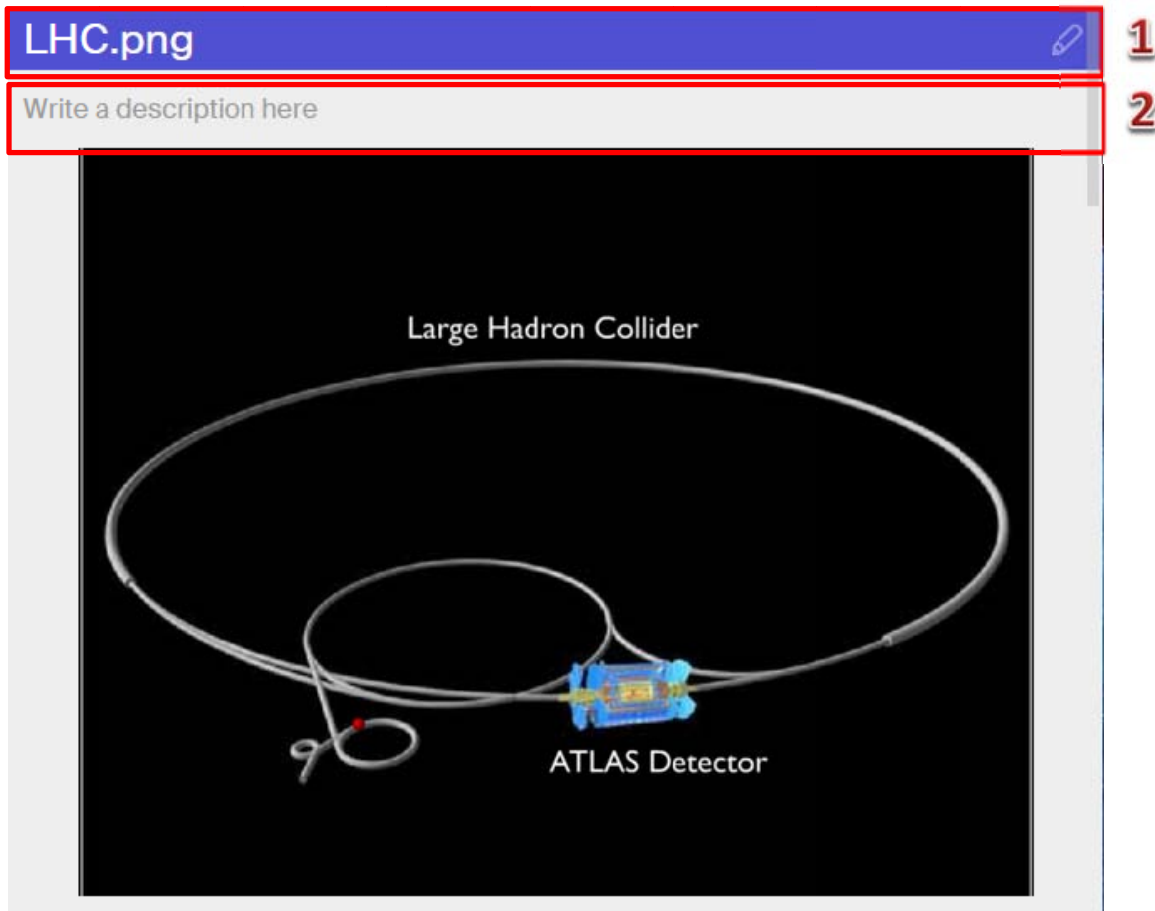


Figure 37. A single item as displayed using the long view

Just like the name of a phase, you can click on the name of an item to rename it. By clicking on the pencil icon on the right you may choose the size of an item(Figure 38).



Figure 38. Change name and change size options of an item

List View

The list view allows you to view all your items in the form of a list. In this view you can also see the access rights your items (public or private).

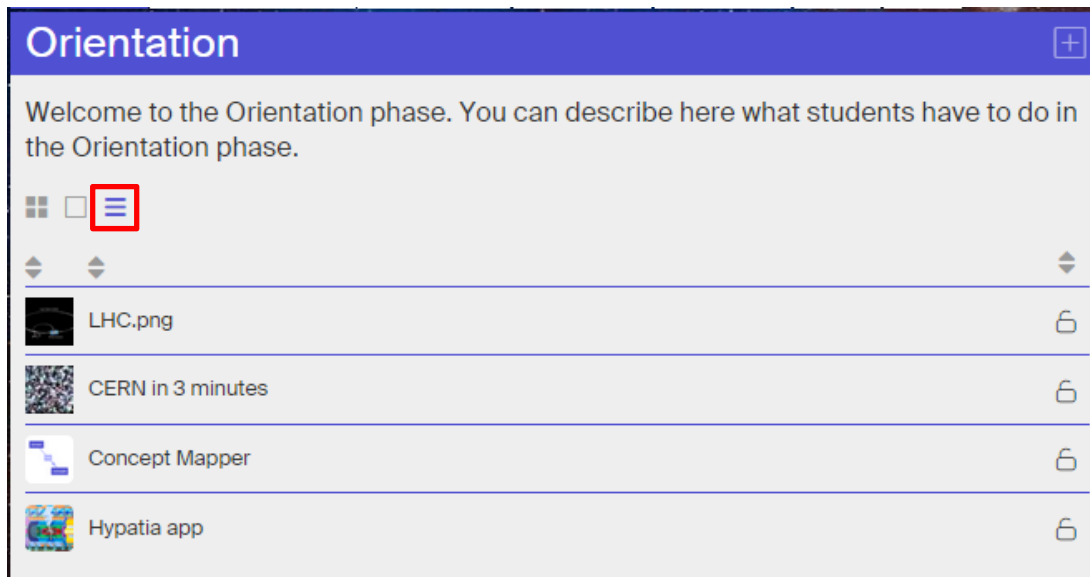


Figure 39. The list view of a space

d. Adding texts

As you may have already noticed, each item comes with a description box above. You can use these text boxes to add the texts between each item.



Figure 40. The description box of an item

You can also add hyperlinks and style your text using the basic styling functions through keyboard shortcuts. The following basic keyboard shortcuts will work in this description box:

- Ctrl+B = Bold letters
- Ctrl+I = Italics
- Ctrl+K= create hyperlink (make sure you first highlight the text to which you wish to add the hyperlink)

If you need extra space for more text or more complex texts (adding bullets, tables etc.) you may also add a text editor as a separate item anywhere in the phase. To do this click on the “Add Resource” button (Figure 20) and add only a name for the resource (1) (do not add a link or click on the “Upload file” button) and then click on “Add resource” (2) as shown in figure 41.

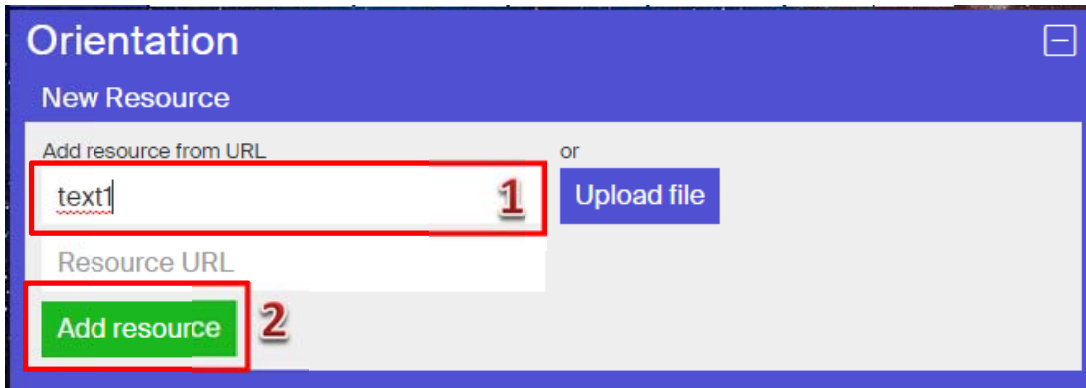


Figure 41. Add a text editor option

The system will then create a “.graasp” resource item which will appear next to the last item you have added (when viewing using the Thumbnail View).

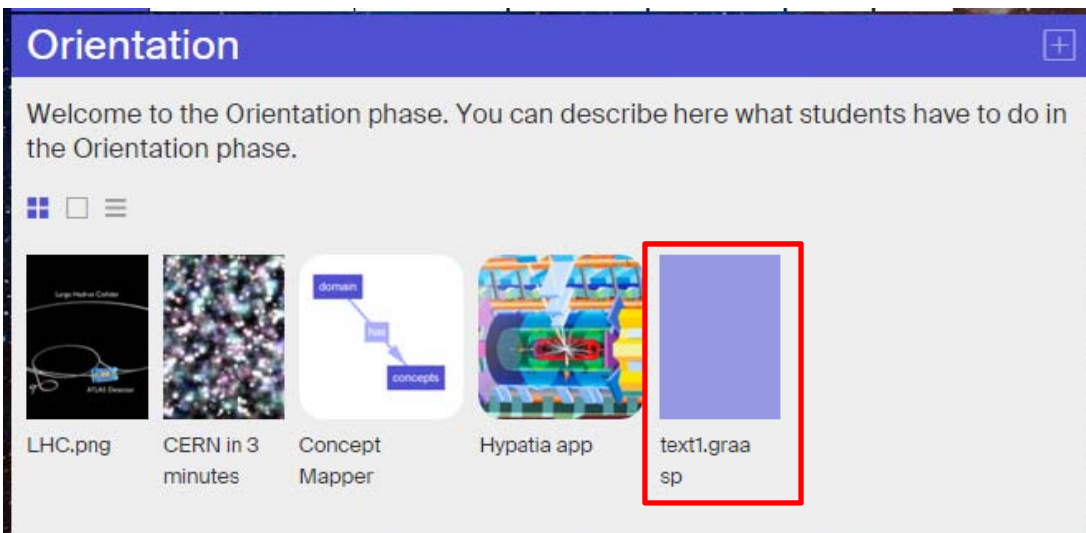


Figure 42. Text editor added to a space

You can use the text editor by switching into the long view (Figure 43). Once you turn into the long view, click on “Edit” (2). You can now type your text and use all the functions which appear in the toolbar (3). The functions available (starting from the left in figure 43) are:

- Formatting (normal texts, code and different types of headings)
- Bold letters
- Italics
- Deleted text
- Insert bullets
- Outdent
- Indent
- Insert table
- Insert link
- Change alignment
- Insert horizontal rule.

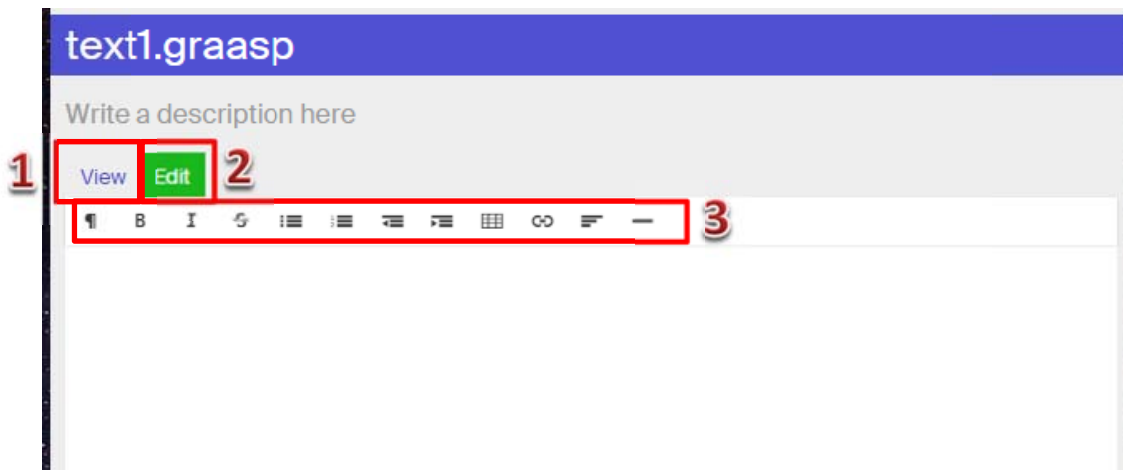


Figure 43. Text editor options

Once you finish your work click on “View” (1) to save your work. You can edit your text by clicking on “Edit” again. Please note that the text editor requires you click on “View” in order to save the text. Additionally, the description boxes of all items save the text automatically so you do not need to save. Like with any other resource you can move around the text boxes and rearrange their position in the phase. After adding the texts needed between the items we had previously inserted, the phase will now look like displayed below (Figure 44). In figure 44 below, the introductory message has been altered. Texts have been added in the description boxes of each item (including a link in the lab’s description) and an additional text editor was added to add the last text displayed below the HYPATIA online lab.

My ILS ET

Orientation Conceptualisation Investigation Conclusion Discussion

Welcome to the Orientation phase. This activity is about elementary particles.
Have a look at the following image? Do you know what it depicts?



ATLAS is a detector located at CERN. Let's see the following video to learn about CERN.

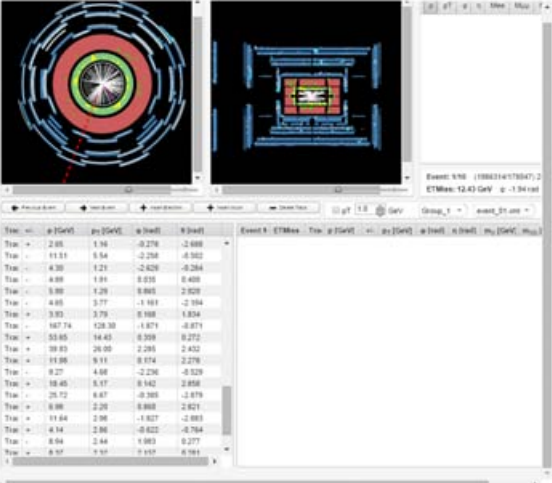


What are the main strands of CERN's research? Which are the elementary particles and how are they connected to the fundamental interactions? Use the concept map tool below to create a map of the concepts you picked up from the video.

Concept Map - concept Map

concept

We will use the HYPATIA online lab below to study to study interactions that occur in the ATLAS detector. Have a look at the lab below to get acquainted with its basic actions. You may also have a look at its manual here.



Once you finish getting comfortable with using the HYPATIA lab, you may move on to the next phase.

Figure 44. Standalone view of a completed ILS Orientation phase

e. Adding resources and notes for the teacher

As mentioned above, you can add notes for the teachers and resources using the comments section of the side box and the “About” space respectively. Adding teachers’ notes as well as supportive materials will make your activity much easier for any teacher to use.

Adding Resources

As mentioned above you can add resources in any phase of an ILS. However there are cases that a teacher might not wish to have a whole document (a long pdf for example) integrated in a phase but instead he/she might prefer to have it as a hyperlink that can be opened in a separate tab. In addition, a teacher might also wish to add resources that will be available only for the teacher (for example an answer key). In both these cases, such resources can be added in the “About” section. Remember that the “About” section is by default set to “Private” so it is not visible to the students through the standalone view. It can only be seen through the authoring environment by the users that are members of the ILS.

To add such resources, go to the “About” section of the inquiry space and use the “Add resource” function to add all the resources or instead use the drag and drop function as described above (chapter 4/section b). Now let’s say that in our example we wish to add a “Related theory” file for the students and an answer key which will be only available to the teacher. Like mentioned above the first step is to add these resources to the “About” space (Figure 45).



Figure 45. Resources added to the “About” section

Once the files are in the “About” section you can derive a URL for each of these files so you can hyperlink them anywhere in the ILS. To do that, while viewing the items using the Thumbnail view like in figure 45 above, click on the Thumbnail of the resource for which you wish to get a URL. The system will then open up a preview of the resource (Figure 46). Click on the “Raw” button on the top right corner.

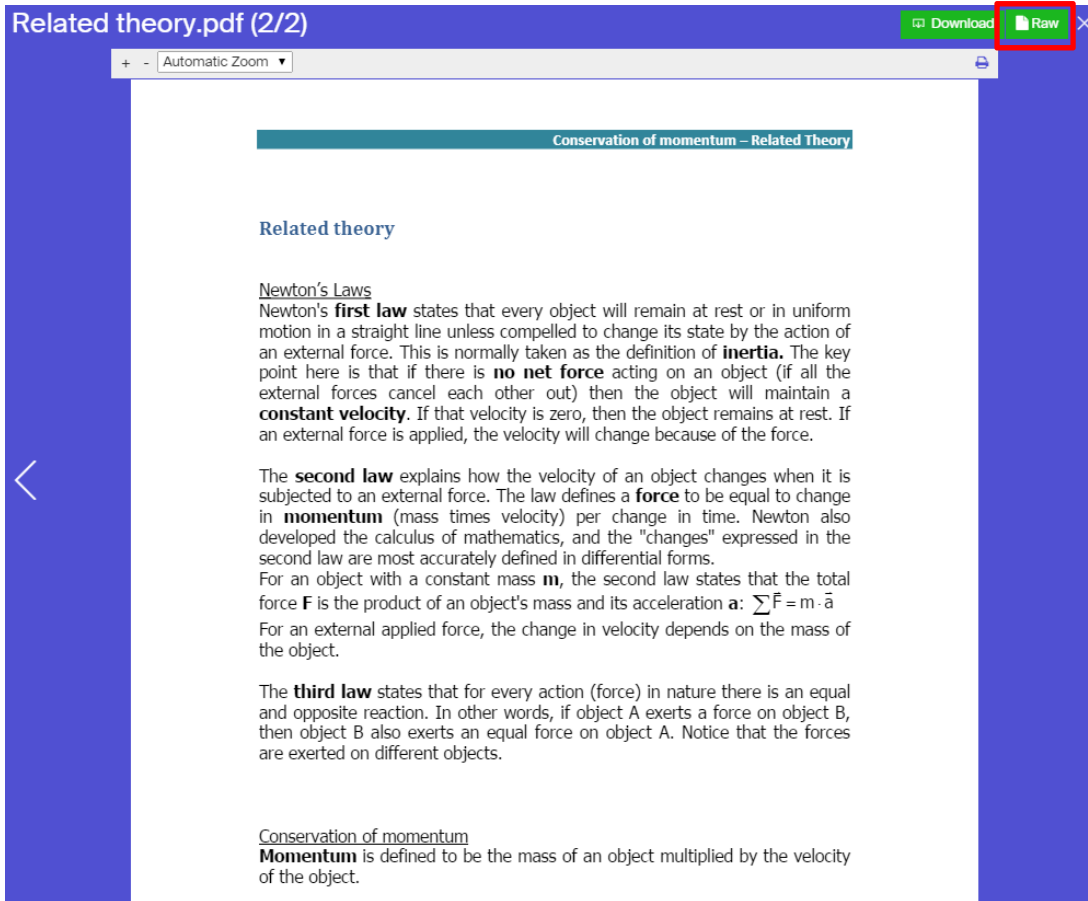


Figure 46. Preview of a resource in Graasp

The resources will now be displayed in a new tab. The link displayed in the browser is the link of the resource. Note that all such links coming from Graasp end in "/raw" (Figure 47). In order to hyperlink this URL anywhere in the ILS, copy the link mentioned above. Then, go to the phase in which you wish to add it, select the text to which you wish to hyperlink it and use the hyperlink function (Ctrl+K in the case of description boxes and the "Insert link" button in the case of the text editor).

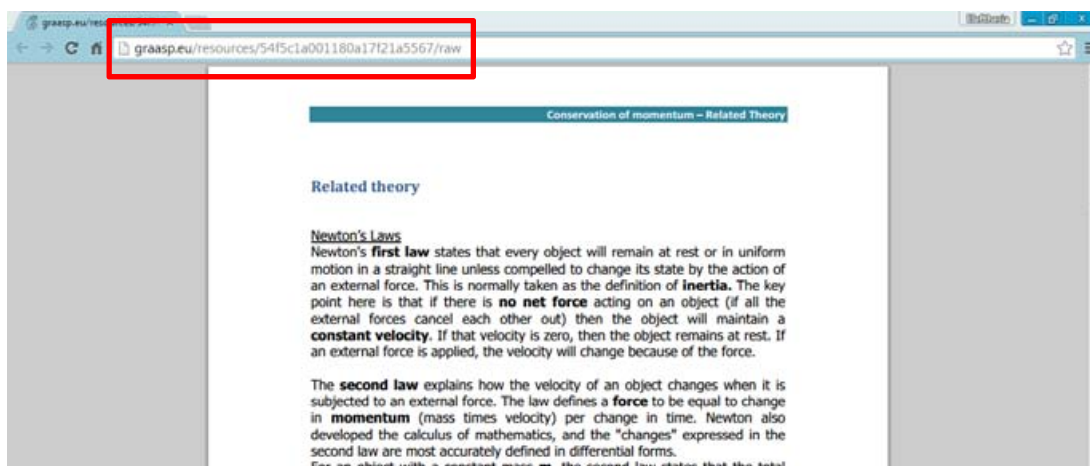


Figure 47. Raw resource displayed

If you wish to have the resource available only for the teacher there is no need to do anything else. As long as the document is in the “About” space, all the members of the inquiry space will have access to it. In addition, you may also indicate to the members where in the ILS a document is needed through the comments section.

Adding notes for the teacher

The notes for the teachers are an essential part of a lesson plan especially in the case we expect many teachers to use it. The notes for the teacher might include suggestions for offline activities, tips and tricks and comments based on a teacher’s past experience with this ILS. You can add notes for the teacher in any phase of the ILS using the “Discussion” option from the side box. Simply type your note and click enter (Figure 48).

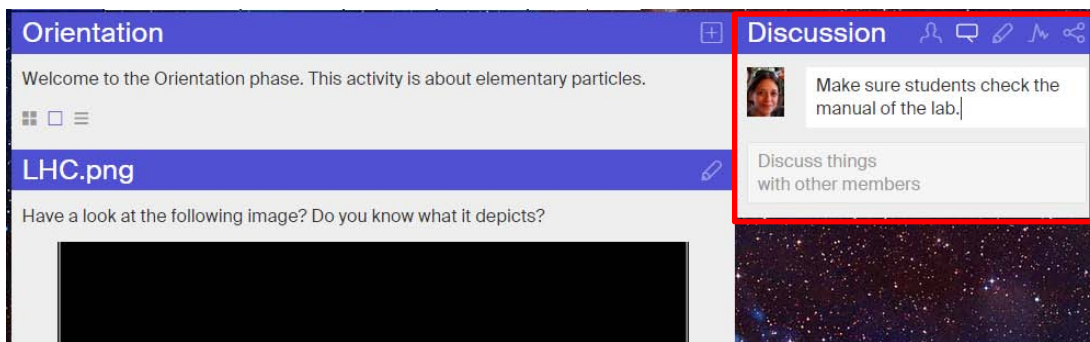


Figure 48. Add notes for the teachers

Note that if you add URLs in this section the system will automatically add a hyperlink for them. Thus you may as well copy the link of a resource from the “About” section as described above and paste it in the comments section for the teacher to find (remember that this section is not visible by the students). This way, teachers not only have access to all additional resources through the “About” section, but they may also find them directly in the phase in which they are supposed to be used (Figure 49).

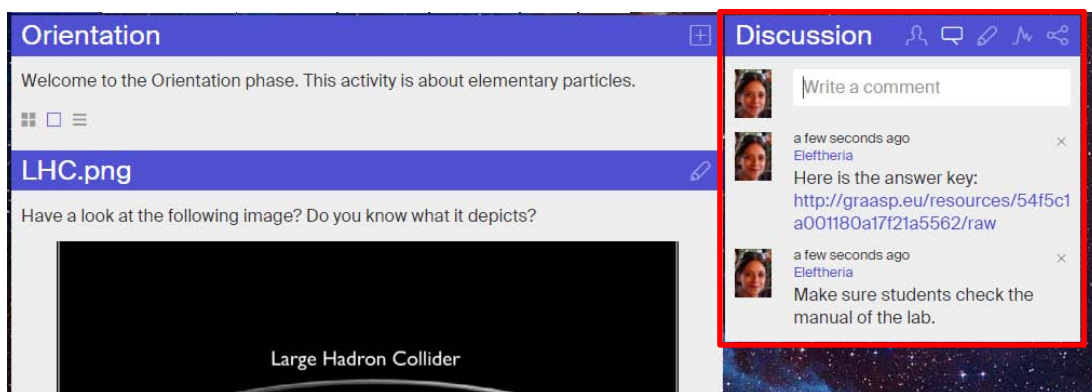


Figure 49. Notes and answer key added to a space

f. Monitoring students

As mentioned in chapter 3/section b, every ILS has a default member called “AngeLA”. As long as “AngeLA” is a member of an ILS, the system will keep track of students’ activity. You can have access to the tracking records by adding to your ILS the respective supportive apps from the Go-Lab repository. You can add these supportive apps in a private space of your ILS so that only the members of the ILS can have access to them (of course, if for some reason you wish your students to have access to these monitoring apps as well you may alternatively add them to a public space). Given that by default the only private space in an ILS is the “About” space you can add these apps there. Alternatively you may create a new space, which you will set to private, and add the apps there so you can have them separately from other items. To do that, go back to the main space of your ILS, click on the “+” button and select the “Create Space” option (Figure 50).

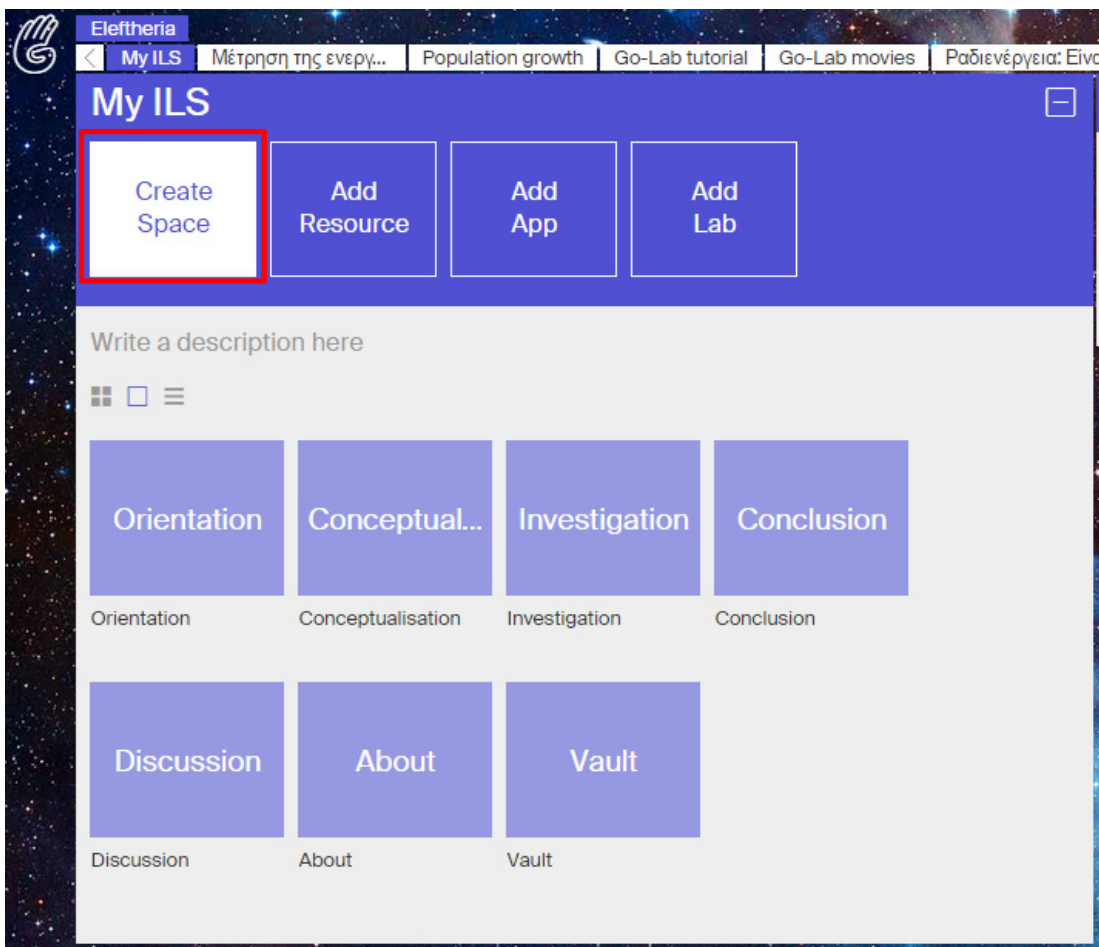


Figure 50. Create new sub-space in an ILS

Add the name you wish (in this case “Monitoring”), click on the green “Create Space” button and the new space will appear right next to the “Vault” space (Figure 51).

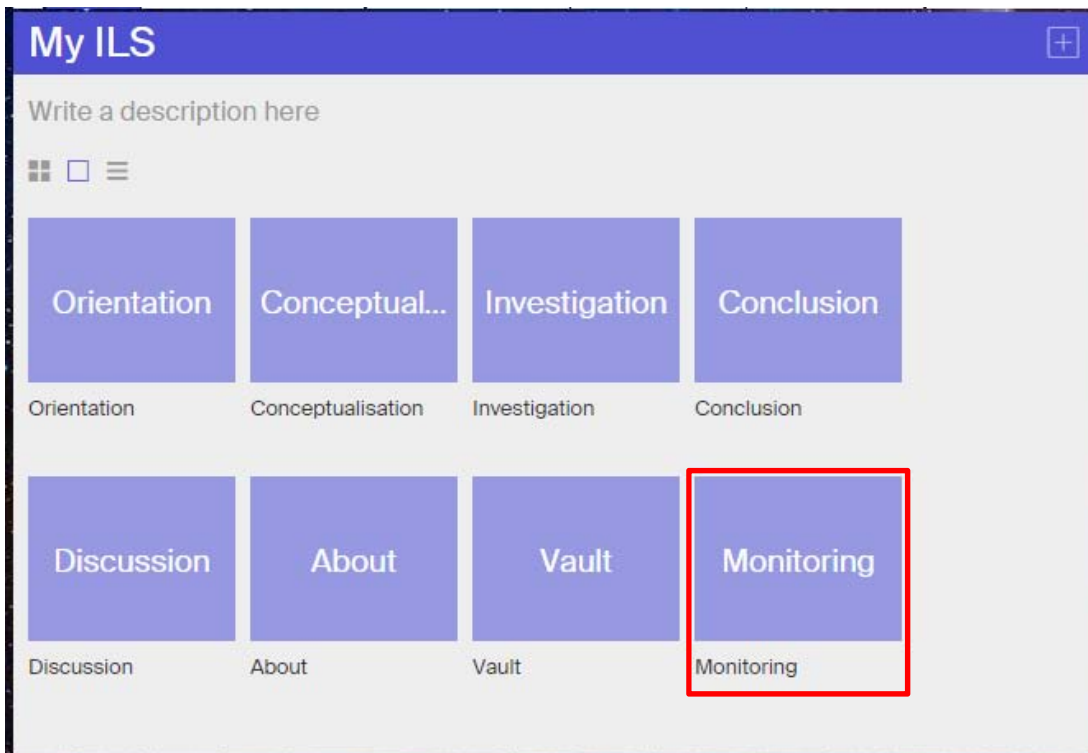


Figure 51. New sub-space added to an ILS

Enter the “Monitoring” space and from the “Members” section of the side box, set the space to “Private” (If you wish your students to have access to this space through the standalone view keep the space set to “Public”. It will then appear in the standalone view as a new separate tab).

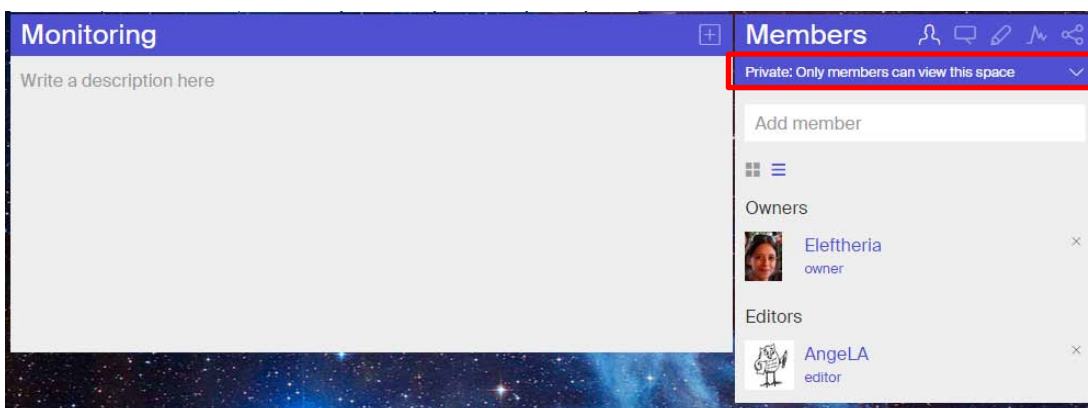


Figure 52. Change access rights of a space option

Now it is time to add the monitoring apps. Following the procedure described in chapter 4/section b, add the following apps (any or all) from the Go-Lab repository:

- Action Statistics
- Online users visualization
- Student time spent

The “Action statistics” app visualizes the number of actions of the users in an ILS per app as a multivariate bar chart. Users can adapt the visualization by filtering for apps and by altering the visual representation.



Figure 53. "Action statistics" supportive application

The “Online users’ visualization” app shows for every phase in an inquiry space which users are currently active in that phase. The user is shown with his profile picture or the first letter of his name. The visualization is updated in real time.

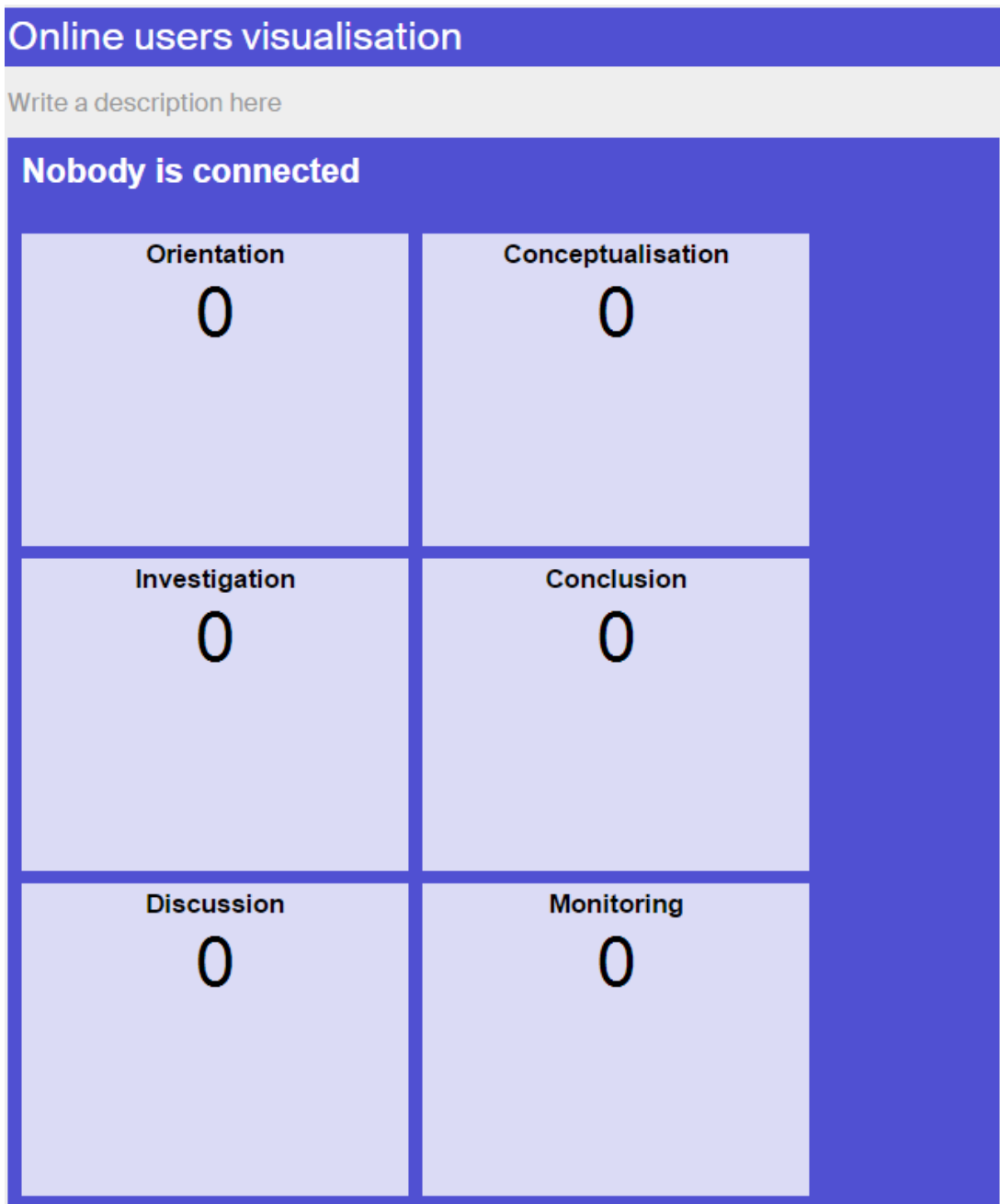


Figure 54. "Online users' visualization" supportive application

Finally the “Student time spent” app displays a table with the time spent for each student in each phase of an inquiry space. The time spent is updated in real time for each user and phase.

The screenshot shows a web application titled "Student time spent". Below the title is a text input field with the placeholder "Write a description here". Below that is a table with a blue header and alternating blue and white rows. The table has seven columns: "Average time", "Orientation", "Conceptualisation", "Investigation", "Conclusion", "Discussion", and "Monitoring". The first row shows "Average time" with values of 06:22, 00:00, 00:00, 00:00, 00:00, 00:00, and 00:00. The second row shows a student name "et" with the same values. A scrollbar is visible on the right side of the table.

	Orientation	Conceptualisation	Investigation	Conclusion	Discussion	Monitoring
Average time	06:22	00:00	00:00	00:00	00:00	00:00
et	06:22	00:00	00:00	00:00	00:00	00:00

Figure 55. "Student time spent" supportive application

5. Publish your ILS

In order to publish your ILS click on the “Publish inquiry space” button in the “Sharing” section of the side box in your ILS space (Figure 56).

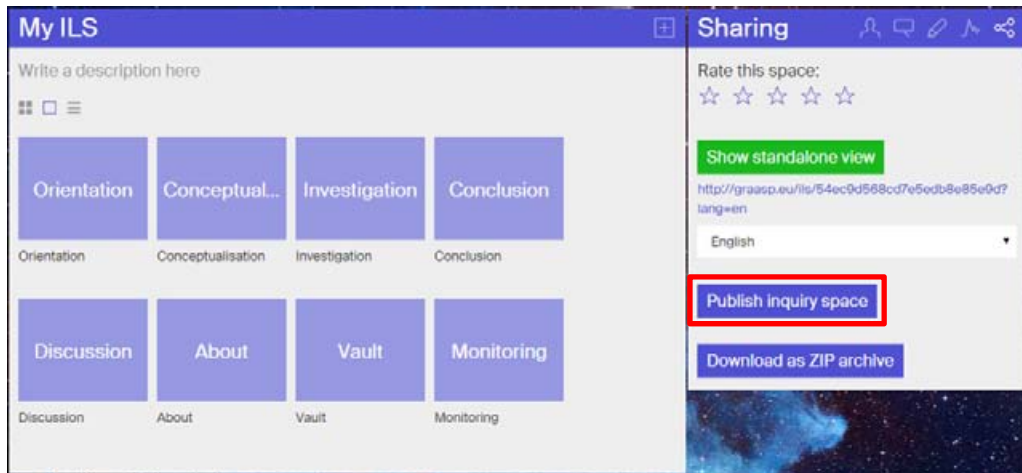


Figure 56. Publish ILS option

The system will redirect you to a new page (you might be asked to re-login first) called “Create Inquiry Space” (Figure 57) in which you can add some basic information for your ILS and then publish it in Go-Labz.

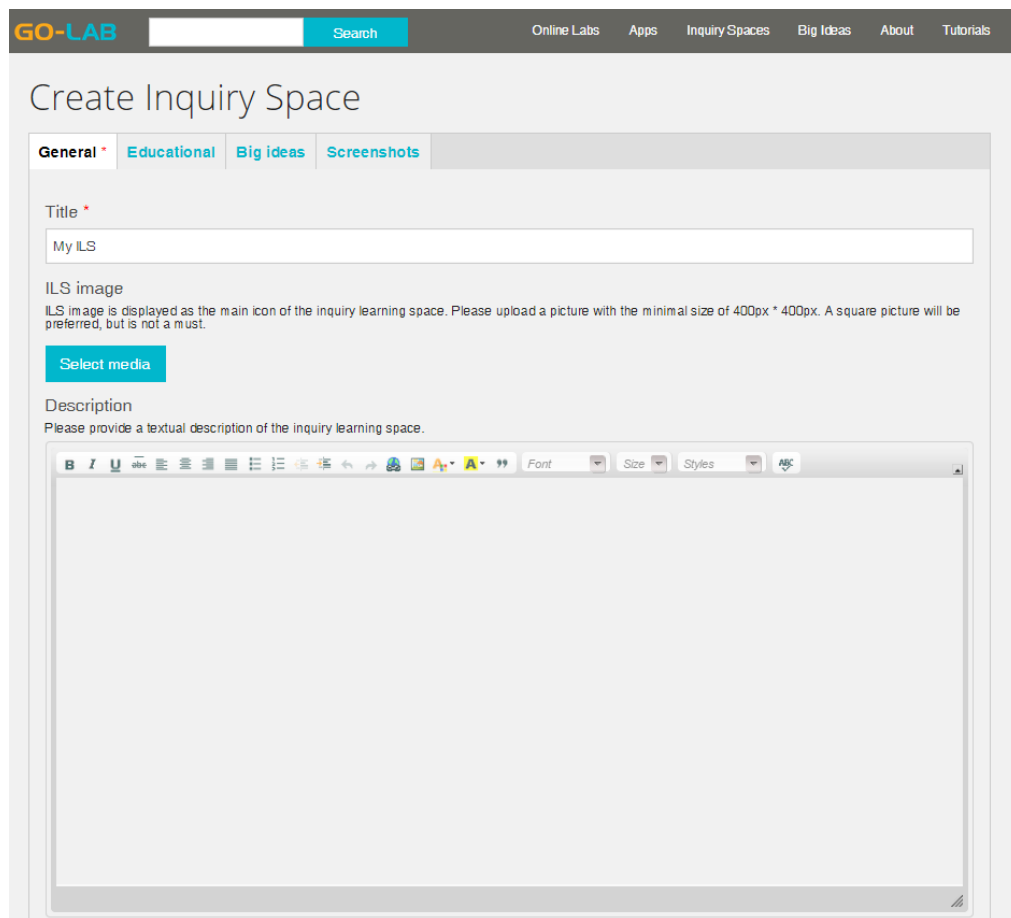


Figure 57. Inquiry Space publish form

You might notice that many of the fields are pre-filled. The information in these pre-filled fields is derived from the lab which you have used in your ILS. You may choose to alter these fields if you wish. Once you fill in all the necessary information in all of the four (4) tabs of the “Create Inquiry Space” page click on the “Save” button at the bottom of the page. Once you are done the ILS will appear in Go-Labz.

Once your ILS is published in GoLabz it will be available to all users of the Go-Lab repository. Thus, other teachers may also choose to view or use your ILS. Likewise you might also wish to use an ILS that is published in GoLabz by another teacher. If you wish to only get access to the ILS part all you need to do is click on the “Students’ Link” URL (1) in the preview page of the ILS in GoLabz (Figure 58). If however you wish to use the whole lesson plan you must get access not only to the standalone view of the ILS but also to the respective inquiry space in Graasp. To do that, click on the “Copy this Inquiry Space” button (2). A clone of the original inquiry space will then be created in your own account. Note that this clone is not published in GoLabz as the original inquiry space. You may use the cloned inquiry space as is, or you may make any alterations you like (note that the clone is located in your profile, so you are its owner). In case you make many alterations so that the two ILSs (original and clone) are no longer the same activity you may choose to publish the cloned ILS as a new ILS following the procedure mentioned above.

Conservation of momentum in particle collisions

View Edit

by Eleftheria Tsourlidaki, Angelos Lazoudis

Age range: 14-16, 16-18, >18
Language: English
Level of difficulty: Advanced
Level of interaction: High
Average learning time: 2 didactic hours
Access rights: Creative Commons Attribution (CC BY)

Student's link: <http://graasp.eu/ils/54731234e9934012b7c65f97?lang=en> **1**

Like 0 Tweet 0 +1 0 Visits: 31

Copy this Inquiry Space **2**

Description:
 In this activity students have the chance to test the conservation of momentum in particle collisions. Using data from the ATLAS experiment at CERN they determine the total momentum from all particles tracked after a particle collision and they calculate (magnitude & direction) the missing momentum.

Figure 58. The preview page of an ILS in GoLabz

6. Glossary

GoLabz: The Go-Lab repository. It includes a selection of online labs, a pool of ILSs which use the online labs and a collection of apps apt for use in the Go-Lab ILSs.

Graasp: The authoring environment of Go-Lab.

Inquiry Learning Space (ILS): The part of the activity that students are able to see through the standalone view.

Inquiry Space: A Graasp space which follows the Go-Lab inquiry cycle. It contains one space for each inquiry phase, an “About” space and a “Vault” space.

Lesson Plan: A complete Go-Lab activity. A lesson plan includes the part that the students can see (ILS), the teachers’ notes, and additional resources for the teacher.

Space (or Graasp space): In Graasp, a space encapsulates the context of a collaboration. A space in Graasp can be loosely compared to a folder with associated membership and permissions. In contrast to a folder, a space in graasp allows not only to store files but also to display dynamic content and run web apps.

Supportive Applications (Apps): Small web based software applications supporting specific learning or teaching goals and tasks in online labs.

Note: For further help on how to create your own space you can also visit the “Go-Lab tutorial” section here <http://www.golabz.eu/spaces/go-lab-tutorial>