D.4.2 Validation Report

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2.0	09.2011	3.3 Reasons for withdrawal	Integration of results of internal document review	Anne-Christin Tannhäuser

Contents

1. Introduction

1.1 UniSchooLabS Project Goals and Envisaged Outcomes

The UniSchooLabS project addressed the Comenius Programme priority 4 *Development of digital learning environments of the acquisition of key competences*. Our overall project objective is to improve the quality of science education in schools and to foster the acquisition of new skills as analytical skills and creativity among both students and teachers. Furthermore, the project aims at raisings students' motivation for studying science and making science education more attractive at school and as a prospective future field for higher education.

UniSchooLabS envisages reaching these aims by:

- Providing European primary and secondary teachers and schools with a validated toolkit which allows the deployment of remote/virtual university science labs for teaching and learning.
- Establishing school-university partnerships
- Working towards a growing community of teachers making use of the developed toolkit

1.2 Scope

Piloting and validation the online toolkit is one of the core activities of the UniSchooLabS projects. The aim was to receive formative feedback from target users and to improve the effectiveness and usefulness of the developed products. The validation report is one of the main outcomes of the piloting activities and will give input to the final toolkit version for schools enabling them to integrate remote/virtual university science labs into their science teaching.

The validation report has been composed to further inform software development and in doing so contribute to the quality of the toolkit. This document shall also inform the dissemination activities in order to promote the UniSchooLabs products to schools and teachers in line with the lessons learnt from validation. Furthermore, this document is aimed at informing the evaluation activities to be taken into account for a judgement on the overall success in terms of the above listed project goals.

We also see a relevance for further projects and initiatives aiming at connecting schools with remote science laboratories offered by universities and science centres.[1]

[1] Four UniSchooLabs partner institutions will participate in an IP-FP7 project called GO-Lab which can be considered as large scale research-oriented follow-up of the UniSchooLabs project . GO-Lab will aim to open up remote science laboratories, their data archives, and virtual models ("online labs") for large-scale use in education and it will involve more schools and universities. The implementation of the GO-Lab project can guarantee the Coordination Entity activity as well as the involvement of high number of schools and universities.

1.3 Aim of validation

Validation within the project concerned the UniSchooLabS toolkit including its support services as well as Recognised value added of the proposed collaboration model school-university. The toolkit composes the following features and support services:

- A catalogue of chosen remote and virtual labs through which teachers discover existing resources and select the ones that match the teacher course and age group.
- Teaching and learning material provided by the university labs as well as the UniSchooLabS partnership (teacher and learner guides) in the national languages of the piloting schools.
- A tool for designing lesson plans for classroom use of remote and virtual labs interconnected with an electronic lab notebook that at each stage of the model will store outputs of students activities (written records comprising: text, data, graphs, mathematical expressions) so they can become materials for reflections and class discussion.
- A moderated online teacher community

2. Methodology

In line with the above mentioned aim two different target groups were involved in the research: schools (teachers/students) and laboratory providers. Two different approaches were developed and are described below.

2.1 Schools (Teachers and Students)

Eight schools were involved in a piloting exercise with real classroom use through direct contacts and indication of interest. Teachers normally worked in pairs, hence the toolkit was used in more than one classroom per school.

Those were:

AT	BG/BRG Klosterneuburg
IT	Liceo Scientifico Galileo Galilei Perugia
IT	Istituto Superiore Torno di Castano Primo
GR	1st Lyceum of Glyka Nera
GR	2nd Lyceum of Aharnes
GR	2nd High School of Echodros
GR	High school of Smynthi
GR	Ellinogermaniki Agogi, Pallini

During the run of the pilots 2 schools withdrew their participation.

GR	2nd Lyceum of Echedoros
IT	Scuola Primaria Manzolini

Unfortunately, given time restrictions and the rhythm of the school year, substitute schools could not be found.

Teachers were engaged and briefed through virtual sessions and received constant support throughout the process of piloting. There feedback was gathered through the following means:

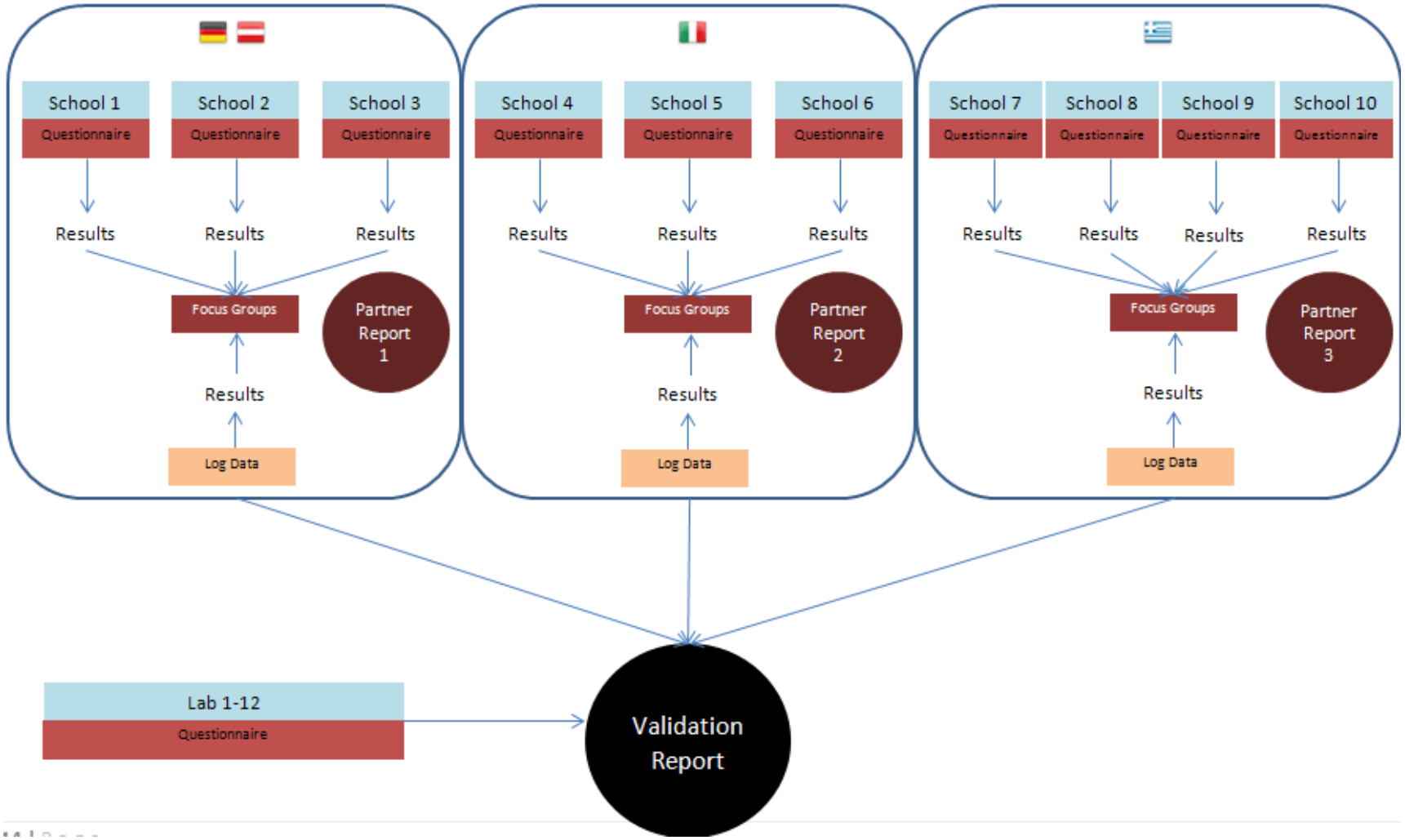
- Questionnaires (see Annex 2) were designed to explore the potential for adoption of the toolkit with the help of established criteria for mainstreaming of the technology into educational settings (see Annex 1). Furthermore they also addressed usability issues (see Annex 2)
- Dedicated questionnaires for teachers who withdrew their participation[2] (see Annex 3)
- Two focus groups were implemented among teachers and students in order to receive feedback on the perception of students and pilot teachers' peers in two selected the pilot schools. Those were self-directed by pilot teachers following guidelines displayed in Annex 4

A visualisation of the methodology is displayed on the next page.

2.2 Laboratory owners (universities and science centres)

The toolkit library contains links and information on 9 different remote and virtual laboratories[3]. The providers of these labs were invited to attend a webinar on the project and toolkit development. Then individual interview were led with the help of interview guidelines which can be found in annex 5.

[2] Three Italian teachers (same school) withdrew their participation mid-time of the piloting activities
[3] The lab catalogue was extended to 12 laboratories by the end of the project


School 1
Questionnaire
School 2
Questionnaire
School 3
Questionnaire
Results
Results
Results
Focus Groups
Partner Report 1
Results
Log Data
School 4
Questionnaire
School 5
Questionnaire
School 6
Questionnaire
Results
Results
Results
Focus Groups
Partner Report 2
Results
Log Data
School 7
Questionnaire
School 8
Questionnaire
School 9
Questionnaire
School 10
Questionnaire
Results
Results
Results
Results
Focus Groups
Partner Report 3
Results
Log Data
Lab 1-12
Questionnaire
Validation Report

3. Results

3.1 Teachers and schools

Answers to the online questionnaires for pilot teachers were analysed by means of descriptive statistics for closed questions and simple summaries of teachers' comments to open questions.

Engagement during the validation activities

- The majority of pilot teachers used the toolkit for more than 3 teaching hours, some for up 6+ altogether (Fig. 1).
- Most of the teachers have created their own lesson plans (Fig. 2) and four of them deployed two or three laboratories (Fig. 3).
- Most popular were the remote laboratories *Observing with NASA*, *DSpace* (both remote telescopes) and Remote Farm (Physics) (Fig. 4)

Usability of the toolkit

Teachers found the time needed for registration and lesson plan creation appropriate

- 40% of pilot teachers experienced serious errors, which forced them to recover data or interrupt their classroom activities.

  Students cannot log in over Open ID, so I had to find a different way to access the activities (twice mentioned)

  My main problem was finding out how to insert photos. I believe a more detailed manual is needed. Although the procedure was explained to us during the training it would be very convinient to have a detailed guide to use will working for the first time with the toolkit.

  Students should be able to somehow "see" that their files were uploaded.

  In my opinion the toolkit is a bit slow, it should correspond faster. I also faced problems with having multiple teams logged in and writing in the notebook at the same time. Moreover, if I do an activity once, I don't know how to reset it in order to use it again. Moreover, it was a bit difficult to find other activities as well as guidelines or technical support. My students enjoyed the chat a lot and I think it is a good tool to work with when students are not all present at the same time. However, it still needs work.

  The choice of values of temperature are not always good.[4]

- The majority of pilot teachers found it (somewhat) easy use the toolkit after some time of break, i.e. the remembered how to handle the online platform.

[4] This concerns a laboratory not the toolkit itself

- Half of the respondents felt confused or stressed when using the toolkit for the first time. At the end of the trial period the vast majority of pilot teachers felt confident in its use.
- In terms of aesthetics, the majority of pilot teachers found the visuals to be clear and colours to be pleasant.

Engagement during the validation activities in figures

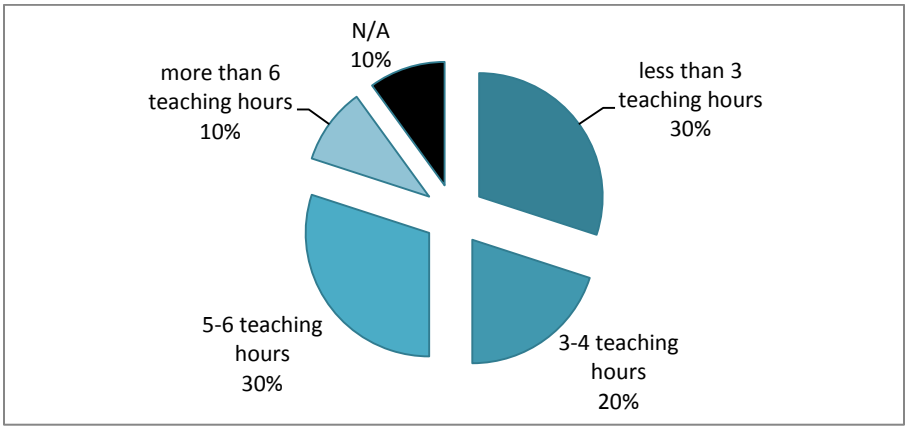


Fig. 1. *Number of teaching hours (45 minutes) spent working with the toolkit and related activities*

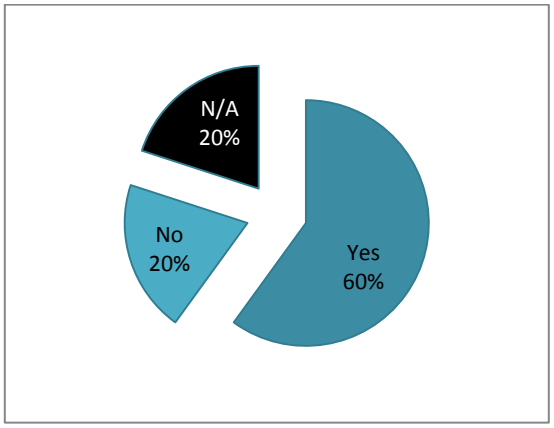


Fig. 2. *Percentage of teachers creating their own lesson plan*

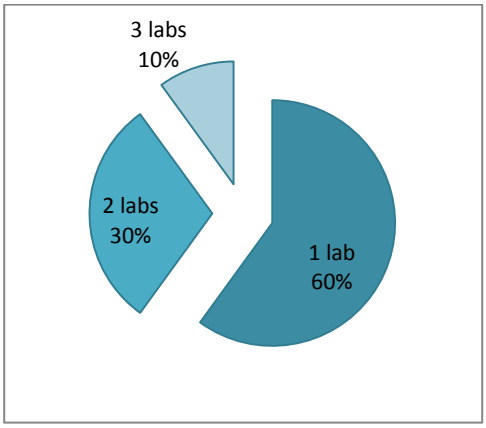


Fig. 3. *Number of labs each pilot teacher use in their classroom*

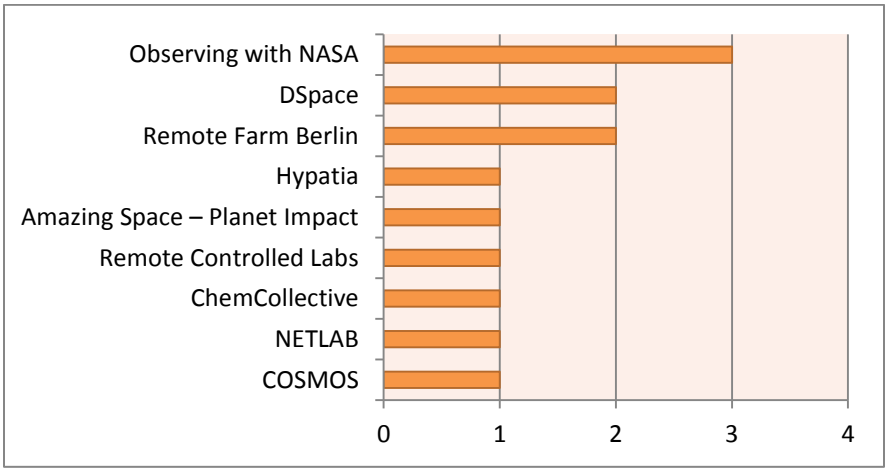


Fig. 4. *Number of pilot teacher selection/usage per toolkit laboratory*

Usability of the toolkit in figures

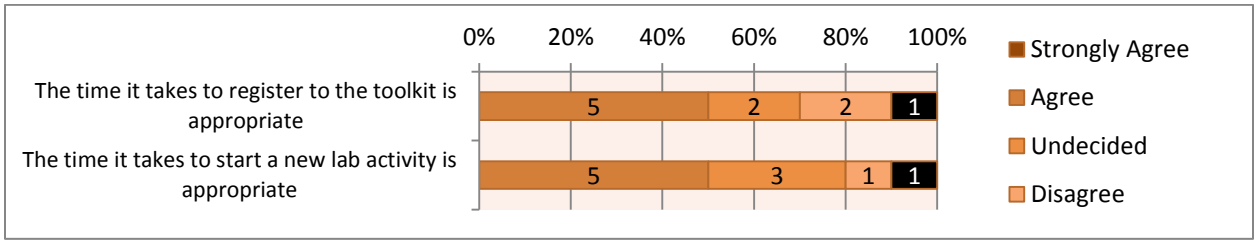


Fig. 5. *Perceived performance*

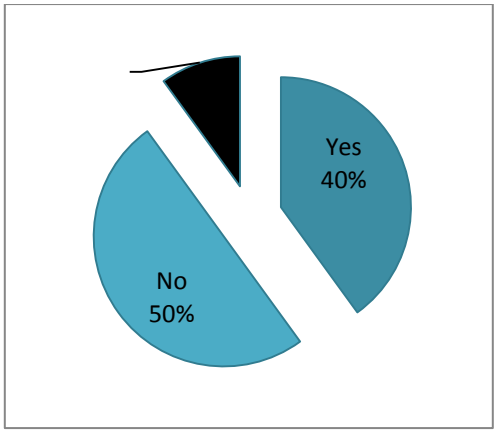


Fig. 6. *Percentage of teachers having experienced crucial "errors" while handling the toolkit, i.e. leading to data recovery*

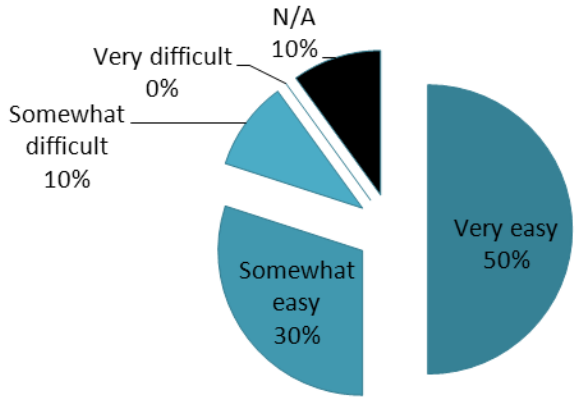


Fig. 7. *Ease of recalling when handling the toolkit*

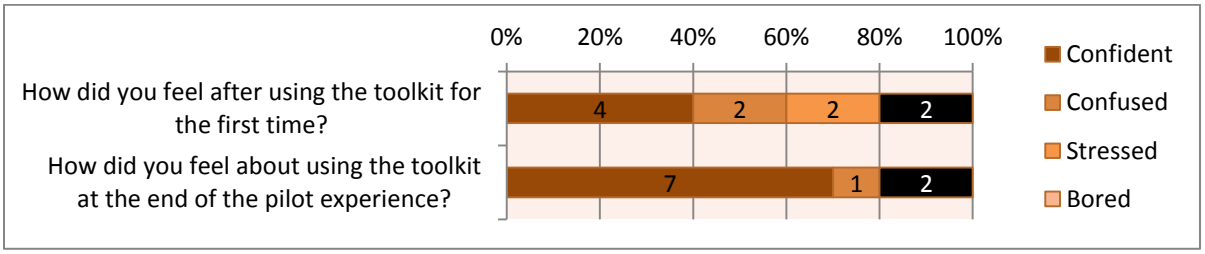


Fig. 8. *Emotional response before and after the trial period*

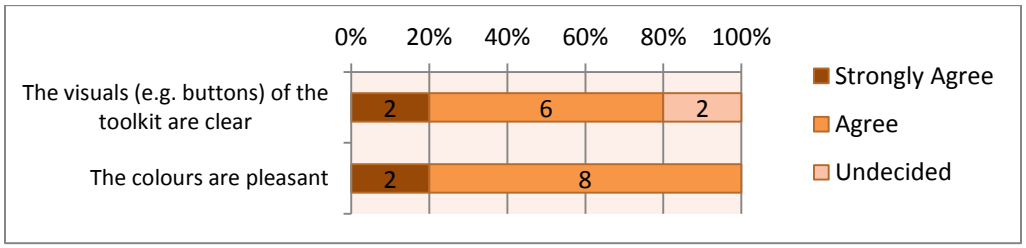


Fig. 9. *Perceived aesthetics*

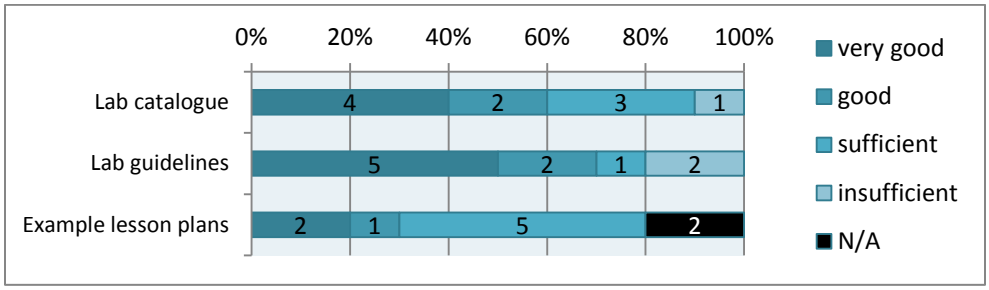


Fig. 10. *General rating of toolkit components*

Results regarding the potential for integration of the toolkit into more educational settings

A large number of questionnaire items targeted at teachers were constructed following established criteria for the integration of innovation and new technology. Hence results will be reported along these:

Criteria	Results
Innovation	The majority of teachers felt that the toolkit provides them with innovative means for their science classrooms (Fig. 11).
Empowerment	The toolkit is also perceived as flexible enough to fit the local conditions of their schools (Fig. 11).
Suitability	The majority of teachers felt sufficiently prepared to use the toolkit in their classrooms (Fig. 11). The support offered before the start of the trials and existing material was important to teachers (Fig. 12Fig. 13). Only the value of the teacher community was doubted by a number of teachers (Fig. 12).
Usefulness	The majority of teachers agreed or strongly agreed that the toolkit • Supports inquiry-based learning • Widens access to quality laboratories • Motivates students (Fig. 13) However, concerning the access to quality laboratories, 3 out of 10 teachers doubted that the toolkit widens access directly. *Half* of the teachers expressed • the toolkit in combination with the IBSE approach raised interest in science among their students • the toolkit is useful for their science teaching (Fig. 14) The majority of teachers expressed that the toolkit is suitable for students 15 years and older (Fig. 15). *Students between 14 and 17 years have found many difficulties with this tool. It'd say it is best suitable for students older than 17.*

Criteria	Results
	The work performed by the site of NASA is alright even for students 15/16 years. Remote farm only with age increased to 17 years. *Middle school students generally enjoy and are motivated by online activities. High school students can use them for independent learning with individual time management* *Students need to be quite well acquainted with the use of computers.* *The students would have to be familiar with certain parts before the process would be of major benefit.*
Universality Trans-nationality	Most of the teachers agreed that the toolkit is suitable for classroom use in their country (Fig. 16) *My school teaches in English, most of the others teach in German.* *In our country the use of IBSE and of on-line labs are encouraged and become more and more present in teaching practices.* *It certainly would bring in many more concepts to the classroom that are at present not possible and so enable the students to "experiment" much more.* The limitations listed are in line with the comments above (usefulness): *Remote farm may be used only in a high school of applied sciences, but not okay in a traditional school.* *Depends on the type of school.* Three teachers were undecided.
Scalability	Teachers perceived the toolkit as scalable with regards to teaching and learning material and felt in the position to expand the toolkit's lesson plans independently (Fig. 17). *I did need a lot of email support and there are still some bugs or online problems.*
Autonomy	All pilot teachers expressed that further support would be needed in order to use the toolkit in their classrooms after the trials (Fig. 17 and Fig. 18). This concerned namely continuous technical support and the moderation of the teacher community. *Continuous extension of the lab catalogue and the related activities*
Partnership	Teachers indicated that partnerships and exchange with peers is supported. Only the minority of respondents felt the same regarding partnerships with universities (Fig. 20).
Mainstreaming	The majority of teacher (70%) state to continue using the toolkit in their classrooms (Fig. 19). Suggested improvements and further comments were mainly technical nature and are listed above. The below statement is however notable: *I want more simple laboratory technology of more from a graphical viewpoint*

The toolkits potential for integration into educational settings in figures

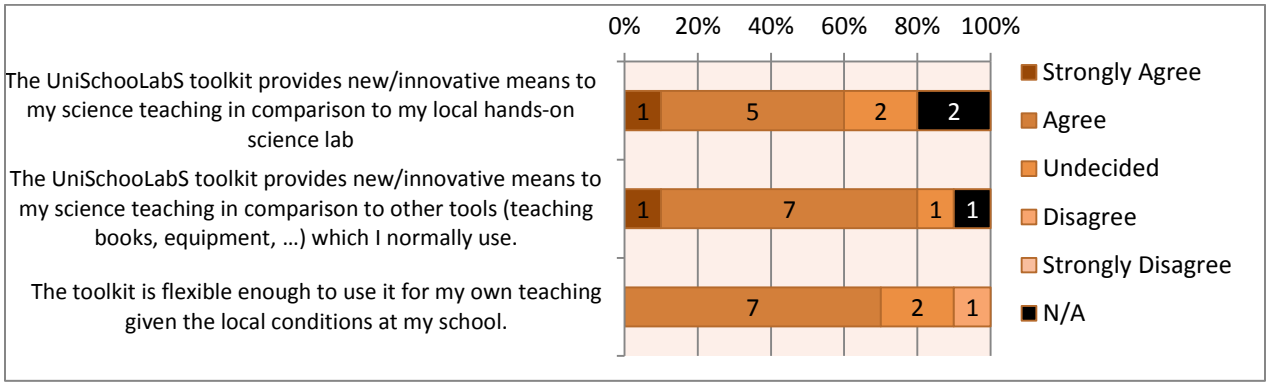


Fig. 11. *Teachers' views on innovative features and perceived empowerment*

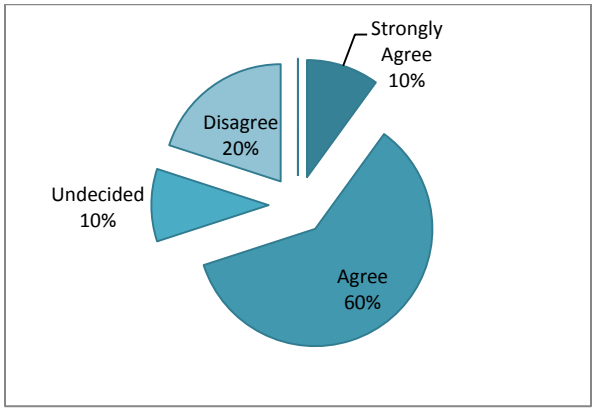


Fig. 12. *Teachers' agreement on sufficient preparation for toolkit use*

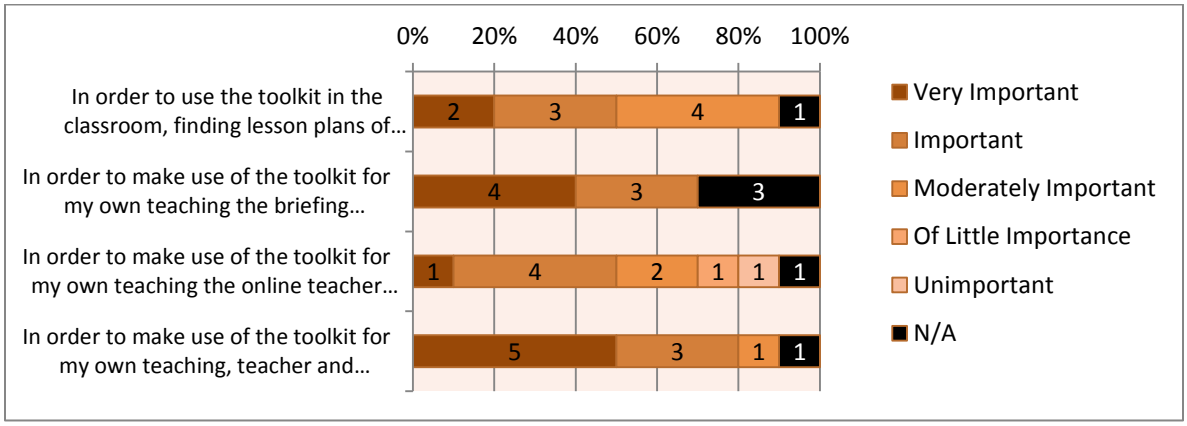


Fig. 13. *Perceived importance of the support material and teacher community*

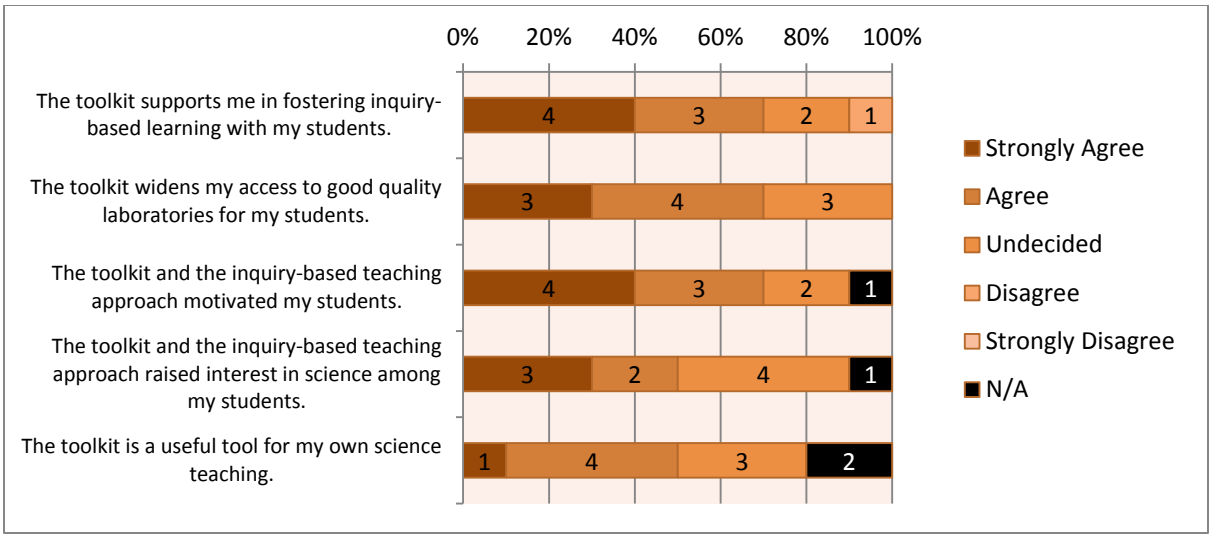


Fig. 14. *Perceived usefulness of the toolkit in terms of student motivation, interest and inquiry-based learning*

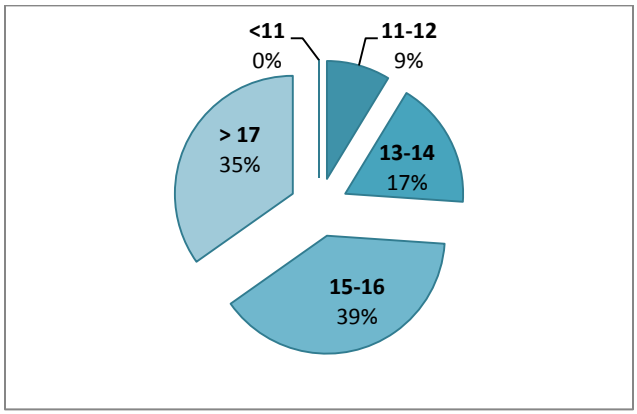


Fig. 15. *Teacher replies on suitable for teaching different age groups (multiple answers possible)*

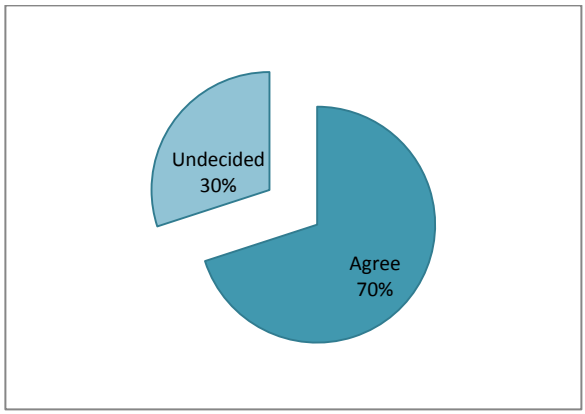


Fig. 16. *Teacher agreement on the toolkits' suitability for teaching in their country or federal state*

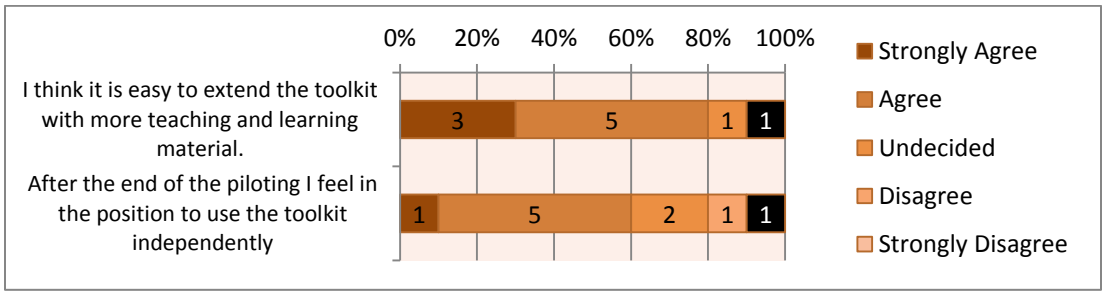


Fig. 17. *Teachers' opinion on the scalability of the toolkit and autonomy regarding its future use*

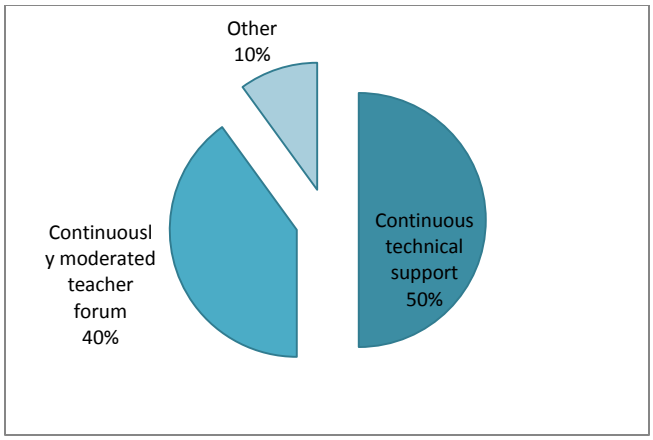


Fig. 18. Expressed need for the *kinds of continuous support for future toolkit use*

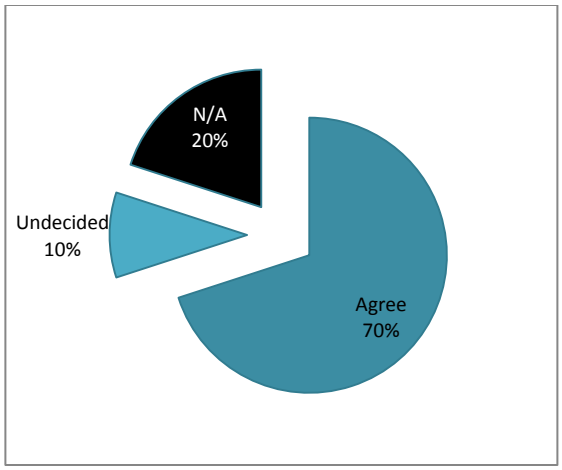


Fig. 19. *Expressed agreement to use the toolkit after the end of the trials*

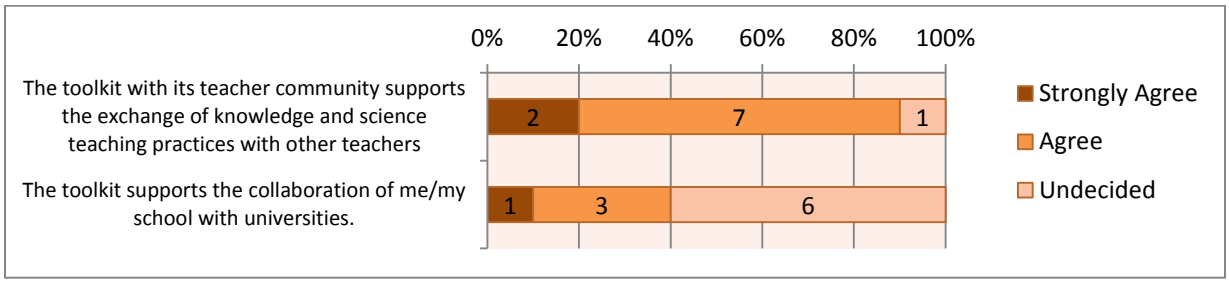


Fig. 20. *Teachers' view on the toolkit's capacity to support partnerships*

3.2 Results discussion with students

Austria

Students' answers concerning their motivation and interest and interest were mixed and ranged from a clear preference for hands-on work to independent research for further remote laboratories.

The advantages to other methods which were mentioned by students as a motivation to a more frequent classroom use of remote laboratories concerned:

the individual pace

Teacher: Students did like the independence of toolkit learning that they could go at their own pace and switch back and forth between different toolkit pages and the online lab.

and the immediacy of results and access to more experiments.

Yes because it makes things visible without much effort, things you couldn't do by yourself

Student suggestion: The toolkit should offer links to other universities who also use

simulations

Faster than real life experiments, useful outside of a lab

Some students were eager to research more remote laboratories.

Student: I used some other online simulations from universities when researching by myself

However, there were students pointing out that they would prefer to work with real-life material.

Greece

Results from the group of Greek students differed less than the ones from the Austrian students.

Positive student reactions concerning learning motivation and fun as well as a reflection on their own learning can be summarized in two points:

Group work and communication with peers	*Student: It was fun doing stuff together as teams* *Student: It was very nice to communicate through the chat* *Teacher: Working with the toolkit was quite enjoyable and interesting for the students. Due to this fact they were motivated to learn more about the subject. Moreover, students mentioned they enjoyed working in groups.*
Use of up-to-date technology for a better understanding of science	*Student: It is nice to work with modern technology.* *Student: It is nice to see the connection of what we learn with modern technology.* *Student: It was very helpful to see the vectors in HYPATIA.* *Student: We understood 'momentum' in a much better and fun way.* *Teacher: Most students thought that it would be a good idea to use virtual laboratories more often because it is more interesting than normal lessons and it helps them get acquainted with modern technology on such fields.*

Overall feedback on technical aspects

- Students liked the design and colours of the toolkit
- They had difficulties with the upload function
- Students pointed out that their internet connection was not always stable
- Students mentioned troubles logging in and the complicated URL
- "The platform was easy to use but it was a bit slow."

Although the discussion group guidelines did not specifically suggest reflecting on the integrated laboratories themselves, Austrian students mentioned the following:

- Some laboratories would not always run properly. Their servers would be down sometimes.
- Students furthermore struggled with the requirements of downloading extensions as java.

- They pointed that laboratories should be "more colourful, less square, old-fashioned, icons instead of words"

3.3 Reasons for withdrawal

During the run of the pilot (school year 2011/12 first half) one Italian and one Greek school withdrew their participation. Our team managed to find substitute teachers of the same school in late 2011, however, after face-to-face briefing sessions had been led, also these teachers decided to not commit to the foreseen piloting activities.

Based on the results of a questionnaire – and an email exchange – reason were unrelated to the UniSchooLabS project.

> *"When I had the chance to join the project I had already planned my science activities and there was no way to fit it into my group age students (grade 2). It would have required more preparation and we were short of time."*

The teacher team still indicated the willingness to be informed about final outcomes of the pilot experience/UniSchooLabS project and considered the online toolkit as suitable for science teaching in Italy.

3.4 Laboratory owners

Six interviews were led with providers whose laboratories are part of the toolkit's library. The below table are displayed:

		Remote Farm	Netlab	RCL	Dspace	HYPATIA	SHODOR
Usefulness	**Overall goal[5] in interest of laboratory owners**	On-going school collaboration (not for the laboratory) on federal level		On-going school collaboration on remote labs with large investment More users intended		Participation in projects with similar goals	Primary focus: U.S. Now expanding to Europe
Usefulness	**Toolkit perceived as useful for teachers in accessing their laboratory?**	For school teachers' feedback to Remote Farm For the inclusion into the curriculum		For finding learning materials More languages are needed Too much text Academic papers are of low interest for teachers		To promote and improve the existing lab tools	For resource discovery and delivery
Innovation	**Acquaintance with similar services?** S… Target of the initiative are schools U… Target of the initiatives are other university students, but open to all users	LILA project (EU): U	LabShare (Australia): S Visir (EU): U	EU project proposal submitted: U			Portals of the National Science Digital Library USL adds lesson plan customization

[5] "improving the quality in science education in Europe, by promoting collaboration between universities and schools in the provision of remote access to science laboratories for primary and secondary schools"

		Remote Farm	Netlab	RCL	Dspace	HYPATIA	SHODOR
Partnership	**Current collaboration with other laboratories?**	LILA project (goal: sustainability after funding ended)	LabShare: Meetings 2x/year	20 universities will collaborated depending on the approval of the above project	As users of other laboratories for educational purposes	International Particle Physics Outreach Group	a) share virtual labs with others b) use other virtual labs c) co-develop new learning/exploration environments.
	Collaboration with other laboratories of interest?						
Empowerment	**Involvement in toolkit development perceived as sufficient?**		Through validation activities	Nevertheless, well displayed in the toolkit.			For lesson plan development
Addded value	**Gain from the UniSchooLab project/pilots? Perceived added value?**	More users More user feedback Feedback from schools	Translations Feedback from schools		More users in schools Translations	Feedback from schools Collaboration with other laboratories	Dissemination of effective learning example More feedback from teachers needed
	Extent of resources necessary during the pilots?	"Lab time, if any"	Maintenance for an open service (independent from pilot)		Production of resources, lesson plans for the pilots		Few (lesson plan creation) Only translation of all lesson activities would request many resources
Mainstreaming	**Free capacities for more school classes/learners?** ***Number of current laboratory users***	Approx. 100 schools through a booking system Few current users	 2,5 K accounts	a) Through successful funding application b) Through transfer of labs to Munich 30 K users			4.5M uses/month

	Remote Farm	Netlab	RCL	Dspace	HYPATIA	SHODOR
Conditions for offering a permanent service to a large number of EU schools?	Free to use for everyone. Only maintenance costs	- Lab visibility ensured - Extended laboratory and school network - More user feedback	None. Free to use for everyone.		Free to use for everyone. Only copyright requirement.	
Need for a collaboration structure to offer service to more EU schools?	Only to set standards on the mode how experiments are offered	/	Essential! Lack of networking among projects Lack of standard Lack of awareness amongst teachers and feedback from their usage.			Need for review for verification, validation, and accreditation, but that need not be centralized.
Possible longer-term involvement?	Depends on geography, ability to adapt to change requests concerning the lab features. Requests should also be in our interest	Open to different kinds of collaboration, e.g. : - offer webinar for teachers on how to use the laboratory - participation in similar initiatives	Only through colleagues in Munich	Leadership role in Greece	Joining a network	As we identify funds, we would envision adding more lessons to the UniSchooLabS structure.

4. Conclusions for a validated toolkit

4.1 Strengths of the toolkit

Technical issues

The visuals and colours can remain unchanged since they were appreciated from all validation participants.

Issues relevant for long term integration into classrooms

It is perceived as **innovative** amongst teachers and laboratory owners, only one individual of the latter group pointed to a similar initiative in Australia (LabShare), i.e. an on-going initiative amongst universities offering their laboratories to schools. The support material already created is **suitable** for teachers. At the end of the trials pilot teachers felt sufficiently **empowered** to use the tool. The feature allowing for teacher-driven lesson plan creation makes it scalable in terms of further content additions and supporting autonomous use (see challenges on continuous support below, however). The overall approach is **useful** for supporting inquiry-based learning and motivating most students independent from gender. The majority of pilot teachers will continue to use the developed toolkit.

Given those facts the online toolkit has the potential for mainstreaming. An important supporting argument is furthermore, that laboratory providers are very much willing to collaborate and network for offering their services to schools, ranging from the readiness to add or adapt features, offering webinars are email support in the future. Even providers outside of Europe are ready to collaborate towards offering their laboratories to European schools.

4.2 Challenges and recommendations

Technical issues

The improved toolkit version should account for easier logins and full integration into the EUN website and ID service. If technically possible, the next version should run faster and some functions for creating lesson plans might be improved (picture upload, group results, duplicating activities). Critical digital natives expect a smooth and functional interface. Platform stability is important since in a school context time is often limited to lessons - in contrast to more independent higher education students. User prompting is crucial. Navigation and features might need to become more intuitive for first users.

Issues relevant for long term integration into classrooms

The current version of the toolkit requires more guidance for new users, since online briefing sessions[6] are difficult to conduct for smaller groups of teachers after the end of the project life-cycle. It is seen as beneficial to add an *online tutorial/improve the technical guide* in order to make the toolkit **suitable** to

[6] Three of them were held to the pilot teachers

future teachers. A clear *strategy on community moderation* would increase the perceived value of the community and facilitate better exchange between teachers and laboratory owners. Furthermore, continuous email support was request by teachers. The latter might partially be covered by the laboratory owners themselves as long as the labs of the toolkit library are concerned, since most of them expressed a high value in receiving feedback and offering email services.

Not every teacher was fully convinced that access to quality laboratories was eased substantially for them. It needs to be discussed how to reach improvement here. Furthermore, it is suggested to either detect and add more laboratories with simple experiments and more lesson plans suitable *for younger students* or to concentrate dissemination and community building on upper secondary schools and schools/classes with a technical/scientific focus. By adding indications of the age level to activities (searchable) might increase perceived usefulness.

While teachers felt supported by the peer contact, a **stronger link laboratory owners – teachers** is needed. Only one laboratory owner felt sufficiently involved in the creation of the toolkit. Most of them pointed out existing partnership among providers to offer services to HE students. Those networks could be involved the long run, which step-by-step have started collaborating on common standards and exchanging resources with other universities.

In the short run, it is suggested to *create a specific channel* (e.g. online community) where teachers and laboratory owners can communicate on:

- Technical questions
- New features for the experiments/simulations; the readiness of some laboratory owners has been proven by the interviews
- Teaching and learning material

4.3 For Discussion

Online Laboratories For Science “Fans”?

Some comments from the discussion group with students raised the question whether remote and virtual laboratories do actually motivate “under-achieving” learners. With the available data it is not possible to state whether remote laboratories do well reach out to all students or are attractive students who do already enjoy their science lessons.

> *Student: I prefer working with real material*
>
> *Teacher: High performing students had much more to say on the issue at all, while others commented less.*
>
> *Teacher: They had shown to be familiar with similar activities and mentioned other universities’ sources. They weren’t naming any specific ones, but had obviously accessed them by browsing the net.*

It shall be mentioned that no teacher mentioned any differences between girls and boys regarding learning motivation. The fact is in line with scientific literature, which has shown that reservations towards experiments and manipulating technical equipment most prevalent among girls is reduced by simulations.

Linking laboratory provider's free offer and teachers' creativity

It is most notable that laboratory owners are able and willing to provide an offer to schools without any costs. The interviews showed a high curiosity amongst laboratory owners to receive feedback from teachers. All of them would generally be happy to further extend their services. No conditions for a large scale usage among European schools[7] and most of them can easily widen their user group, increased maintenance costs might even get covered through university funds.

Only a selection of laboratories offers teaching and learning material directed towards younger learners which is one of the main barriers for a wider classroom use in schools. On the other hand piloting teachers were prone to create lesson plans and share them online. Orchestrating the offer and readiness of both sides is the key.

[7] Eased through already installed booking systems and the capacity for larger user groups.

Annex 1
Criteria for Mainstreaming of Technology into Educational Settings
–
Specifications for the UniSchooLabS Toolkit

Criteria	Description
Innovation	Extent of the presence of new and distinctive features in the toolkit; what distinguishes the toolkit from tools for science education with similar characteristics and purposes; added value in relation to conventional solutions (local hands-on lab)
Empowerment	To what extent were beneficiaries and target users involved in the toolkit design, and how much will its use enhance the schools integration and participation in their organisational and social contexts?
Suitability	To what extent are teachers' learning needs addressed in terms of their culture, as well as social and vocational experience?
Usefulness	Does the toolkit actively contribute to solving the problems and addressing the needs of users and end beneficiaries? Are the toolkits benefits recognized and valued by the users and end beneficiaries? Does the toolkit raise students' motivation and makes science education more attractive to them (also in terms of gender)?
Universality Trans-nationality	Is the toolkit capable of being applied/used in different contexts and with diverse target groups? Is the toolkit culturally and politically neutral and thus fully exchangeable?
Scalability	organisation of knowledge in small updatable units, ensuring modularity of contents and of the resources incorporated in the toolkit, facilitating update and renewal
Autonomy	ease and extent of independence of the teacher users in terms of exploiting and using the contents and materials integrating the products
Partnership	Are partnerships among teachers as well as between schools and universities as base for exchange knowledge, inspiration, and learning increased?
Mainstreaming	Can the toolkit be adapted and integrated into the normal daily practices of the pilot schools
Quality[8]	Ensuring quality feedback from final users of the toolkit on different aspects and components of the tool, such as: catalogues, teacher's guides, etc.

[8] investigated by the evaluation activities

Annex 2
Questionnaire for Laboratory Providers

Questionnaire for Laboratory Providers

The goal of UniSchooLabS is "improving the quality in science education in Europe, by promoting collaboration between universities and schools in the provision of remote access to science laboratories for primary and secondary schools"

1. Is the above mentioned goal within your organisational interest? Why, why not?

2. What triggered your decision to collaborate with UniSchooLabS in the first place?

3. Do you think the UniSchooLabS toolkit is useful for teachers/schools in increasing the access to your laboratory?

4. What similar services do you know, if any? What innovative aspects do you see in the UniSchooLabS toolkit?

5. How do you currently collaborate with other remote/virtual laboratories?

6. Does the toolkit facilitate the exchange with other lab owners and would that be in your interest?

7. Did you feel sufficiently involved in the design of the toolkit?

8. By your involvement what have you gained anything from the experience? Where do you see added value (e.g. translations of learning material, feedback schools, exchange with other lab owners)?

9. To what extent did you need to/have you been able to dedicate resources to the UniSchooLabS activities?

10. What is the estimated number of users of your laboratory and, in your opinion, do you have free capacities for school classes?

11. What are the conditions under which you would consider permanently offering your laboratory to a larger number of schools around Europe?

12. What is your opinion on the following: To reach a larger number of schools in Europe, laboratories (involved linked through the UniSchooLabs toolkit) need a coordination structure, e.g. a central board?

13. What kind of longer-term involvement could you imagine (Note to interviewer: Specify after initial answer has been received: working with a set school in your country/European level, only on specific request, an active member of a network, the commencement of a new or future collaborative programme)

14. In case a network of schools and university labs would be created out of the UniSchooLabS experience to keep on collaborating in the long run, would you be available to join? If so, would you be available to take a leadership role in your country in terms of promoting the initiative?

15. Following the UniSchooLabS experience, new collaboration projects will most probably be set-up. Are you interested in being partner in these projects? Would you consider taking a leadership role, in principle?

Annex 3
Questionnaire for Pilot Teachers

Dear UniSchooLabS pilot teacher,

Congratulations, you have introduced the UniSchooLabS toolkit to your classroom! Now we would like to find out your opinion on the experience. The below questionnaire will help our team

- To understand for whether the toolkit was useful to you;
- To make improvements to the toolkit; and
- To decide which further teachers (e.g. school subject, age level of students) and schools to encourage to use the toolkit at a later stage.

Hence your feedback is very valuable to us. Feel free to let us know anything you consider important in the "comments" box at the last page.

There are three sections:

1. General Feedback on the Toolkit and Your Classroom Use
2. Your Feedback on Technical Aspects
3. Your Opinion on the UniSchooLabS Experience

For all three sections, please check the boxes ☐ and write your responses in the text fields, the more descriptive you can be, the better. Filling in the questionnaire will take approximately 30 minutes.

Many thanks in advance.

Please send your filled in questionnaires to

Anne-Christin Tannhäuser

actannhauser@scienter.org

1. General Feedback on the Toolkit and Your Classroom Use

Please rate the following toolkit components in general terms:

2.1 Lab catalogue

- ☐ very good
- ☐ good
- ☐ sufficient
- ☐ Insufficient

2.2 Lab guidelines

- ☐ very good
- ☐ good
- ☐ sufficient
- ☐ Insufficient

2.3 Example lesson plans

- ☐ very good
- ☐ good
- ☐ sufficient
- ☐ Insufficient

2.4 For how many teaching hours (45 minutes) did you work with the toolkit and related activities with your students?

- ☐ less than 3 teaching hours
- ☐ 3-4 teaching hours
- ☐ 5-6 teaching hours
- ☐ more than 6 teaching hours

2.5 Did you create your own online lesson plan using the toolkit?

- ☐ Yes
- ☐ No

If yes, please write the name of the activity If not, please comment

2.6 Which remote/virtual lab(s) did you use in your classroom(s)?

a. b. c.

2. Your Feedback on Technical Aspects

2.1 What error messages did you receive, if any (you can paraphrase)? Did you experience any system crashes or problems with your browser?

2.2 The time it takes to register to the toolkit is appropriate

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

2.3 The time it takes to start a new lab activity is appropriate

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

2.4 While using the toolkit did you make any “mistakes”?

- ☐ No
- ☐ Yes, but only minor ones after which I could easily undo
- ☐ Yes, fatal errors after which I had to recover a lot of information

If you answered with ‘yes’, please comment:

2.5 After not using the UniSchooLabS toolkit for some time how easy was it for you to remember how to use it?

- ☐ Very easy.
- ☐ Somewhat easy.
- ☐ Somewhat difficult.
- ☐ Very difficult.

If you answered with ‘(somewhat) difficult’, please describe briefly why:

2.6 How did you feel after using the toolkit for the first time?

- ☐ Confident
- ☐ Confused
- ☐ Stressed
- ☐ Bored

2.7 How did you feel about using the toolkit at the end of the pilot experience?

- ☐ Confident
- ☐ Confused
- ☐ Stressed
- ☐ Bored

2.8 The visuals (e.g. buttons) of the toolkit are clear

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

2.9 The colours are pleasant

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3. Your Opinion on the UniSchooLabS Experience

3.1. The UniSchooLabS toolkit provides new/innovative means to my science teaching in comparison to my local hands-on science lab (please answer only if a hands-on lab is available at your school)

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.2. The UniSchooLabS toolkit provides new/innovative means to my science teaching in comparison to other tools (teaching books, equipment, …) which I normally use.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.3. In order to use the toolkit in the classroom, finding lesson plans of other teachers is

- ☐ Very Important
- ☐ Important
- ☐ Moderately Important
- ☐ Of Little Importance
- ☐ Unimportant

3.4. The toolkit is flexible enough to use it for my own teaching given the local conditions at my school.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.5. I felt sufficiently prepared to use the toolkit with my own students.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you disagree or are undecided, please note down what further support would have been helpful to you:

3.6. In order to make use of the toolkit for my own teaching the briefing sessions were

- ☐ Very Important
- ☐ Important
- ☐ Moderately Important
- ☐ Of Little Importance
- ☐ Unimportant

3.7. In order to make use of the toolkit for my own teaching the online teacher community was

- ☐ Very Important
- ☐ Important
- ☐ Moderately Important
- ☐ Of Little Importance
- ☐ Unimportant

3.8. In order to make use of the toolkit for my own teaching, teacher and student guides were

- ☐ Very Important
- ☐ Important
- ☐ Moderately Important
- ☐ Of Little Importance
- ☐ Unimportant

3.9. The toolkit supports me in fostering inquiry-based learning with my students.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.10. The toolkit widens my access to good quality laboratories for my students.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.11. The toolkit and the inquiry-based teaching approach motivated my students.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.12. The toolkit and the inquiry-based teaching approach raised interest in science among my students.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.13. The toolkit is a useful tool for my own science teaching.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.14. In my opinion the toolkit is suitable to work with students of the following age groups:

- ☐ <11
- ☐ 11-12
- ☐ 13-14
- ☐ 15-16
- ☐ > 17
- ☐ none of them

(multiply answers possible)

Please comment:

3.15. In my opinion the toolkit is suitable for science teaching in *my country/federal state*.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

Please comment:

3.16. In my opinion the toolkit can be a useful tool to enhance science teaching in schools *in other countries*.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.17. I think it is easy to extend the toolkit with more teaching and learning material.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.18. After the end of the piloting I feel in the position to use the toolkit independently

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you ticked '(strongly) disagreed' please comment

And tick if further support would be necessary:

- ☐ Continuous technical support
- ☐ Continuously moderated teacher forum
- ☐ Other:

3.19. The toolkit with its teacher community supports the exchange of knowledge and science teaching practices with other teachers

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.20. The toolkit supports the collaboration of me/my school with universities.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

3.21. I will continue to use the toolkit for my science teaching.

☐ Yes, I will use it often.
☐ Yes, I will use it sometimes.
☐ Yes, I will use it, but only if improvements will be made

Please list suggested improvements:

☐ No.

Please explain briefly why you will not continue to use the toolkit for your science teaching:

Please use this space for further comments as you wish:

UniSchooLabS

SCIENTER and the whole UniSchooLabS team thanks you for your answers!

Annex 4
Questionnaire for Pilot Teachers – reasons for withdrawal

Dear teacher,

Thank you for considering to become a UniSchooLabS pilot teacher and test the toolkit in your classroom! We would like to learn about the reasons for your withdrawal. By answering the few questions below you will help our team

- To understand why the toolkit was not useful to you;
- To make improvements to the toolkit; and
- To decide which further teachers (e.g. school subject, age level of students) and schools to encourage to use the toolkit at a later stage.

Hence your feedback is very valuable to us. Please check the boxes ☐ and write your responses in the text fields, the more descriptive you can be, the better. Filling in the questionnaire will take approximately 10 minutes.

Many thanks in advance.

Please send your filled in questionnaires to

Anne-Christin Tannhäuser

actannhauser@scienter.org

1. Reasons for withdrawal

1.1 I decided to not work with the toolkit in my classroom for technical reasons

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you answered with '(strongly) agree', please comment:

1.2 I decided not to become part of the pilot experience for linguistic (English) reasons

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you answered with '(strongly) agree', please comment:

1.3 I decided not to become part of the pilot experience because the UniSchooLabS approach does not fit my teaching context (e.g. school subject, age of students)

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you answered with '(strongly) agree', please comment:

1.4 I decided not to become part of the pilot experience for reasons unrelated to the UniSchooLabS project

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

If you answered with '(strongly) agree', please comment:

1.5 I decided not to become part of the pilot experience for other reasons, namely the following:

2. Feedback to the UniSchooLabS team

2.1 If there is something that should have been done differently from our side to keep you board, please let us know

2.2 I would still like to be informed about final outcomes of the pilot experience and the UniSchooLabS project

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

2.3 In my opinion the toolkit is suitable to work with students of the following age groups:

- ☐ <11
- ☐ 11-12
- ☐ 13-14
- ☐ 15-16
- ☐ > 17
- ☐ none of them

(multiply answers possible)

Please comment:

2.4 In my opinion the toolkit is suitable for science teaching in *my country/federal state*.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Undecided
- ☐ Disagree
- ☐ Strongly Disagree

Please comment:

UniSchooLabS

SCIENTER and the whole UniSchooLabS team thanks you for your answers!

Annex 5
Discussion group questionnaire
- instructions -

Dear pilot teacher,

You have chosen to support the UniSchooLabS project further by gathering feedback from your science teacher colleagues and students. Our whole project team says “Thank you” in advance.

Three schools from Austria, Greece and Italy will participate in the below described activities. The below instructions serve to guide you well in involving your students and equip you with a template to feedback your results to our project team.

One representative from our pilot school will be chosen to attend the UniSchooLabS international workshop in Sevilla, Spain, 10/11 May 2012 in order to meet and discuss in English with other invitees as:

- laboratory providers at universities

- policy makers

- science communicators such as museums and science centres

In case your school leadership and colleagues are interested in working with our team in the future towards better access to high quality laboratories for students of your school, in your country and elsewhere in Europe.

We are very much looking forward to your gathered feedback from your peer teachers/your headmaster and your students via the provided answering templates.

The UniSchooLabS project team

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Discussion group with students

Selecting students

Select a **group of students** (6-10) from your science class

- who learned with the toolkit in your classroom
- male and female students
- typically low and high performing students in your science class

The mixed group is important to hear potentially different opinions.

Instructions/guidelines for the discussion session

Before starting:

- recall the activities done with the toolkit in the classroom and open/show the toolkit and your activity again
- explain that you would like to learn more about their thoughts when working with remote/virtual laboratories, e.g.:

> ***"We are asking approximately 30 students in three countries and we would like to find out, whether more students should use remote laboratories and the UniSchooLabS toolkit for their learning. You can help with telling us what you think"***

Sit in a round of chairs. Ask everyone in the group to answer the questions below and take notes. Use a conversation ball (or another small item) to pass around and give the word to everyone who has the item. Students who do not want to answer can just pass the ball on to the next person. Then discuss briefly on the different answers.

Idea: You can also write each questions on big paper or on a powerpoint slide.

Discussion group with teachers and school headmaster

Who should you invite?

Teachers of your school teaching:

- different science subjects: astronomy, chemistry, physics, science (if a general class)
- teaching younger and older students in the age range of your school

How?

- You could try to arrange during a regular teacher meeting
- Explain that you were using remote laboratories in your science classrooms for the EU project "UniSchooLabS", tell that you would like to show the lesson plan you created and find out whether the toolkit and remote/virtual laboratories would also be useful for other science teachers of your school

Instructions/guidelines for the discussion session

Introduction

Show your colleagues the toolkit and your lesson plan, present how students worked with it

Explain the *purpose* of the session:

- learn what European teachers think about remote laboratories and the toolkit developed by UniSchooLabS with the help of pilot teachers
- contribute to improving the online toolkit
- work towards establishing a group of interested schools and teachers to improve access to university science laboratories to European students

Inform about *privacy* and the use of the results:

- will be gathered anonymously
- will be analyzed from your school and two others meetings published in a report (in English, translation of main outcomes under discussion) and provided to your school
- for further questions, you can write to actannhauser@scienter.org

Leading a discussion

Ask the below questions in the same format as with the students (you can skip the conversation ball if you wish), having everyone answer to the each questions with the option to skip answering.

Feeding back/Reporting

Note down the main responses to each question. Furthermore, provide some quotes that present opinions well or are notable from your perspective.

Annex 6
Discussion group questionnaire

Your Feedback to the UniSchooLabS team

Your name:	
Your school:	

Outcome discussion group with students

Date of the discussion:	
Number of students participating	

Question	Group reply (describe the overall answers, "most students thought that …. Some few mentioned that….)	Notable quotes (please add as many as possible)
Do you think that working with the toolkit in the classroom was fun? Did you feel motivated to learn more? Why? Why not?		
Do you think you learned something using the online laboratory? Why? Why not?		
Would you like to use remote/virtual laboratories more often in your classroom? Why? Why not?		
What were things that did not work so well? What technical issues need to be improved?		

On what aspects did students differ the most?

Did you notice any difference between the answers of male and female students? If so, please describe:

Did you notice any difference between the answers of low and high performing students? If so, please describe:

Please describe the most valuable insights from your side gained during the discussion group:

Outcomes discussion group with teachers and school headmaster

Date of the discussion:	
Number of teachers participating	
Did your headmaster participate?	Yes ☐ No ☐

Question	Group reply (describe the overall answers, "most teachers thought that …. Some few mentioned that….)	Notable quotes and profile e.g. teacher, student (please add as many as possible)
Do you think the toolkit could provide some new/innovative means to your science teaching in comparison to my local hands-on science lab or other tools you normally use?		
Could you imagine using the toolkit and/or remote/virtual laboratories for your own teaching? Would it be useful, would it add value? Why? Why not?		
Do you think the toolkit matches well with the conditions in your school and in your classroom?		

Question	Group reply (describe the overall answers, "most teachers thought that …. Some few mentioned that….)	Notable quotes and profile e.g. teacher, student (please add as many as possible)
(e.g. computer access, amount of "practical" science work, working in your "physical" science laboratory)? Why? Why not?		
Would you be interested in becoming part of a(n online) European community of teachers using remote/virtual laboratories for their teaching? Could you imagine your school playing a leading role in your country?		

On what aspects did participant differ the most?

Please list the most valuable insights from your side gained during the discussion group
