

DELIVERABLE D5.3

REVISED FOCUS GROUP AND DESIGN REPORT

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1. INTRODUCTION AND SCOPE

Piloting at schools is a vital part of the LEA's Box project as it enables us to verify the functionality of the tools, their user-friendliness and comprehensibility. The previous deliverables focused on the description of the theoretical framework of piloting: D5.1 contained a plan of the piloting methodology, D5.4 focused on different scenarios at schools and on problems faced by current teachers, and D5.2 suggested particular steps and activities that were going to be done during the pilot studies. All these deliverables served as a background for planning the piloting activities, the outcomes of which will now be summarized.

The piloting included creating virtual classrooms, working with mind maps, observing students doing different activities and assessing their performance and behaviour. Feedback from teachers was gathered from online survey and focus groups held in the Czech Republic, Turkey and Austria.

This report will contain some relevant information concerning the current situation at schools and a summary of teachers' experience with the LEA's Box tools including:

- comprehensibility and user-friendliness of the tools; see section
- any technical problems that might have occurred, questions and queries regarding the tools' functionality; see section
- description of the differences between teachers' expectations and reality, expected functionality of the LEA's Box tools; see section **Fehler! Verweisquelle konnte nicht gefunden werden.**
- teachers' suggestions regarding the tools, data visualization, user interface etc.; see sections
- possible future development and improvements; see section

2. PILOTING AND FOCUS GROUPS IN THE CZECH REPUBLIC - SCIO

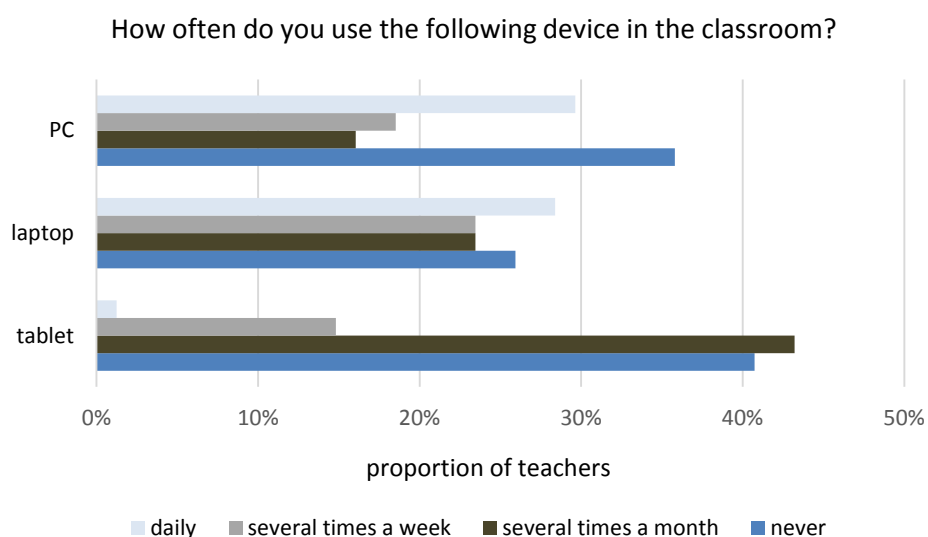
2.1 CURRENT SITUATION AT CZECH SCHOOLS

A successful implementation of the LEA's Box tools depends, among other things, on the situation concerning the use of ICT in the classrooms, as well as on current assessment methods and classroom practices. In order for the LEA's Box tools to be adopted, teachers must have suitable devices, such as tablets at their disposal and they must be able to use the tools within the scope of their ordinary classroom activities.

Below given results are based on structured interviews, focus groups and an online survey held in June 2015. The survey was attended by teachers from 10 schools piloting Lea's Box tools and 78 other schools.

The use of ICT in the classrooms

As can be seen from Graph 2.1, most teachers do not use tablets very often. Almost half of them said they do not use tablets in the classroom at all, only a slightly higher percentage of them said they use tablets several times a month. Laptops and personal computers are used much more frequently, with nearly 30 % of teachers reporting they use these devices daily. Digital textbooks and electronic dictionaries are used by 55 % and 30 % of teachers respectively, with as many as 62 % of them using online testing and other online exercises. As for the internet connection, 85 % of teachers can use the internet at home, 71 % of teachers can use it at school outside the classroom (e.g. in the staff room) and a full 94 % of teachers can use the internet right in the classroom, which is a very positive finding. As for their computer literacy, teachers were asked to rate their skills on a scale from 1 (very bad) to 5 (very good): 46 % of them see their skills as average, 30 % as good and 15 % as very good.



Graph 2.1 Frequency of use of different types of devices

Assessment methods and classroom practices

When asked about the assessment methods they commonly use, grades on a scale from 1 to 5 (a typical Czech scale) were mentioned most often, by as many as 93 % of teachers. However, 52 % of teachers regularly use narrative evaluation and 45 % of them use pictures such as smiley faces. The fourth most common type of assessment are percentages (23 % of teachers). Note that some teachers combine different types of assessment, depending on the task and situation. For example, when assessing a pupil's performance during a project presentation in front of the class, 86 % of teacher would consider narrative evaluation to be a suitable form of assessment, compared to only 32 % of teachers who think grades would be suitable for such purpose.

As for the frequency with which pupils are evaluated, teachers said pupils get a grade about 4 to 5 times a week, take a test about 2 times a week and take an oral exam or do an oral presentation about 3 times a week. However, teachers' responses varied from "daily" to "never", depending on the form of evaluation generally used etc. Most teachers also said pupils are given feedback from their classmates several times a week, so in most cases, peer-assessment seems to play an important role in the classroom. Most teachers also said pupils are given informal positive feedback several times a week, while material rewards are used very rarely. In general, it seems teachers perceive frequent feedback as very important. Most teachers said they use project-based learning and group work, but the frequency varies from teacher to teacher.

During a focus group, teachers had the chance to describe the methods of assessment they use in more depth. One of the teachers described the process of writing a narrative evaluation, and pointed out it can be quite demanding and time consuming. She mentioned the most important thing is that it is written in a way children can understand and that it clearly mentions what a child can and cannot do together with relevant recommendations. Another interesting method of assessment which was mentioned during the focus group were so-called "steps", created every year in each classroom. These steps represent expected performance in a certain area and they allow children to compare what step they should be on in terms of performance with where they are actually finding themselves. Some teachers also mentioned their pupils keep notebooks where they put all their tests, projects etc. and these then form a part of their portfolio, which children make themselves and which also includes their own comments and self-assessment. Teachers present in the focus group generally agreed that a portfolio is a very useful, but extremely time consuming form of assessment.

As for the self-assessment, teachers generally perceive it as very useful, but mentioned children tend to underestimate themselves. One teacher mentioned that after a test or an oral exam, children are often asked how they feel and then they can compare their own impression with how well they performed according to the teacher.

In general, teachers said assessment methods vary with age and mentioned that some parents and children, especially older ones, may prefer grades to narrative evaluation as a simpler and more straightforward form of assessment. Sometimes, grades may be required as a part of the admission process to another school: in that case, grades may become a main focus of some children and their parents. Therefore, sometimes grades may be necessary although teachers themselves might prefer a different method of assessment, and probably will not be completely replaced by other forms of assessment in the near future at most schools.

As for the assessment tools, teachers already use an electronic database called Bakalar (www.bakalari.cz), where they can keep track of their timetable, of pupils' attendance, grades etc. In

general, teachers seemed to be very satisfied with the program and mentioned it also allows them to summarize pupils' performance, draw graphs and plots etc. The only disadvantage they mentioned was its complexity and difficulties when writing down substitutions.

Summary

Most teachers use an electronic device in the classroom on a daily basis, though tablets are not very common. Most teachers also consider themselves to be quite computer literate. This may, however, not be the case of smaller or village schools. Teachers taking part in the piloting and focus groups might not present a completely representative picture of the Czech reality at schools.

Many teachers already use an electronic assessment application with which they are generally very satisfied. Grades are still the main form of assessment in most schools. They may be complemented, but probably not entirely replaced by other forms of assessment in the near future.

According to teachers, assessment should:

- be given on a regular basis;
- be motivating;
- be easily understandable for children;
- not be too time consuming;
- enable children to compare their skills with an expected performance;
- include self-assessment and peer-assessment.

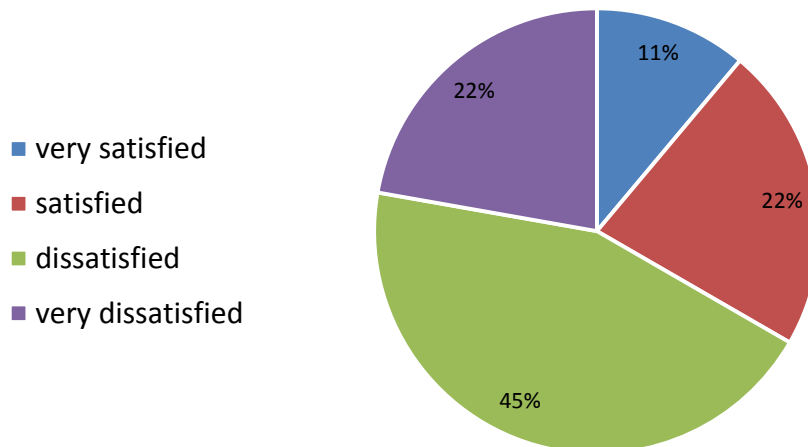
2.2 TEACHERS' EXPERIENCE WITH LEA'S BOX

General experience

This chapter describes teachers' experience with the LEA's Box tools during the first step of piloting. The main goal was to evaluate the functionality and user-friendliness of the tools, mainly MyClass and mind-mapping tool. Teachers were provided with two activities focused on reading literacy, which had been prepared by Scio, as well as the mind map. Teachers were encouraged to make changes to the mind map based on their own experience though. Teachers did the activities with their students and assessed their performance using MyClass. Their feedback is presented below.

Lea's Box team have been piloting the tools in 11 Czech schools with approximately 300 students involved. The below given results are based on the direct experience observed by our colleagues in the classes, numerous interviews with teachers, focus groups and an online survey.

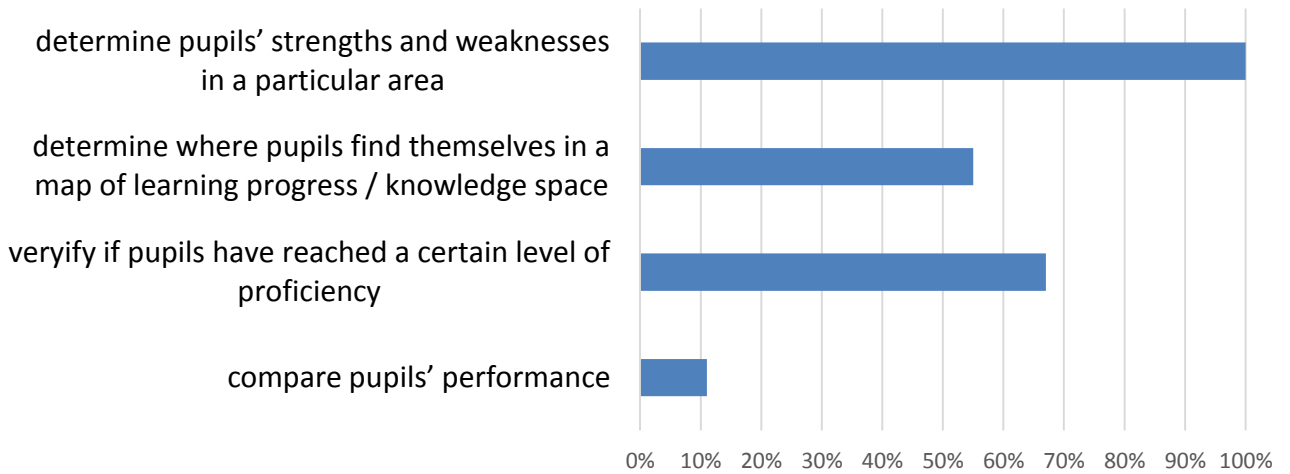
Graph 2.2 shows that one third of teachers was satisfied or very satisfied with the tools in general. Nevertheless, two thirds were not, which suggests considerable improvements may be needed. 89 % of teachers said they would probably use the LEA's Box tools in the future as a complement to other activities and applications, but not as a replacement. 11 % of teachers would probably not use it in the future. Teachers mentioned they might use it for self-assessment, group work, project-based learning and general feedback. Mostly, they mentioned children aged 10 – 12 as a suitable target group.



Graph 2.2 Overall satisfaction

Graph 2.3 shows what kind of feedback teachers would like to get about their pupils using the LEA's Box tools. All of them mentioned they would like to be able to determine their pupils' strengths and weaknesses regarding their skills and knowledge in a particular area of interest. Most teachers would also like to be able to verify whether a pupil has reached a certain level of proficiency (67 %). Being able to compare pupils' performance seems to be less important to teachers.

What kind of feedback would you like to get using the tools?



Graph 2.3 Expected feedback

Teachers were also asked how they would use the tools in the classroom.

- Most teachers said the tools would make preparation for their classes easier. Some mentioned it would help them set learning objectives and track pupils' progress better than when using grades or other forms of assessment.
- All the teachers agreed their pupils would probably find the tools interesting and more attractive compared to grades. Some teachers pointed out the tools would allow pupils to better watch their progress and that they might promote group work and creativity.
- Most teachers were not certain whether the tools would also be interesting for parents, as the information provided might not be as straightforward and simple as other forms of assessment parents have been used to so far. They were also uncertain about using the tools to communicate with authorities (inspectors etc.).

Graph 2.3 shows teachers' satisfaction with the user-friendliness of MyClass. As can be seen, about 50 % of teachers found the configuration tool and the tool for assessment easy to use.



Graph 2.4 Satisfaction with MyClass

Functionality: expectations versus reality

1) Configuration tool

As some features of the configuration tool weren't ready at the time of the piloting, teachers' and pupils' profiles were created and managed by Scio, not by the teachers themselves. Therefore, the following suggestions are based on our own observations rather than on teachers' experience. The drawbacks of the configuration tool can be summarized as follows:

- It is impossible for a teacher or a pupil to sign up for the LEA's Box tools themselves. Their user profile needs to be created by one of the LEA's Box partner institutions. Only after someone from a particular school or institution has had their profile created externally, they may start creating profiles of other people in their school or institution.
- The process of creating and managing classrooms is not particularly intuitive, especially because a teacher needs to first create pupils' profiles, then create virtual classrooms and then assign pupils to a particular classroom. A more suitable way to do this would be assigning pupils to a classroom when their profile is being created.
- All the mind maps and lists of behaviour to be evaluated must be assigned to teachers by one of the LEA's Box partner institutions. It is not possible for a teacher to share a mind map he/she has created him/herself with other teachers.

2) Evaluating classroom behaviour

Using MyClass, teachers evaluate not only pupils' performance but also their behaviour (raises hand, helps others...) by giving one or more points to their pupils for the relevant behaviour. Teachers mentioned they would, among other things, appreciate being able to write down information about the following behaviour:

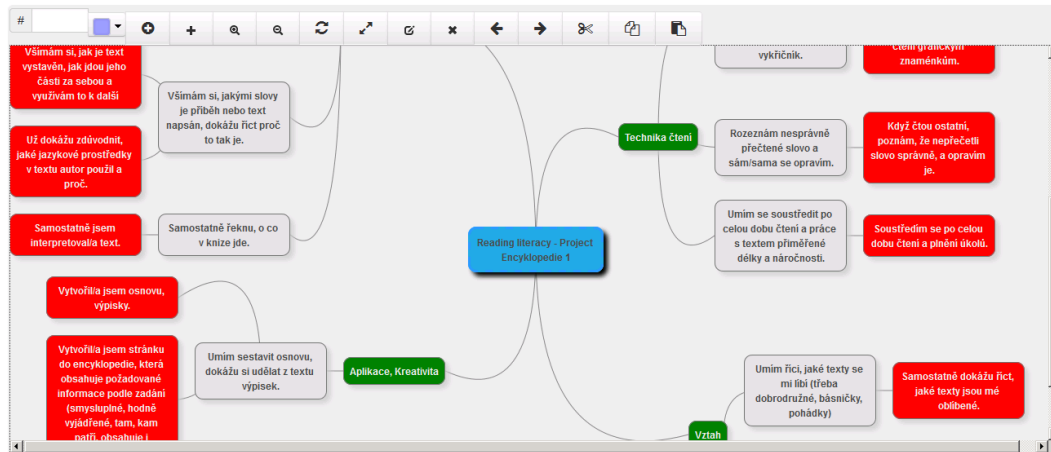
- how well a pupils works in a group (is he/she a leader or a follower? does he/she prefer to work on his/her own? etc.);
- if a pupil can evaluate his/her own work;
- if a pupil can find relevant information and how well he/she can work with the information;
- if a pupil gives advice to others, helps less able classmates etc.;
- if a pupil can come up with his/her own ideas;
- if a pupil cheats.

Teachers were quite confused by the fact that no single scale was determined for the evaluation of behaviour (i.e. a maximum could be 1, 10, 100 points or another number depending on a teacher), which made them slightly confused about how to give points to their pupils. In a focus group, they mentioned that the score would then not be comparable among schools or even classes as the scale would differ from teacher to teacher.

The basic idea behind this feature of the tool is that each teacher can choose her own scale, but this idea should be explained before teachers start to use the tool. However, teachers mentioned that evaluating behaviour did indeed help them realize the differences between pupils and compare their social skills and strengths and weaknesses.

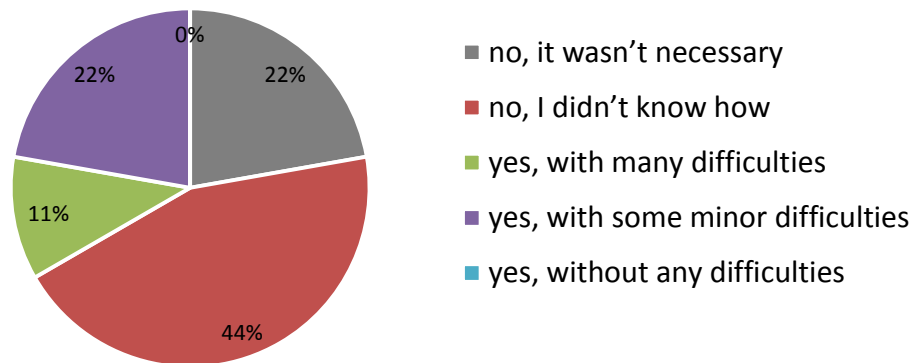
3) Mind-mapping tool

As mentioned before, teachers were given a mind-map prepared by Scio (see the picture below), but they were encouraged to modify it based on their own experience. About one third of teachers did attempt to modify the mind map, they experienced some difficulties though. 44 % of teachers said they didn't know how to modify the mind map, which suggests it might be useful to provide teachers with a tutorial or an instruction manual, or improve the intuitiveness of the tool.



Graph 2.5 Example of a mind map

Did you attempt to modify the mind map?



Graph 2.6 Modifying the mind map

Furthermore, teachers expected the mind map would be personalized for each pupil, while in reality, it only shows a structure of a certain skill (i.e. reading literacy) with respect to a particular activity. They also expected assessment would be done using the mind map itself or that the map would change after the assessment has been done. Again, a better explanation of the purpose of the mind map and how it is related to the assessment would be useful before teachers start using the tool. The possibility to evaluate pupils directly in the mind map should also be considered.

Teachers also said they would appreciate being able to add their own comments when evaluating pupils' skills. So far, the tool only enables teachers to choose whether a pupil has demonstrated a skill or not, but doesn't allow them to add personalized comments.

Last but not least, teachers said it is important that the descriptions of the skills in the map are written in a way that is understandable for students and attention must be paid to this when creating a mind map.

4) Self-assessment and peer-assessment

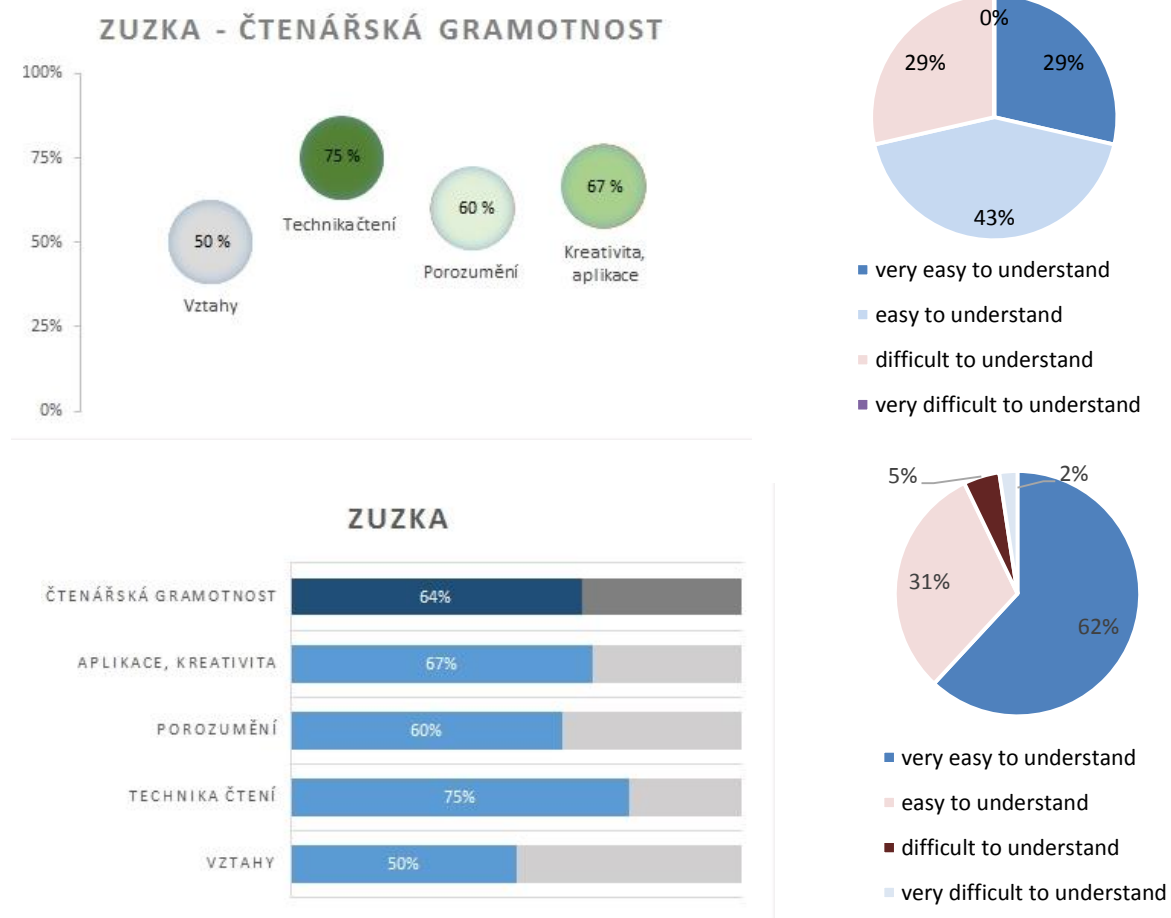
All the teachers agreed self-assessment should be integrated into the tools as it is very beneficial for pupils and helps them think about their own work. Only about 50 % of teachers thought peer-assessment should be part of the tools even though most teachers, as stated earlier, perceive peer-assessment as important.

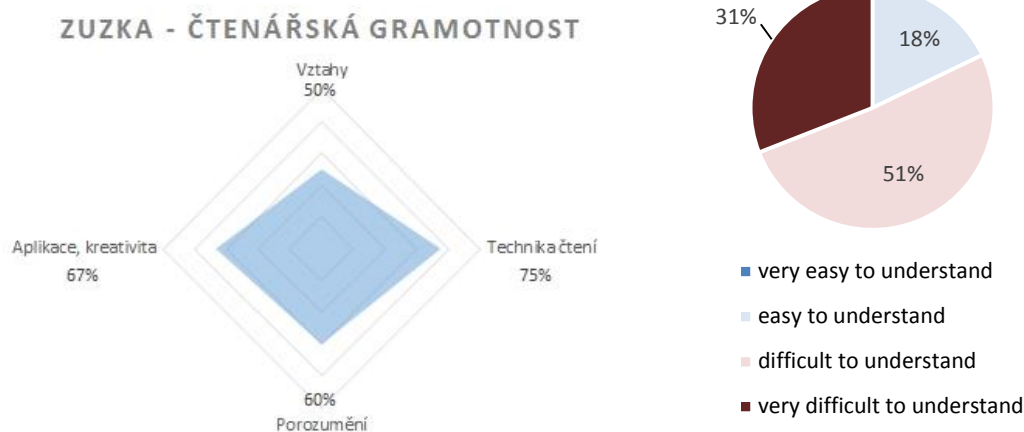
2.3 SUGGESTIONS FOR IMPROVEMENT & FUTURE DEVELOPMENT

Teachers' comments will now be summarized and suggestions for improvement will be presented.

1. Adding graphs depicting pupils' performance

In the future, the LEA's Box tools will be able to summarize pupils' performance in the form of a graph. We asked teachers about their opinion on several different types of graphs, which are shown below together with teachers' responses. Their responses clearly show that the middle graph is by far the most understandable form of visualization, while the last graph is the least understandable one.





2. **Tutorials and instruction manuals**

The piloting process clearly showed that it is crucial to have good tutorials and instruction manuals. Teachers must understand what exactly the LEA's Box tools can do, why they might be useful to them, and what, on the other hand, the tools cannot do so that they don't have unrealistic expectations. In the future, all the tools must be accompanied by a manual and/or an accessible tutorial.

3. **Adding self-assessment and peer-assessment**

Most teachers mentioned self-assessment and peer-assessment as an important part of the learning process and said they would like them to be integrated into the tools so that pupils can compare teacher's evaluation with their own or with the one provided by their classmates. Self-assessment in particular seems to be of high importance, while peer-assessment tends to be done orally and informally at many schools and might be used less often should it be integrated into the tools.

4. **Modifying the mind-mapping tool**

During focus groups, many teachers mentioned that they expected each pupil would have his/her own mind map. This expectation is worth considering, as it might be more suitable than having a single mind map for the whole classroom. This means a teacher would start with a mind map depicting a certain activity, which would remain unchanged, but a copy of the same map would also appear in each pupil's profile and this one would change according to that pupil's performance, so that he/she could see directly from the map what he/she can and cannot do. The possibility to add personal comments about each pupil to the map might also be helpful.

5. **Configuration tool**

Several aspects of the configuration tool need to be improved in order to make the tool intuitive and user-friendly. Firstly, teachers and pupils need to be able to create their profiles themselves, without the need to contact a LEA's Box partner institution. Secondly, it should be possible for a teacher to assign his/her pupils to classrooms right when their profile is being created. Last but not least, teachers should be able to share mind maps, activities and lists of behaviour they have created with other teachers in a simple and intuitive way.

6. **Adding scale to the behaviour evaluation**

Teachers in general appreciated the possibility to evaluate not only pupils' performance, but also their behaviour. Given teachers' suggestions, new types of behaviour might be included in the tool. Also, it might be useful for teachers to be able to add a new type of behaviour themselves according to what they consider important. Furthermore, a scale should be added to the tool with a pre-defined maximum value, because without one, teachers were quite confused and worried about the comparability of the information among different classes and schools.

3. FOCUS GROUP STUDIES IN TURKEY – SEBIT

3.1 CURRENT SITUATION IN TURKISH SCHOOLS

The more the digital technologies are used in education, the larger the digital footprints will be. Only with a large enough data set it is possible for the analytics tools to produce reliable results. E-Okul system was the first nationwide educational technology project in Turkey. Started in 2004, this project had in its scope to collect all grading information from all schools in one central repository and print digital report cards. The input templates provided space for much more than grade information, such as behavioural data, the books read by each student, attendance and certificates of achievement with all grading information entered carefully in order to print report cards. What's more, the parents interface for E-Okul exposes all this information, also in comparison to class averages. Data collected in E-Okul for 10 years can naturally be used for decision support by simply linking with the other systems that MoNE use, such as Book Collections, Incident Management, Content Archives, Teachers Performance Tracking, HR Management, Estate Planning etc. This task has been present in MoNE's work plan since 2008 but has never been achieved. The reason for this delay is probably political.

The second nationwide ICT educational technology project is the Movement of Enhancing Opportunities and Improving Technology (FATİH) Project¹, which was initiated on 22nd November of 2010. This is the "largest" e-learning project in the world, with the aim of broadband connection to 45K schools, interactive boards in 432K classes, and mobile computers for 10M users. With a signed protocol with the MoNE in February 2015, SEBIT is to build the software stack for FATİH in the next 10 years using its Vitamin Platform and VCloud suite of educational services. Making ICTs one of the fundamental tools used in the education process and ensuring active utilization of those technologies by students, teachers, and other education staff, FATİH aims not only to "invest in technology" but rather "invest in education". FATİH Project also envisages in-service training of teachers and education staff and development of digital contents for the students' and teachers' use. MoNE has developed an educational network, namely "EBA", in which the digital content is available. The aim of EBA is to enable technology integration in teaching process by supporting efficient material usage. E-Okul and FATİH promises a very suitable ground for exploiting LEA's Box outcomes. However, the existing monitoring tables and reports on these systems raise the bar for usability and functionality expectations.

¹ <http://fatihprojesi.meb.gov.tr/tr/english.php>



In order to achieve an efficient use of ICTs in educational settings and to make the target audience acquire ICT skills at an expected level, analytics and feedback is essential for both students and teachers. Also, it is necessary to provide not only teacher guides about the reception and processing of such feedback, but also a clear paradigm of use such as with “data teams” and full support of the school leaders.

3.2 TURKISH FOCUS GROUP STUDY

SEBIT has organised training for 1000 teachers on content development and use in technology enhanced classrooms. The sessions will run from mid-July until mid-Sept in a hotel near Istanbul. On 10th January a 3 days preliminary meeting with 30 head teachers was organised in Ankara. On this opportunity a half day meeting was held with the teachers to study LEA’s Box. It is important to note that these teachers had had experience in ICT equipped classes of FATİH project for 2 years.



The agenda of the meeting was as follows:

S1: Project Intro using the Turkish version of the promo video of the project

S2: Hesse vs Radar Plot

- Use samples of these two plot options in a math topic to explain these visualizations
- Poll the teachers on the potential of the two options in answering 10 pedagogical questions relevant to the use of visualization

S3: Study on the Portal

- Use the 6 questions in “Perceived Usefulness” survey of TAM3 framework to evaluate the Portal parts

S4: Study on the OLM

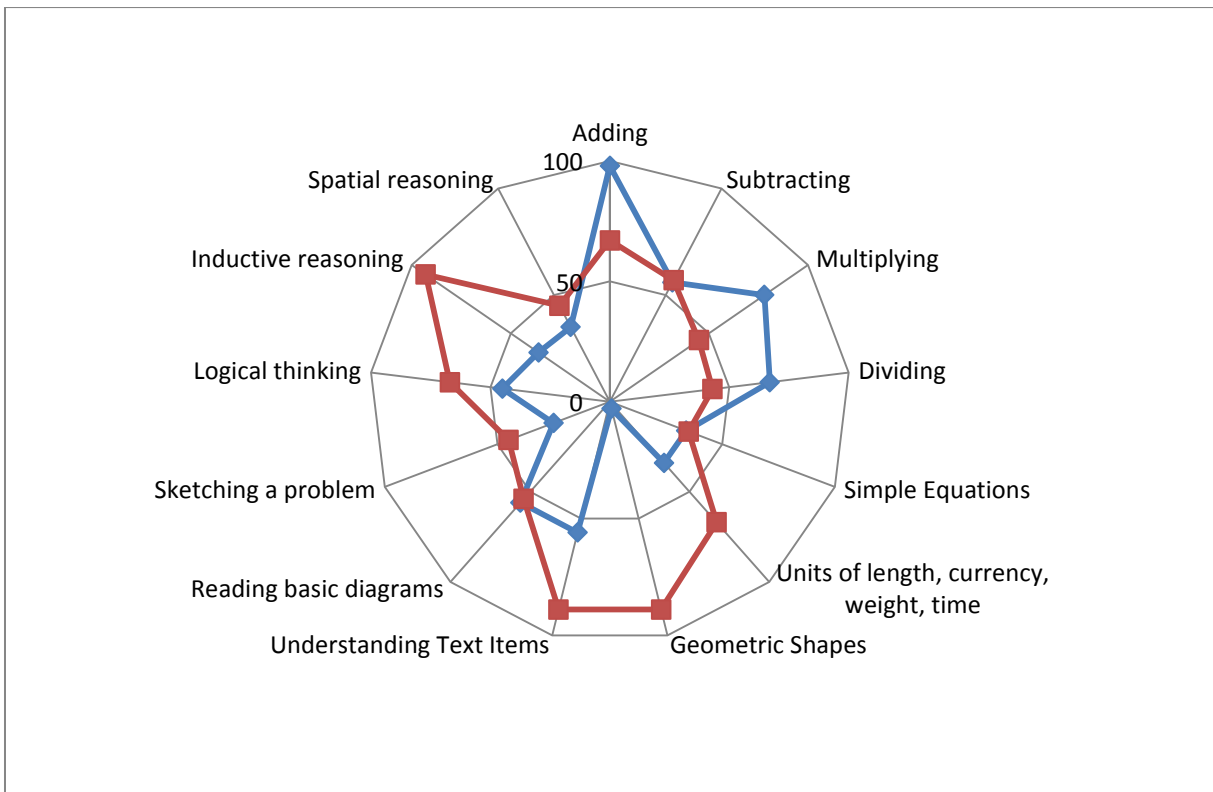
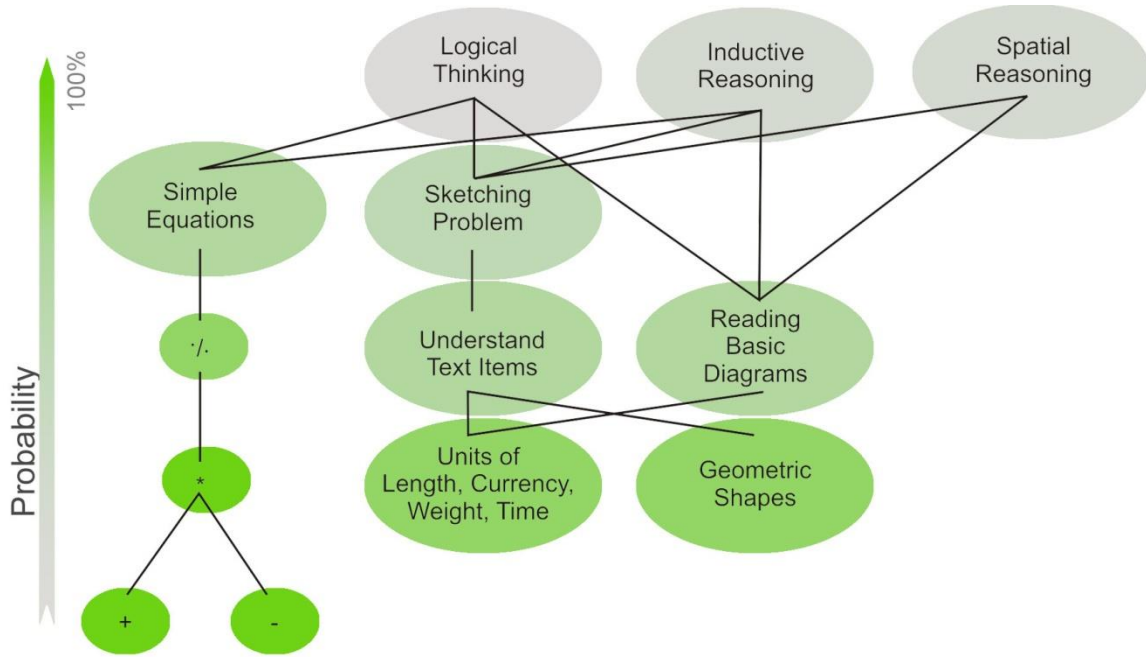
- Use the OLM Visualisations of the “biological adaptations” topic, to inquire if such visualisations are good to determine skill level, what students need to do, which activities are useful, comparing skills and activities across subjects and ease at examining large/small amounts of data

S5: An open table discussion on the 6 main pedagogical problems which LEA's Box is addressing in year 2 of the project.

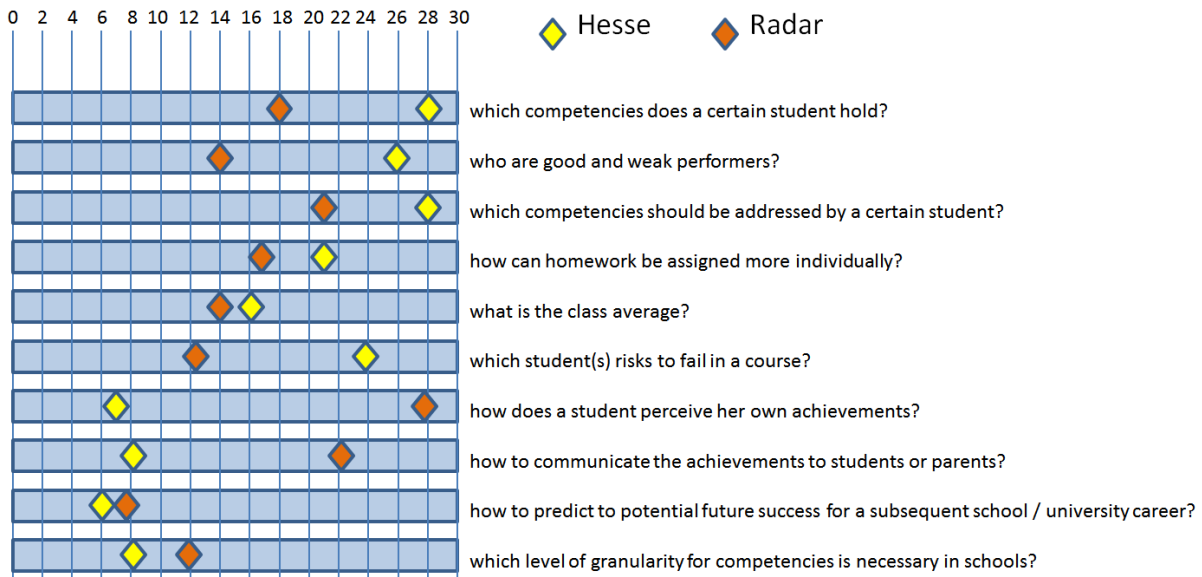
3.3 THE STUDY OUTCOMES

The S2 Study:

Hesse and Radar plots were the two favourite visualization techniques identified by the focus group that convened in Ankara in autumn 2014. For the new study group, the below given two samples of Hesse vs Radar Plot were introduced. Colour coded probabilities of achievement in the Hesse diagram was derived based on the 20/30 correct answers of a particular student. Note that it is necessary to have the competencies linked to test items to form this kind of diagram. On the other hand the Radar plot shows the assessment of a teacher (blue) and the self-assessment of a student (red) on the same topic.



The polling result of 10 pedagogical questions answering of which could be supported by these plots is as follows:

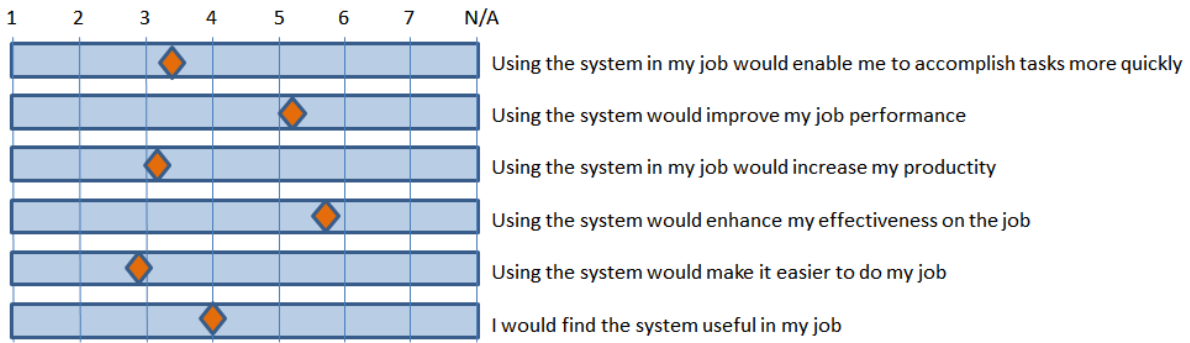


Outcome S2: Hesse Plot is useful in determining competency states that are ordered in a constructivist manner, hence support decisions on homework assignments. Radar Plot is useful in comparisons and negotiations. Neither tool seemed to have prediction power in our teachers' regards. Perhaps a further statistical tool is needed to link the plot views to outcomes that are to be predicted. Hesse plot is somewhat complex to be used by parents, but may be used by students once they get used to interpreting it.

The S3 Study:

As described in Deliverable D5.4, the survey to develop a TAM3 model of user experience of a product typically has two parts: perceived usefulness and perceived ease of use. After forming the model, anchors of these two perceptions can be measured in their explanatory power for the participants behavioral intentions towards the product. Such anchors include "perceived locus of control," "self-efficacy" "computer anxiety" "habit triggering" and "hedonic motivation." However to answer the perceived ease of use survey, a minimum of 4 weeks regular use of the product is recommended. Therefore we ran a partial survey only for perceived usefulness, with 6 psychometric statements that are asked to be rated on a 7 level Likert scale, plus an option for "No Opinion." A complete TAM3 model of the tool set will be carried out after further pilot studies.

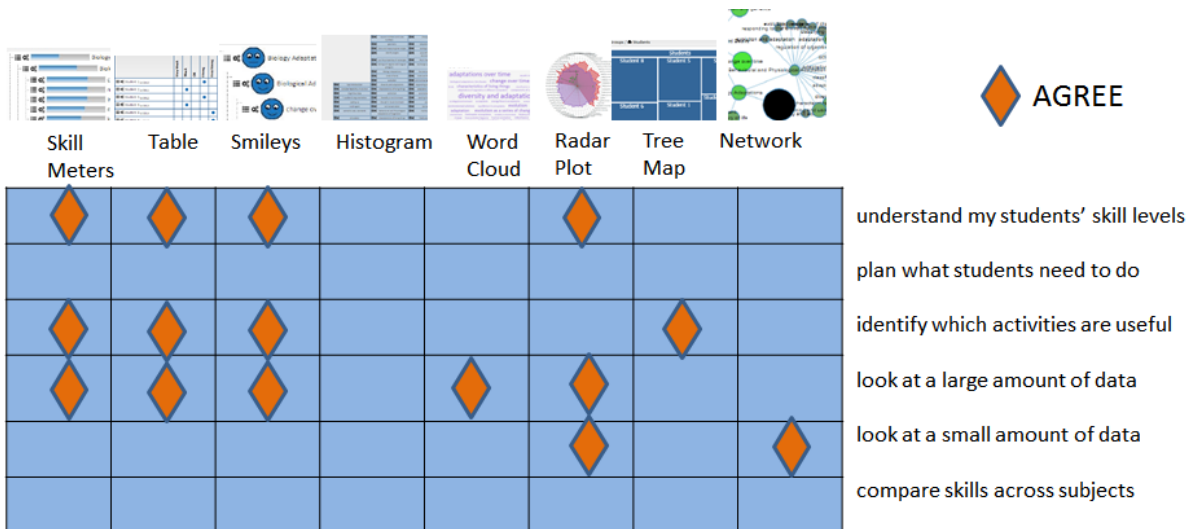
The perceived usefulness survey is run after explaining the functions of the Configuration Tool, MyClass and MindMapping. The majority votes on the 6 psychometric statements were as follows with very little deviation:



Outcome S3: The survey result indicates that improvement in job performance and effectiveness on the job are the top two usefulness anchors that explain an increase in intention to use and the anxiety to introduce a software to be used in daily decision making. In general, this explains a decrease in intention to refrain from using. Some teachers pointed out that competency gaps, which are not addressed immediately, would require more time to teach later, so the tool is essentially time saving. Turkish version of the portal had still some labels in English and that had a somewhat negative effect on their perception. Configuration tool is essentially regarded as a registration and account management tool, which Turkish teachers are not accustomed to use since all student records already exist in the E-Okul system. In general, teachers demanded tools which are more actionable so that productivity would also improve. The present tools have potential to improve performance. Turkish teachers were especially interested in MyClass ability to record behavioral information. The richness in these records impressed the teachers as they just use a “+” sign for a student’s particularly good behavior. They showed great interest in how such behavioral information may relate to academic performance.

The S4 Study:

Partners from UoB have used real data from SEBIT’s Adaptive Curriculum product, to create a set of OLMs on the Biology Adaptations topic. These plots were explained and examined one by one during the study group meeting. Later, 6 pedagogical goals that can be supported by these plots were polled on each plot. The majority results are as follows:



Outcome S4: Generally speaking, the skill-meter, the table and the smiley plots seems to serve the same purposes almost equally well. The histogram plot does not seem helpful for the 6 given pedagogical goals. None of the plot types seems to particularly help in planning what students should do next and how the skills can be compared across subjects. The skill meters of two different subjects can be viewed at once but having plots of two subjects side by side provide neither causal nor relational information when comparing skills across subjects.

The S5 Study: The 6 pedagogical problems that the project is considering to address in year 2 are as follows:

- Problem I: How to evaluate students during project based learning
- Problem II: How to structure and track students' knowledge in domains such as reading literacy and soft skills
- Problem III: How to track students' progress
- Problem IV: How to track the class' progress
- Problem V: How to integrate self-assessment and peer-assessment into the process of assessment
- Problem VI: How to get data without sufficient ICT support

These problems were openly discussed at the end of the meeting and the teachers argued for or against the use of learning analytics in solving these problems.

Outcome S5: Our teachers unanimously agreed that these problems are relevant and important to their everyday educational experience. Note that even though their classes are well-equipped with ICT tools, Problem VI as well is relevant since behavioral data is critical in decision making, yet having hardware equipment in the class does not immediately capture this kind of information.

The main idea that emerged during the open discussion is that the mode of engagement with the systems needs to be defined, or at least recommended, so that the new users can adopt quickly. For example, data teams that meet for research based decision making using analytics tools can be a recommended mode of engagement and if the school leadership agree to this kind of daily operation it would make more sense to teachers. Whatever the recommended mode is, there should be in-built support for that in the portal. For example, if a shift from evidence-based decision-making to research based decision-making is foreseen, then the tools should be linking hypotheses easily to data and all the hypothesis/findings should be accumulated in the platform to avoid recurrence.

3.4 SUGGESTIONS FOR IMPROVEMENT & FUTURE DEVELOPMENT

Examining the outcomes of this second study group sessions, SEBIT team adds the below points to the first study group suggestions that were given in Deliverable D5.2.

- In D5.2, tools were recommended to be designed to trigger behavioural change and/or call to action. In addition, they may help teachers in identifying similarities and differences between students so that teachers may “learn about their students” easier.

- In D5.2, change of competency states in time was recommended to be added to OLM views, which were taken on board by UoB in their year 2 development plan. In addition, some research can be done on how to incorporate entailment relations between competencies in OLM plots.
- In D5.2 it was recommended to have plots that link actions to changes in behaviour or competency states so that actions that yielded the change would enable the user to draw conclusions, or reason about what works. In addition, it may help to convince teachers that competency gaps that are not addressed immediately cause more time and effort for teachers later, so the tools actually save them time if they choose to act on what they observe.
- In D5.2 “discovering competency states” and “feedback to students about their strengths and weaknesses” came out to be the top 2 pedagogical goals that the LEA’s Box tools could serve for. In our new study we realized that linking tools to particular pedagogical problems provides teachers with a better incentive to use them. Some tools may be better than others in tackling a given problem. When that is decidedly the case, this may be used to improve the user experience with the system.
- In D5.2 it was recommended to examine real teacher notebooks to improve MyClass. This can be done during piloting activities.
- Another suggestion was to include “comparison” or “relative to class average” views in myClass. These can help in assessing readiness of the class for the activities of the day.

4. FOCUS GROUPS AND DESIGN STUDIES IN AUSTRIA – TUGRAZ

The design studies of TUG concentrated on three topics; the design of the web portal, the design of the myClass tool according to teachers' work flows, and finally, the functional requirements of administrative features.

4.1 PORTAL DESIGN

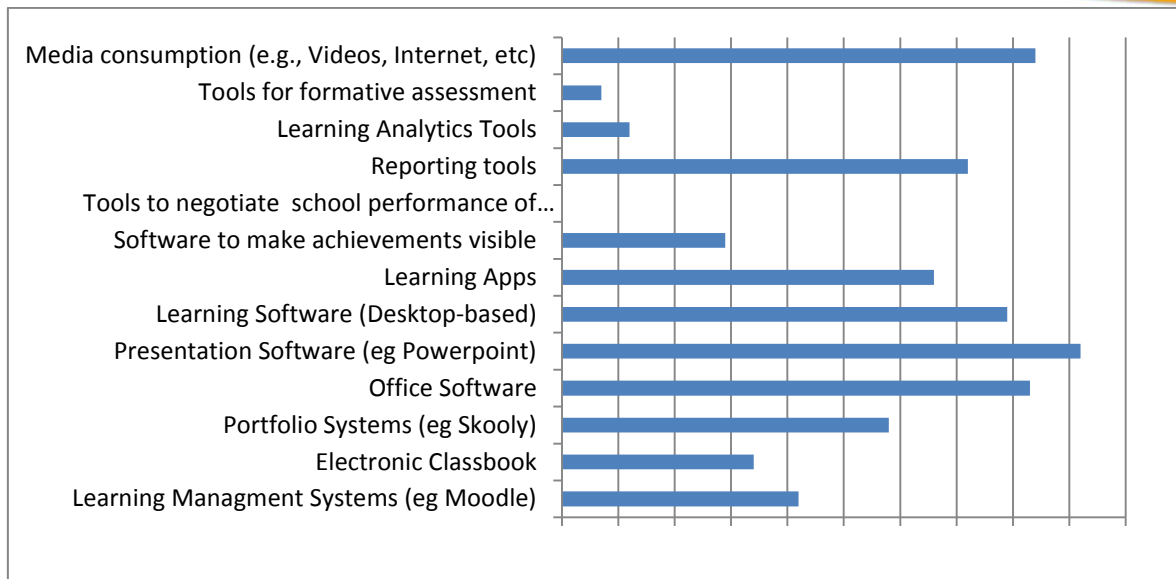
In order to develop and provide a web portal for teachers, we conducted an online survey among Austrian teachers. We made calls for participation of the ELSA network (<http://elsa20.schule.at/>), which is an organisation promoting e-Learning and media pedagogy in Austrian schools. We received in total 32 complete responses. The main results are shown below.

The first question covered the elements of the portal ('What elements would you like to access through a web portal for educational tools'). The answer form was a free text. The most frequent answers are shown in the following box.

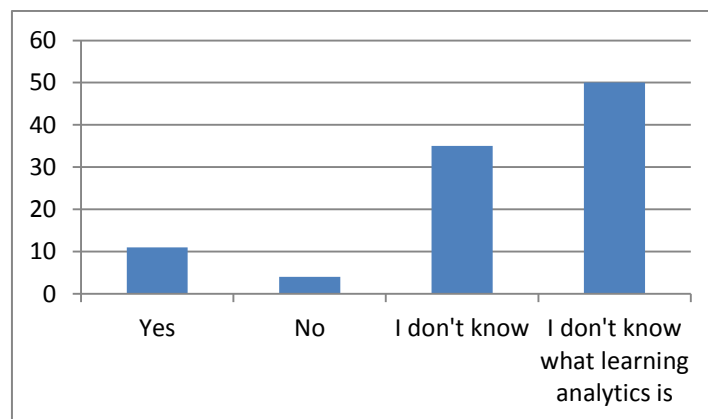
Access to tools and apps
Access to a search engine for available tools and apps
Browsable database of available tools and apps
General information
A library of documents for more detailed information about educational technology, pedagogy, technology/media use
Community and network contacts
Web forum
Link to social media

The qualitative analysis of the free answers revealed that the teachers' understanding of such web portal refers rather to a source of information instead of an integrated collection of tools for their daily work.

A further question referred to the general technology use in classrooms (the results are displayed as bars; the longer the more frequent the use, ranging from 'never' to 'on a daily basis').



The general impression is that the most frequent tasks are administrative ones and the access to media. Whereas a more 'pedagogically' inspired use of tools is much less frequent. This leads to the next question, focusing on the perception of a concept such as learning analytics: Can you imagine using or do you already use techniques and/or learning analytics tools?



Finally, we asked for the internet connectivity in schools. As a result, the survey revealed that over 80% of teachers reported to have fair to good WiFi access in schools and classes.

In total, technology acceptance as well as accessible internet connectivity is quite good in this survey. However, these figures are based on a quite selective sample of teachers based on the call through an e-Learning network.

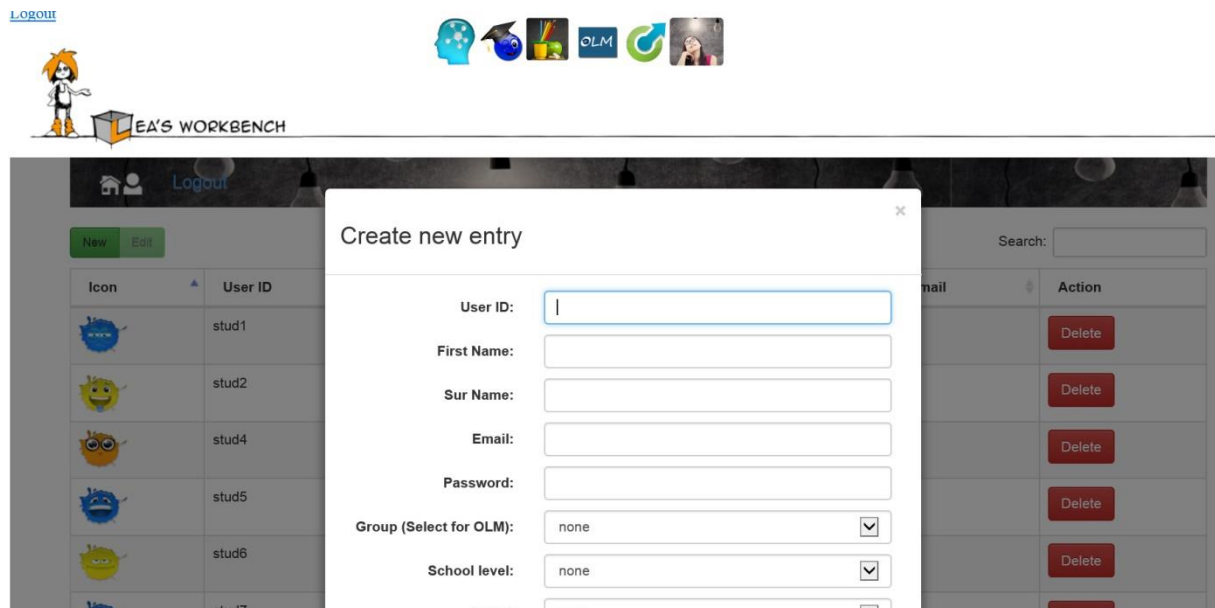
The conclusions for the portal design drawn from that are (i) a web platform is technically acceptable since WiFi is mostly available, even in classrooms. However, a re-design of the portal is necessary since it is not perceived as one dedicated to an integrative tool but rather as an information platform. In the next steps of the design studies we will identify the typical work flows of European teachers and adjust the design accordingly, so that the experience and interaction sequence with the portal mirrors the workflow. Access to additional information and community links will be presented up front.

4.2 MYCLASS DESIGN

In the first period of the project we conducted a number of frequent meetings with partner schools and discussed together the functionalities and design elements of a usable tool.



These efforts resulted in the new versions of myClass as tools for teacher's daily work, primarily recording and documenting achievements. In the recent months we concentrated much more on the design and setup of an administration/configuration tool. In all our interactions with teachers and instructors the possibility to maintain the school's data (i.e., students, teachers, subjects, classes, etc.) had the top priority. First, we established a rather regular config tool (as shown in the following figure).



However, the regular functionality of typical web forms appeared not to be satisfying, specifically since the first release suffered from several usability problems (as report section 2.2 for the Czech activities). In focus groups we established a catalogue of additional features that must be available to teachers or administrators for a take up of tools in schools.

- Regular forms are not suitable for larger data sets such as students or competencies. Links to existing databases should be available, it should be possible to import existing documents (e.g., Excel spreadsheets), batch processing should be available.
- Backup features must be available
- Additional tasks that are typical for schools must be simplified; this includes “shifting” all students of a class on to the next term or school year or the archiving of data and repository contents when students leave the school.
- Better documentation is required.

In re-design iterations we designed a slightly alternative look and feel and included a first set of batch functions. The entire design is now re-assessed by teachers of our partner schools.

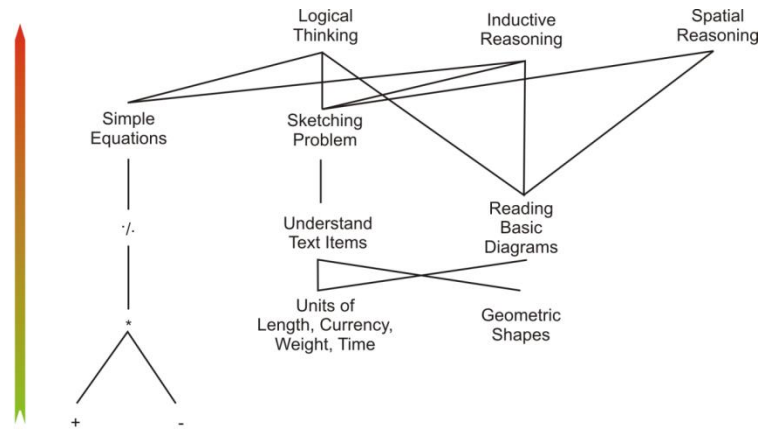


The screenshot shows a web interface for managing students. At the top, there is a header with the name 'Julian Dupont' and a home icon. Below the header, there is a section titled 'Schüler' (Students) with a sub-section 'Schüler hinzufügen und bearbeiten' (Add and edit students). On the left, there is a list of students with columns for ID and Name. On the right, there is a form for adding and editing students. The form includes fields for 'Vorname' (First name), 'Nachname' (Last name), 'Geburtsort' (Place of birth), and 'Geburtsdatum' (Date of birth). There is also a dropdown menu for 'Klasse' (Class) and buttons for 'Speichern' (Save) and 'Zurück' (Back). The footer of the page contains the copyright information '© 2016 TU Graz [v5.02]'.

A further part of myClass and the portal is the visualization of competence structures and learning paths. As proposed in the DoW, a key goal is to utilize the strength of CbKST and FCA related graph types. This however is not trivial since these types of visualizations are complex and require certain expertise to read them properly. Key question to elaborate on is whether the conceptual approach is meaningful and intuitive to teachers and, if not, how competencies and structures of competencies (or knowledge) can be tackled conceptually and visually.

The idea: competencies, knowledge, skills, any kind of aptitude is not directly observable, it is determined by the human brain, the “black box”. But this aptitude determines the observable performance (e.g., test results or other achievements). However, there are other factors leading to specific results (e.g., guessing, careless errors, the student is tired or distracted, transfer from one task to another fails, etc.). The competencies are not independent from each other. Often a specific competency (e.g., adding) is a prerequisite for another (e.g., multiplying), some ability develop before another, or certain contents is taught before some other. This opens the possibility to give the competencies are structure.

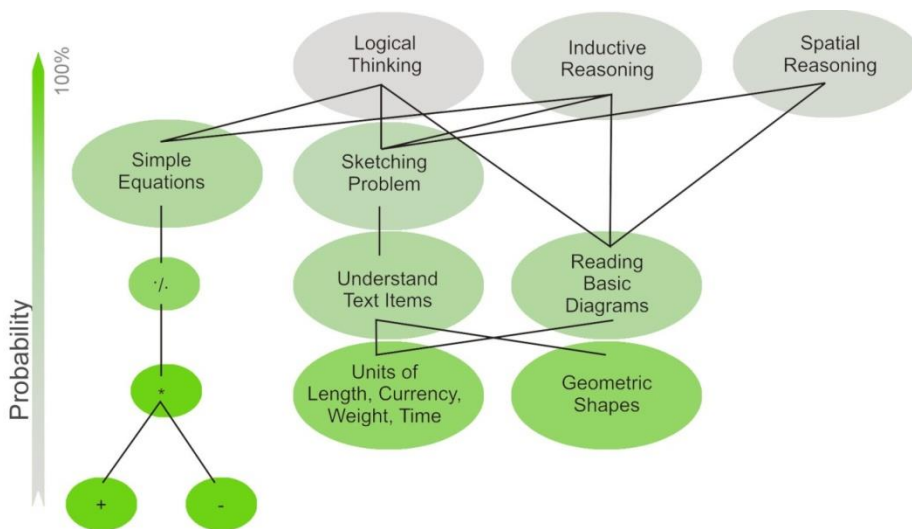
The following is a simplified structure based on a mathematics test (A Czech Standard test provided by Scio); In one of the focus group meetings we provided the teachers with a printout of the test and showed the following structure.

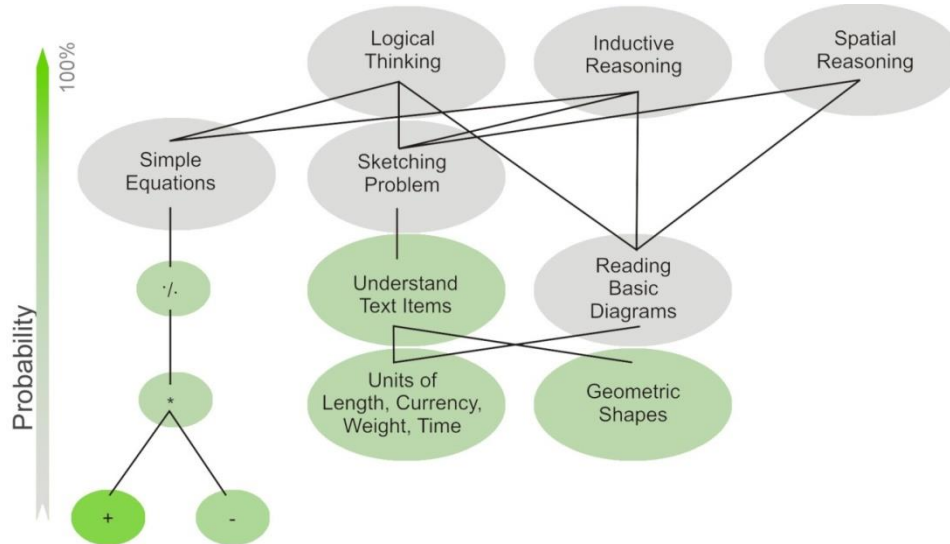


The test items are linked to the competencies by the following assignment:

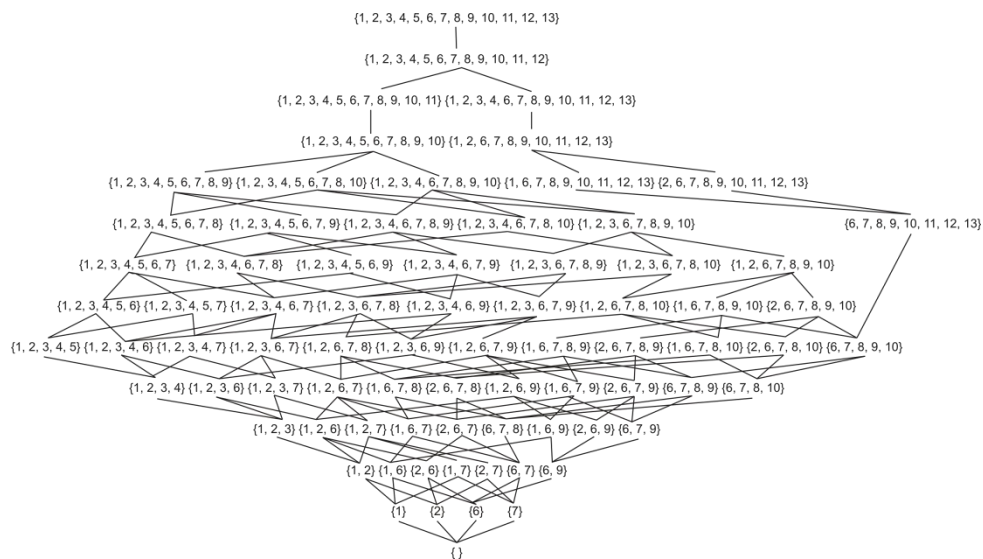
Competencies		Test Items	
a	Adding	1	d, h
b	Subtracting	2	a, c, h, j
c	Multiplying	3	a, d, h, j
d	Dividing	4	a, d, h, j
e	Simple Equations	5	a, d, h, j
f	Units of length, currency, weight, time	6	a, b, c, d, f, h
g	Geometric Shapes	7	a, b, c, k
h	Understanding Text Items	8	h, m
i	Reading basic diagrams	9	g, h, m
j	Sketching a problem	10	a, b, c, d, h, i
k	Logical thinking	11	a, b, c, d, f, h
l	Inductive reasoning	12	a, b, c, d, f, h
m	Spatial reasoning	13	a, b, c, d, f, h, k
		14	a, b, c, d, f, h, k
		15	a, b, c, d, f, h, k, i
		16	a, b, c, d, f, h
		17	a, b, c, d, f, h
		18	a, b, c, d, f, h
		19	a, b, c, d, f, h
		20	a, b, c, d, e, h
		21	a, b, g, h, m
		22	h, m
		23	a, b, c, d, f, h
		24	a, b, c, d, h, j, k, l
		25	a, b, c, d, h, j, k, l
		26	a, b, c, d, f, h, k, i
		27	a, b, c, d, f, h
		28	a, b, c, d, f, h, k, i
		29	a, b, c, d, f, h
		30	a, b, c, d, f, h

In addition, we showed mock-ups of fictitious test results (e.g., these are the results of a specific student who mastered the following item correctly: 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 18, 20, 22, 23, 29, 30); or “These are the results of another student who mastered the following item correctly: 1, 2, 3, 4, 5, 16, 18”.

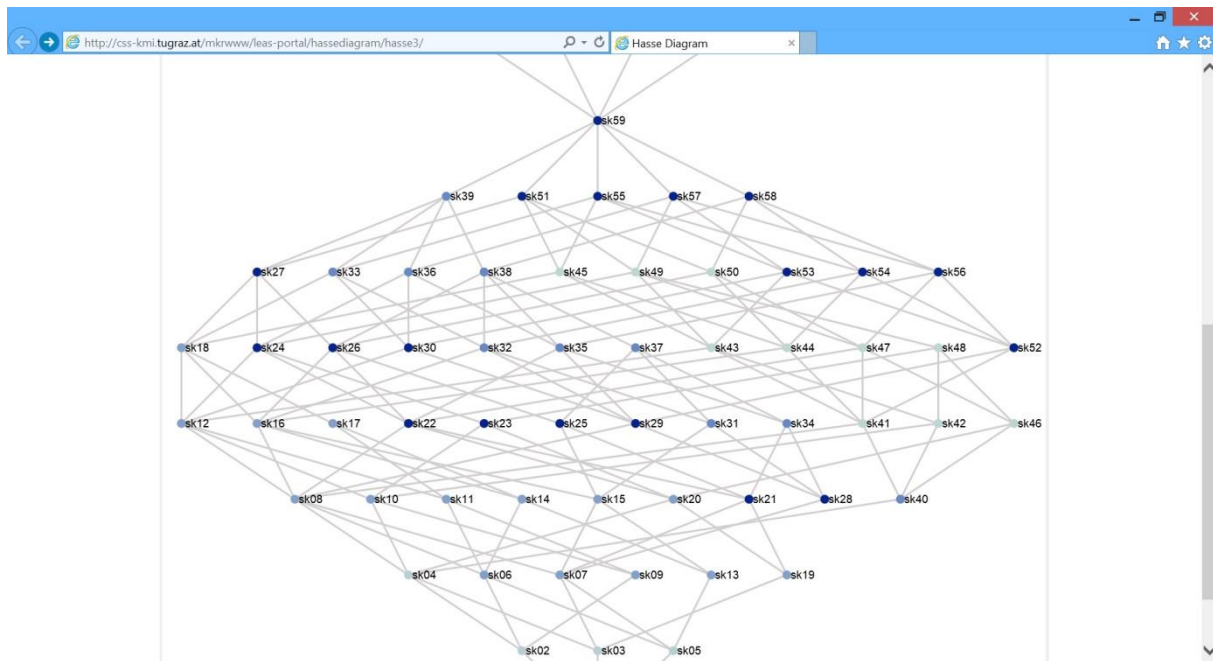




Finally, we also showed them the full competence structure arising from the relationships displayed above.



In addition, we demonstrated various forms of colour coding and to illustrate also meaning of different structures using the portal's visualization module.



We tried to identify in the group whether teachers could read and understand the graphs properly. The main results were:

- The concept of relationships between competencies is well understood, however, discussions about the correctness of the proposed structure occurred very easily (even among teachers).
- On a conceptual basis, the role of the lines is sometimes misleading; also the way of reading the diagram from bottom to the top is not always intuitive, the lines should be displayed with arrows.
- The line segments should be less visible or are not necessary at all (unless displaying a learning path).
- The scale on the left (green-red, grey-green) are not intuitive.
- Colour code of nodes is easy and quick to understand.
- The concept of “competence states” and competence spaces (as the set of all possible states) is extremely difficult to understand and not intuitive.
- The concept of learning paths is well understood and appreciated by teachers.
- The structural layout is not important for the teachers.
- Colour coding from grey to green is preferred over red-green (the general statement is that colours should be well visible and differentiable but as neutral as possible).

5. SUMMARY AND OUTLOOK

In the past few months, our main focus was to study current situation in the classrooms, to identify teachers' and students' needs and requirements when it comes to improving the learning process, to describe different classroom scenarios and problems and to suggest ways to tackle them using the LEA's Box tools.

In order for the LEA's Box tools to be adopted and used in today's classrooms, they must make teachers' and students' work easier and more efficient while also being simple and understandable. To achieve this, we collected teachers' opinions regarding the tools. Among other things, we asked them in what way the tools may be beneficial for them and their students, whether they are easy to use and how they could be improved. This deliverable presented a summary of teachers' responses and opinions, which are going to serve as a basis for our next actions.

As it turned out during surveys carried out in the Czech Republic, Turkey and Austria, schools are relatively well equipped with IT equipment and internet access. However, teachers' knowledge and awareness about the possibilities of Learning Analytics tools, as well as about the possible use of modern ICT tools in the evaluation of learning outcomes are weak.

It has also been shown that many visualizations that are unique to CbKST and FCA are relatively little understood by ordinary teachers.

In order to achieve a broader expansion and popularization of these tools and outcomes in schools in the future, it will be necessary among other things, to focus on increasing the skills and knowledge of teachers in this area.

As also shown, teachers need to constantly consider the time devoted to direct teaching and working with students and the time they spend on activities, from their perspective often considered as accompanying, such as assessment.

We believe that for further successful development of the project it is necessary to modify the existing tools so as to be a less demanding for teachers, while displaying a clearly evident reason for their use. This will make it possible to increase the motivation of teachers to use them and help the future successful dissemination of the project outcomes.

Below are given some of the possible measures that are to be pursued in the coming months in response to the findings observed so far.

The next actions are going to include mainly changing some important aspects of the tools so as to make them more user-friendly and beneficial for teachers and their students. Above all, we are considering to:

- improve the myClass tool, especially the mind mapping tool and behaviour evaluation, with respect to teachers' experience;
- improve the functionality of the configuration tool;
- develop tutorials and/or instruction manuals for teachers;
- develop visualization components of the tools;
- consider integrating self-assessment and peer-assessment into the tools.

Furthermore, we are also going to:

- get continuous feedback from teachers on the latest versions of the tools;
- use the tools for a long-term formative assessment (by asking teachers to do a set of activities over a longer period of time);
- raise teachers' interests using blog entries, workshops, discussion seminars etc.;
- do further research into the algorithms behind the tools.