Next Generation
Teaching, Education
and Learning for Life

Deliverable D6.6

Report on TDS II

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3	2014-05-19	KMRC: elaboration of SAT/SAL model
4	2014-06-05	KMRC: Executive Summary and Conclusions
5	2014-06-08	KMRC: Version for internal review
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1 Executive Summary

This deliverable reports on the teacher-led studies that have been conducted during the first three quarters of NEXT-TELL's final year.

After giving a general introduction, in chapter 3 we will give an overview about a model that has been developed during the last year: the model of student-aware teaching (SAT) and self-aware-learning (SAL). This model aims at integrating not only principles of self-regulated learning (as it is one of NEXT-TELL's aims to leverage self-regulation processes in students) but also formative feedback as an essential part of NEXT-TELL's underlying pedagogical core concept of Assessment for Learning.

As it is furthermore a model that also fits into NEXT-TELL's frameworks of cognitive density and classroom orchestration and that comprises the tools that have been developed during the projects lifetime it might also be used for the upcoming evaluation of the project in D6.7.

Chapter 4 is reporting on the conducted studies in Austria (LIP, Sonic Divider), Norway, Germany, and Singapore (all OLM and partly TISL). As already mentioned in D6.5, Teacher-led Design (TLD) of studies is very challenging for teachers who are usually not used to do research (neither researcher driven nor on their own). We were aiming at conducting these studies as closely as possible to the TLD approach but as unfortunately not all schools accompanied us throughout the whole project duration and therefore were not able to develop their own design over time, we provided support whenever needed.

The LIP tool is used in four Austrian schools with nine teachers nearly on a daily basis. Only one of these schools is engaged with NEXT-TELL for a longer period of time and in this particular school a teacher-led question was raised and answered due to the implementation of the LIP tool.

The reported Austrian study on the Sonic Divider is an evaluation study that aims at evaluating the effects of gamification as well as CbKST-based intelligent feedback mechanisms that took place in a more controlled setting but not in a TLD way.

In Norway, we conducted a TLD study as this school is also involved with the project for a longer time. The participating teachers used their last trials to gather new insight into their students' learning while being counselled by researchers. This insight was used to create a new unit, which they now implemented on their own.

The reported study in Germany is as well a teacher-led study. The teacher has already been working with the OLM last year and raised a TISL question afterwards that came to his mind due to the experiences he made during the first implementation.

We furthermore report on a TLD that has been taken out in Singapore. Although this is not a NEXT-TELL school in the classical sense for it is not on the European ground, we were able to make contact to them and they engaged in a TLD. No project member was on the ground in Singapore and all support in setting up the tools and raising their TLD-questions was only given through email conversation. The teachers furthermore presented their outcomes at a conference (iCTLT – international Conference on Teaching and Learning with Technology) in April in Singapore.

The project furthermore has as this state some schools in Germany and Austria that are already using or declared their interest in using the myClass and/or OLM tool. As there were mainly training workshops in the reporting period and the evaluation in these schools is still going on, the results will be presented in the final deliverable of WP6 at the end of August. Moreover, we have three teachers involved in the Netherlands using the OLM with NEXT-TELL's meeting scenario for teaching English as a Second Language of which the data-analysis is also not yet completed.

In chapter 5, we report on inquiries in schools in England that led to the further development of the TISL model to a one-to-many inquiry model.

Finally, chapter 6 summarizes the main findings from the studies and sets those into relation to our developed model of student-aware teaching and self-aware learning.

2 Introduction

2.1 Purpose of this Document

D6.6 informs about the on-going Teacher-led Design Studies (TDS) of the first three quarters of the final project year within NEXT-TELL.

2.2 Scope of this Document

The main information presented in D6.6 is about research on how NEXT-TELL tools are adopted in classrooms. Nearly all reports are follow ups to previous studies, therefore, the adoption still ranges in dependence of the tool used as well as of teachers' ideas and ways of implementing it. NEXT-TELL partners accompanied the teachers with regard to tool developments and adaptions as well as data gathering (e.g., questionnaire or interviews).

Apart from that, we introduce a model that has been developed during the last year and that is still under development, and we report on the state of affairs with a school that approached one of our partners to get assistance in becoming a community school.

This deliverable does not provide a step-by-step manual about how to adopt NEXT-TELL tools in teaching. Neither does it provide the TISL method that supports teachers how to investigate the influence of their teaching practices on students' learning.

2.3 Status of this Document

This is the final version of Deliverable D6.6.

2.4 Related Documents

Before reading this document it is recommended to be familiar with the abbreviations used in the NEXT-TELL deliverables. Therefore, we recommend to first having a look in the glossary section at the end of this document.

For a comprehensive understanding we recommend the following public deliverables, which present former steps within the project:

- D2.8: Report on Classroom Studies with STEM and TESL assessment
- D4.2: Student Model Tools R1
- D5.1: TISL (Teachers' Inquiry into Students' Learning), SPICE (Strategic Planning with ICTs in Education)
- D6.3: Report on RDS 1
- D6.4: Report on RDS 2
- D6.5: Report on TDS 1

We also recommend four deliverables with a focus on technological and methodological details:

- D3.7: Activity Capturing Tools Code Release and Documentation (restricted) for LIP and Configuration Tool
- D4.6: Student Model Tools R3
- D5.5 and D5.6: Methods and Specification for TISL Components V3 as well as TISL Components R3

3 Developing NEXT-TELL's "Documentation" Tools

As an introduction to this deliverable we would like to introduce a theoretical and conceptual model that has been developed during the last year and that is still in development.

Within NEXT-TELL, the aim is to develop methods and tools for (collaborative) learning scenarios in order to support teaching and learning by enabling and facilitating assessment for learning (AfL)/formative assessment practices as it is elaborated by Black and Wiliam [Black, 2009] or even self-regulated or at least student-aware (teaching analytics) teaching or self-aware (learning analytics) learning.

Therefore, we are working on supporting teachers in diagnosing students' learning progress and in documenting it accordingly. This can for instance take place by activity and competence tracking with NEXT-TELL tools. With this approach, we would like to leverage classroom orchestration by facilitating decision-making for teachers' teachings within lessons but also in regard to general lesson planning in an evidence-based way [Pachler, 2009]. In addition, we are working on raising teachers' insight what potential obstacles are in their teachings in order to reflect on them and approach these actively (e.g., TISL method and tool) so that students can mostly benefit.

Furthermore, on the students' side, we are aiming at supporting them in their engagement and flow, their collaboration, and their meta-cognition by the use of NEXT-TELL tools in order to approach an optimal cognitive density.

NEXT-TELL supports especially awareness-based processes due to the documentation of information. The documentation is either directly visible to the user through the interaction with the different components that lead to visual representations (e.g., assessing competencies in OLM) or in forms of log file data that is generated during the usage (e.g., through a new implemented monitoring component in TISL and ECAAD planner that is accessible by the administrator) that can be analysed later on.

Whether teachers and students really change their regulation processes needs to be investigated in the future. Only, if the awareness processes lead to positive changes in learning regulation processes, one can assume that students' learning outcomes will increase.

All NEXT-TELL tools were developed with different teachers in different school contexts with the overall purpose of supporting teachers and students in AfL in order to document learning processes to provide evidence for further decision making. This general approach of design-based research led to several different tools. The basic structure/features of these tools are described in the deliverables of WP2, WP3, WP4 and WP5.

Each of our tools emphasizes different aspects of an AfL approach [Black, 2009] (e.g., transparency of success criteria for students in OLM in forms of expected competencies; make students aware what they are doing during lessons through activity tracking in LIP). Furthermore, they serve all for the purpose of documenting (learning) data in different kinds of ways in order to support this challenging and time-consuming task.

3.1 The model of student-aware teaching (SAT) and self-aware learning (SAL)

During the last year, we developed a first version of the model of student-aware teaching and self-aware learning (SAT/SAL-model)[1] in order to comprise NEXT-TELL's pedagogical core concept of assessment for learning and the aim of supporting learners' self-regulation (cf. D6.3 [Cierniak, 2012a]) as well as the tools that were developed in NEXT-TELL. Furthermore, our model fits into NEXT-TELL's underlying framework of classroom orchestration [Dillenbourg, 2010; Drijvers 2010] and cognitive density [Crawford, 2008] described in more detail in D6.4 (see also revised Figure 1 below - cf. D6.4 [Cierniak, 2012b]).

[1] The model of self-aware learning presented here should not be mixed up with the framework of self-aware learning in the computer science field of machine learning [cf. Li, 2008].

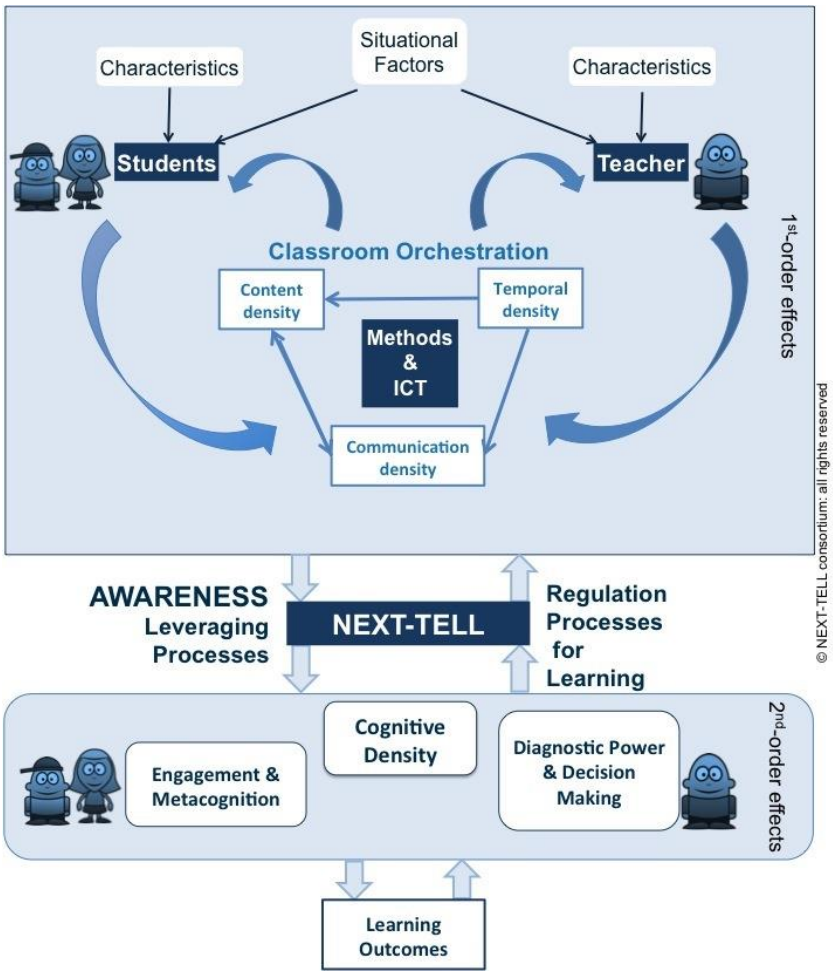


Figure 1. Revised NEXT-TELL framework of cognitive density and classroom orchestration (cf. Cierniak, 2012b)

In NEXT-TELL, we are concerned with both the perspective of the teacher and of the student. Despite the number of highly elaborated SRL models [e.g., Boekaerts, 1999; Pintrich, 2004; Butler, 1995; Zimmermann, 2002] none of them was considered to describe SRL with respect to how ICTs can be used to foster SRL (with only few exceptions, e.g., [Winne, 2006]). Of course, ICT is not mandatory to support learners in developing SRL competencies because contextual factors like school type, teaching styles, and students' free-time environments as well as students' characteristics also shape how students regulate their learning and influence how their SRL competencies will develop. Nevertheless, there are several projects (which NEXT-TELL is one of) that assume that ICT which is carefully developed with regard to SRL-related processes (e.g., goal setting, planning, monitoring) might also play an important role in students' SRL competency development.

Our SAT/SAL model consists of different components that refer to (meta-)cognitive, motivational, behavioural and contextual areas that are taken from elaborated models of SRL. None of the components should be seen separately from each other, for they occur repeatedly and dependent on each other.

The name student-aware teaching and self-aware learning is chosen according to the SRL processes which are seen as the most critical components in regulation processes [Pintrich, 2004] and at the same time thought to be best supported by recent ICT developments. Moreover, the focus on awareness is said to be in line with recent pedagogical views on AfL [e.g., Black, 1998; Black, 2009] and feedback [e.g., Hattie, 2007]. Furthermore, NEXT-TELL tools mainly aim at visualizing back different types of information. Hence, the main psycho-pedagogical process that might be enhanced or facilitated by NEXT-TELL tools is the stakeholder's awareness in different information (e.g., competence level, tracked activities, comprehensiveness of lesson plans, etc.).

3.2 Recomposing models of SRL and integrating AfL

Up to date, there is a lot of research in the field of SRL that is also diverse and there are many different models and perspectives that emphasize slightly different aspects. It would fit no purpose to describe all the different models here. We refer to some components mentioned by Pintrich as relevant phases and areas for self-regulated learning [Pintrich, 2004].

According to Pintrich, the self-regulated learning perspective perceives learners as active participants in the learning process in which they construct own meaning, goals, and strategies through available information from internal and external sources. Furthermore, learners can monitor and regulate certain aspects of their internal settings (cognition, behaviour, motivation) as well as some external environmental features. In a third assumption, Pintrich points out that learner compare and assess their learning processes against goals and standards [Pintrich, 2004].

Pintrich divides SRL in four phases that involve (1) planning and goal setting, (2) monitoring processes that represent metacognitive awareness, (3) control and regulation processes of the self, the task or the context, and (4) reflection [Pintrich, 2004].

AfL has been mentioned to be a unifying theory of instruction that not only guides practices but also might lead to an improvement of learning processes by the development of SRL strategies [Buldu, 2010].

Black and Wiliam conceptualize it as consisting of five key strategies: (1) Clarifying and sharing intentions and success criteria, (2) enacting in classroom discussion and learning tasks that provide evidence of students' understanding, (3) providing formative feedback, (4) activating students as resources to each other, and (5) activating students as owners of their learning [Black, 2009].

We developed the model of student-aware teaching and self-aware learning (SAT/SAL-model) in which we see all components not as different phases but as interrelated processes that are dependent on each other. Therefore, we integrated some parts of an AfL into a model of SRL by reframing and recomposing the components of Pintrich and complementing them with (formative) feedback and documentation (see Figure 2).

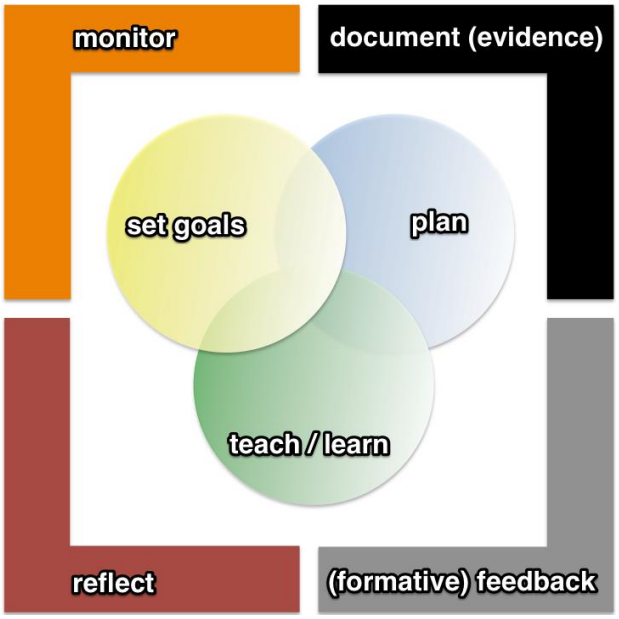


Figure 2. NEXT-TELL psycho-pedagogical SAT/SAL-model

The three inner components – set goals, plan, teach/learn – are visualized as a Venn diagram in which the colours of each circle are crossfading to white. This should illustrate that each of these components is dependent on individual and/or environmental factors (to be understood as e.g., schools infrastructure, national curriculum, etc.).

The processes on the outer left hand side (reflect, monitor) are on a meta-level, whereas the processes on the right-hand side (document, feedback) are the ones that should be directly supported through NEXT-TELL tools and that refer to the AfL components in order to facilitate the metacognitive processes and also the inner components of the model. We would like to see the outer components of the model as a method for approaching self-regulated learning.

(Formative) feedback is not only an essential part in an AfL that is in close relation to other AfL components (e.g., self-/peer-assessment – above strategies 3 and 4) [Black, 2009]. It is also already mentioned by Butler and Winne [Butler, 1995] in matters of SRL that could generally support the monitoring and reflecting process as it might help to estimate where someone stands in regard to a teaching/learning goal or the fulfilment of a teaching/learning plan. This way it might leverage the adaptation of goals and plans if necessary and therefore fits the purpose of SRL.

"Documentation" as an added component can on the one hand easily be supported by the use of ICT (as approached with the NEXT-TELL tools). On the other hand, (pedagogical) documentation is already known from the Reggio pedagogy and can be used as an AfL technique [Buldu, 2010]. Reggio pedagogy is a reform-oriented approach by Loris Malaguzzi for early childhood education with the purpose of inclusion that is highly influenced by the educational theories of Dewey, Erikson, Piaget, Vygotsky, and Biber [Fraser, 2002]. Students have different abilities, interests, and learning styles and teachers have to make sure that these different requirements are met. Therefore, it is advisable to document evidence of the learning processes in order to use it for decision making for individual requirements [Buldu, 2010]. Within the scope of Reggio pedagogy, research showed that pedagogical documentation has the potential to improve learning because the information about the learning process as a whole is explicitly externalized which raises the awareness in this information for all stakeholders and make it more transparent [Buldu, 2010]. Within Reggio pedagogy the term "documentation" is used in the sense that students' capabilities and activities within their zone of proximal development [Vygotsky, 1978] should be captured. This involves recording learning experiences, analysis of work products, and sharing these documentations [Buldu, 2010].

NEXT-TELL in fact aims at those documentation processes with some of its tools (e.g., LIP tool, myClass). Other NEXT-TELL tools were initially not designed with the idea of documentation in mind (e.g., the OLM) but it turned out during the project duration that teachers use it for the purpose of capturing and documenting students' activities (on a competency level) in order to have evidence of students' learning progression or misconceptions.

The documentation of goals, plans and the learning itself (i.e., learning artefacts and products) makes it easier to generate feedback (internal and/or as external resource), monitor progress and/or to reflect upon it and therefore serves many of the goals that NEXT-TELL initially had. The different „documents" serve as an evidence base for future learning decisions in order to restructure goals, plans and/or learning ideally for both students and teachers which fits again directly into the (self-)regulation of processes and into an AfL approach.

One of the intentions of our model is also to put an emphasis on the change of a teacher-centred classroom orchestration to a more student-centred one (see also D6.4 [Cierniak, 2012b]).

"Student-aware teaching" implies that a teacher should not only be aware what his/her students exactly need for their learning (e.g., in terms of resources) but furthermore try to act in a more student-centred way of teaching on basis of the documented learning evidence s/he got from his/her students or documented for him-/herself during instruction. This could be done e.g. by aiming at raising awareness in his/her students by the means of clarifying success criteria ("set goals") in order to expand teaching transparency which could be used by his/her students to set goals of their own in that area of expertise or s/he could involve students into peer teaching.

The student view of the model ("self-aware learning") implies that students should gain more awareness of what they are capable to do. Due to the externalisation of information (e.g., shared success criteria or tracked activities) by the teacher or by the students themselves, students should get more insight into their learning progressions in order to monitor or reflect upon them, and furthermore provide new evidence for the teacher on which s/he could act again.

This means for instance, if a teacher is planning the next learning steps with or for the students, s/he has not only set goals in mind but also references to the documentation of already occurred learning processes in order to diagnose further learning needs of the students and to decide on next steps. The documentation is for

instance the represented information on students' competency levels in OLM that was put in there through self-/peer- and teacher-assessments.

4 Studies with NEXT-TELL documentation tools

This chapter will report on different studies with NEXT-TELL tools conducted with schools in Austria, Norway, Germany, and Singapore. The main data gathering methods in our studies were semi-structured interviews, short questionnaires, email conversations, field notes, and observations. Although not all of our studies are completely teacher-led, which is due to the fact that not all teachers accompanied us during the whole project duration and were able to develop their own design over time, the input and interests of teachers were the basis for the studies conducted with different levels of support by the researchers.

The first two subchapters deal with studies from Austria that are concerned with LIP and the Sonic Divider (which is not mainly a tool to document learning progress but can rather be called a subject-dependent formative assessment tool). The reported Austrian study on the Sonic Divider (section 4.3) is an evaluation study that aims at evaluating the effects of gamification as well as CbKST-based intelligent feedback mechanisms that took place in a more controlled setting but not in a TLD way. The studies in sections 4.4 to 4.6 all deal with the OLM used in Norway, Germany, and Singapore. Furthermore, in Norway and Germany the TISL method and tool also were used.

Some schools mainly in Austria and Germany are already using or declared their interest in using the myClass and/or the OLM tool. As there were mainly training workshops in the reporting period and the evaluation in these schools is still going on, the results will be presented in the final deliverable of WP6 at the end of August. Moreover, we have three teachers involved in the Netherlands using the OLM with NEXT-TELL's meeting scenario for teaching English as a Second Language of which the data-analysis is also not yet completed.

4.1 Overview of Studies

main focus	country	schools	teachers	classes/groups	students
LIP	Austria	4	9	5	approx. 120
Sonic Divider	Austria	1	4	2	40
OLM	Norway	1	2	2	approx. 60
	Germany	1	1	1	15
	Singapore	2	3	2	64
TISL	England	2	2	n/a	n/a

4.2 Austria: LIP for raising students' motivation in learning

The following section reports on trials conducted with LIP in four Austrian schools. Two of these schools are public primary schools of which one used LIP in a Montessori-oriented class setting for almost two years now. The other two schools are privately funded Montessori schools. All of the schools cover a broad range of student ages (6 - 13 years).

The main focus of research in the first three quarters of the final project year was the question of how the usage of LIP had changed daily school routines. This question is directly connected to the teacher's initial motivation. The following text describes the essence from many informal talks with our teachers. Most insight has been gained from the two teachers who used LIP for almost two years in their self-set Montessori classes in the VS Laimäckergasse.

4.2.1 Background of the four participating schools using LIP

VS Laimäckergasse

The VS Laimäckergasse is a public primary school with almost 100% of students being migrants (with about 13 different mother tongues spoken). In this challenging environment two teachers decided to set up two Montessori-oriented mixed-age classes in which 50 students (ages 6-10 years) are given most of their time for self-regulated learning, which means, they can work at their own speed, within groups of their choice, using a large variety of available material. This approach reduces formal instruction to a minimum (which is a necessity due to the large variation in the students' command of German), and addresses individualisation. LIP was used in these two classes.

Montessorischule Pinkafeld

The Montessorischule Pinkafeld is a small privately funded Montessori school in a rural area about 90 kilometers from Graz. LIP was used by three teachers and 20 students (ages 6-10 years).

GaLeMo Klosterneuburg, Sekundarstufe 1

The GaLeMo is a privately funded Montessori-school in Klosterneuburg, which is a few kilometers west of Vienna. The students are from well-off, education-conscious families. GaLeMo runs a class for students aged 6-9 ("Primaria 1"), one for students aged 9-12 ("Primaria 2) and one for students aged 12-15 ("Sekundaria 1"). Many students leave the Sekundaria by the age of 14 (which means they do not spend all 3 years in Sekundaria 1) to continue their education in a public high school. Three teachers from the Sekundaria 1 participated with 15 students (ages 9-13 years).

VS Oberwart

The VS Oberwart is a small public primary school in a town in rural Austria. LIP was used by one teacher in one class of 25 students (ages 6-7 years).

4.2.2 Intentions and motivations for using LIP

The motivational approaches for using LIP in class were quite similar due to all schools need for a detailed and elaborated documentation for individualized teaching in order to facilitate communication with students as well as their parents about students' learning progression. A detailed documentation is also necessary if students e.g. change classes and the new teacher has to be informed about the learning progression of this particular student or if teachers only work part time but need information about every activity in order to adequately plan in a Montessori way. Furthermore, the teachers hoped for support in their planning and assessment practices and wanted to leverage the motivation of their students.

The latter one was furthermore a personal research interest of one of the teachers from VS Laimäckergasse. She was curious of whether it is possible to increase students' motivation by using LIP because many of her students do not get a lot of support from their homes.

Another school (Pinkafeld) that uses "Lernzielhefte" ("learning goal books") where they need to tick topics and levels of mastery was moreover aiming at making the compilation of these books easier and less time consuming.

4.2.3 Positive changes of daily school routines

Documentation

The participating teachers of all schools described their daily practices as very time consuming and partly very complicated because of all the paperwork for documentation and where to store the different sheets. Although all teachers were of course aware that documentation is a necessary task, it usually only took place sporadically and via handwritten notes.

The teachers of the VS Laimäckergasse tried indeed to act systematically and also integrated the students in this documentation process in order to give them more responsibility for their learning. This approach was a very time consuming one because each student needed to explain what s/he had done on that day and another student wrote it down. This process took away up to 30 minutes of learning time each day and the teachers needed to sit down on weekends to analyse their students progression in order to set follow ups for the next week for each student.

After the introduction of LIP into the everyday school life the teachers of all schools reported a reduction in their workload for documentation because they can now document their students progression and observations more casually and as an integrated part of their daily work routine. Especially the possibility to document the same activity for more than one student at the same time was mentioned to be time-saving. Some of the teachers even started to document not only the material students worked on and the related competencies but furthermore started to track students' motivation, self-organisation, teamwork, social behaviour or endurance. The logged entries in the GaLeMo Klosterneuburg for instance is on an average of 3,5 entries per student each day which reflects the degree of usage and the potential added value that teachers see in LIP.

Planning

We only got information of two schools with regard to their planning approaches. Both teachers of the VS Laimäckergasse described that the individualized planning for each student (weekly work plans) was a tedious task which involved a lot of deciphering and combining the various handwritten notes in order to get a valid picture of the student's current state.

Both teacher experienced that LIP makes this task a lot easier because they get an accumulated report for each student that shows what, when and with whom the student had worked. LIP also visualises preferred topics and materials of the student. Thus, the individual strengths and interests of a student as well as the areas that need improvement (and therefore maybe need special consideration in the next week's plan) are immediately visible to the teacher.

At the Montessorischule Pinkafeld the LIP documentation is used to update different teachers of one class in order to help them with their planning. Two of the teachers only work part time. Thus, it is very difficult for them to always be up-to-date with no proper documentation system and only the "main teacher" who works with the students every day always knew in detail what was going on. LIP helped them to improve the situation. They are now able to document more processes because it is less time consuming for them. Therefore, the two part time teachers now also get more information what, according to them, facilitates their planning.

Assessment and feedback practices

In relation to the assessment and feedback practices there was also quite some change in the participating schools. The VS Laimäckergasse reported that they could give a lot more feedback with LIP than before and that they were able to discuss students' achievements with them more frequently.

The same holds true for the GaLeMo Klosterneuburg. The teachers of that school already invested a lot of time in individual conversations with the students before using LIP because they are of the opinion that it is necessary to define learning goals together with their students and getting their commitments to these goals. Now they use LIP not only to document what the students' did during class time in relation to their learning goals but also students' behaviour, working attitude, social issues, etc. and use this documentation as a basis for their individual feedback talks.

Leveraging students' motivation

We ask the teacher of VS Laimäckergasse explicitly if her research interest of whether students' motivation could be increased via LIP got fulfilled. She elaborated her interest further and described that many of her students come from families where school work is not highly valued. Consequently, many of those students often do not challenge themselves too hard. Instead, they try to "slip through" with a minimum of effort.

In this regard, she experienced a clear difference with LIP. The visualisations helped her students getting aware of what they spent their time on during their self-regulated learning phases and also - often even more important - what they not spent their time on. Many of her students used this new transparency to engage in discussions in order to understand the visualisations and in direct talks with the teacher about their performance and achievements. Following this, the teacher sees her intention to leverage her students' motivation as fulfilled.

Communication with parents

Three of the schools (the fourth one did not use LIP for this purpose yet) reported that LIP became especially useful when talking to parents about students' achievements. The data in LIP and the visualisations helped the teachers preparing these meetings because all needed information for these talks is immediately available for each student.

4.2.4 Future use of LIP

All schools intend to further use LIP for documenting students' progression. The next version of LIP will also integrate self- and peer-assessment and therefore will enable the student to document on their own which potentially could lower teachers workload even more.

As the GaleMo Klosterneuburg so far used LIP only in one of its classes but has the vision to use the same documentation system by all teachers, the school intends to integrate the other classes in the future.

Furthermore, there are several very interested teachers who would like to use the LIP tool from next school year on (after the lifetime of the NEXT-TELL project). The interested teachers are mainly from "Neue Mittelschule". "Neue Mittelschule" was introduced in Austria in 2012 as a new form of standard school. It is similar to a community school and the individualisation approach is demanded by educational law.

4.3 Austria: An evaluation of a gamified feedback tool (Sonic Divider)

In order to evaluate the principles and features of the Sonic Divider tool we applied the tool in a primary school in Graz, Austria. The main purpose of this evaluation was not the tool itself but rather to look into the effects of gamification (and potential downsides) as well as CbKST-based intelligent feedback mechanisms in educational settings. The tool was applied for rehearsing divisions in two 2nd grade classes. The study is primarily qualitative in nature and also serves the ideas of co-designing the look and feel of the tool and the implemented feedback styles.

4.3.1 Method

Participants

In total 40 students (21 male, 19 female) from the primary school of the University of Teacher Education Styria in Graz, Austria took part in this feedback study. The sample consisted of two 2nd grade classes of school children aged about 6 to 8 years. The experimental study was carried out in the school context during school time. Students were asked to pursue two sessions of division tasks provided by the division tool Sonic Divider and to fill in a short questionnaire after system usage. Log data on students' interaction with the Sonic Divider tool has been recorded as useful descriptive data for the purpose of investigating learning performance and learning success.

Material

In this experimental study, we used the division tool Sonic Divider - a tool allowing for practicing written division and its underlying sequences by integrating game like aspects in order to encourage students' motivation to learn. The tool targeted for school children aged about 6 to 8 years is based on the domain of basic fractions of the nature 854/4 whereby the divisor is always a single digit number and fractions do not have a remainder. A detailed description of this division rehearsal tool can be found in D2.4 and D2.8.

A special highlight of Sonic Divider is the feedback mechanism, which allows formative, competence-based feedback in real time. This feedback is displayed in form of a smiley (Figure 3). This smiley tells learners not only whether their overall answer is correct or incorrect, but also refers to the correctness or incorrectness of the single actions a student made. For instance, if a student makes an incorrect action, the smiley turns red saying 'ups' (Figure 3a). The feedback mechanism also takes into account the correctness of the applied sequence of the steps of calculation. For instance, given the following task dividing 442 by 2, the first task is dividing 4 by 2 and the correct answer is added to the first box. The next task is also dividing 4 by 2. If the student tries that, it is an incorrect sequence because he has to draw down the remainder first, and then the number in the computation area before adding the result to the box on the right site. If the student tries to solve the task in an incorrect sequence, the smiley says that the sequence of the calculation steps is incorrect (Figure 3b).

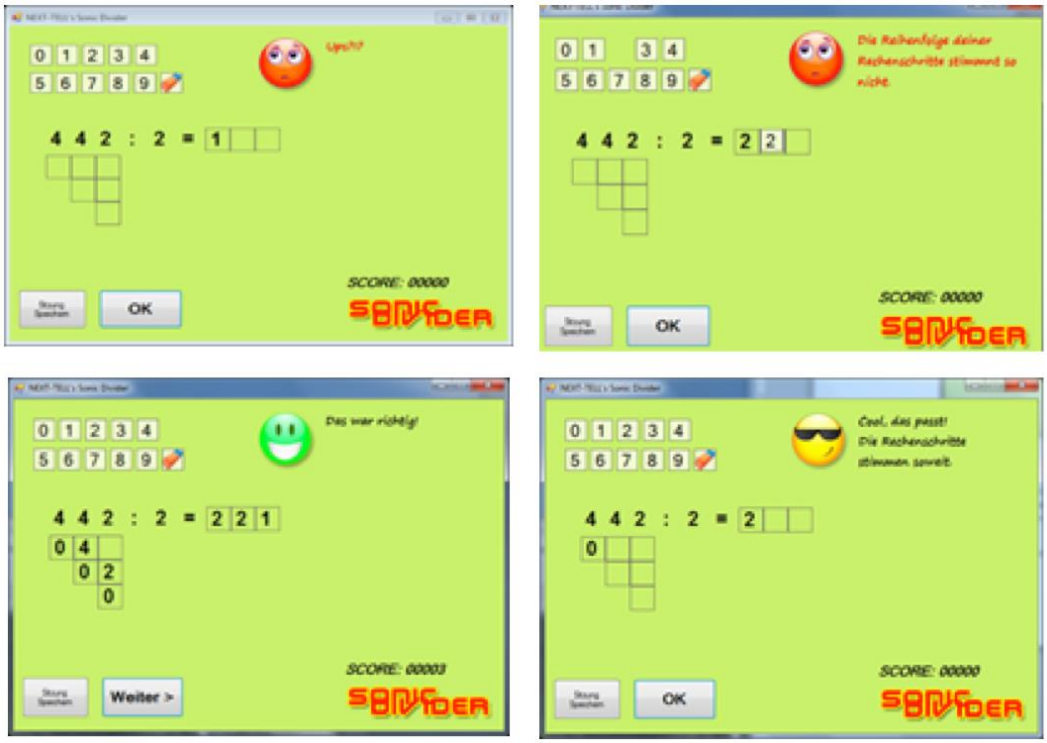


Figure 3. Smiley-based feedback: (a) incorrect feedback (top left), (b) incorrect feedback with additional explanations (top right), (c) correct feedback (bottom left) and (d) correct feedback with additional explanations (bottom right)

Additionally to these different feedback types, a scoring mechanism has been added. For each task certain points can be achieved that depend on the difficulty of the task. Depending on the general configuration (whether a task must be processed correctly or whether false results are possible to continue) several scoring options are available: i) adding points to the score when the task is correct, ii) deducting a certain amount of points from the maximum for a specific task for each incorrect action made during the division process, and iii) using the time needed to process a task to alter the points for the task.

Experimental Design

In this study, a 2x2 mixed design was used in order to investigate the effect on learning performance: there were two experimental conditions depended on the type of feedback provided to each participant (i.e. feedback vs. no feedback) as well as two measurement times for each condition. Students were randomly separated into two groups, one group receiving condition 1 with feedback, the other receiving condition 2 without feedback. Table 1 illustrates the experimental design and the number of subjects.

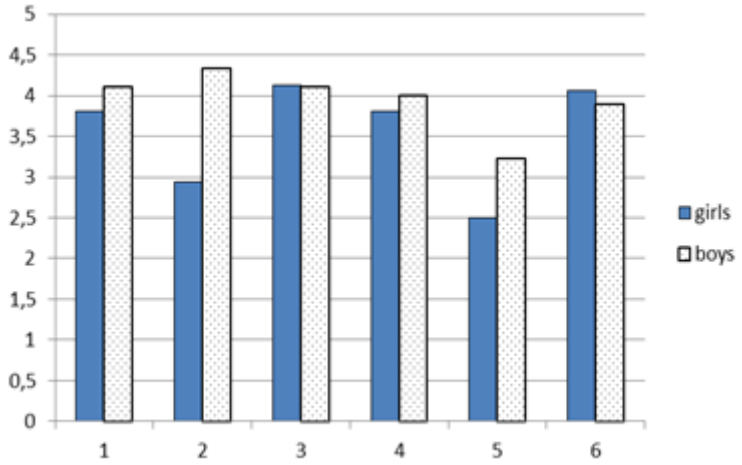
			Time of measurement	
			Session 1	Session 2
Type of feedback	Feedback 1	n	18 (10 male/ 8 female)	
	Feedback 2 (no feedback)	n	22 (11 male /11 female)	

Table 1. A 2x2 mixed design with the variations of the two variables 'Feedback' and 'Time of measurement'

4.3.2 Results

Qualitative Aspects

One part of this study was a short survey after using the tool in class for the first time. In total each child could use the Sonic Divider for 30 minutes. The average time spend with the tool was 18.6 minutes (girls: 16.7, boys: 22.1 minutes). The survey consisted of six short questions that could be answered on a five-step rating scale made of smileys ranging from 1 – "dislike it" to 5 – "like it very much". The descriptive results are shown in the chart below (Figure 4).



1 … Using the Sonic Divider for practicing divisions in general

2 … Possibility to achieve scores for mastering divisions

3 … The look of the Sonic Divider, especially the smileys

4 … Getting feedback by the smileys colours

5 … Getting right/wrong feedback by the smileys

6 … Getting feedback where I did well and where I didn't

Figure 4. Descriptive results of a survey after using the tool

Quantitative Aspects

4.3.2.1.1 Usage Statistics

Students completed on average 29 division tasks (M=28.72, SD=8.82) in any session without taking into account the type of feedback they received. As can be seen from Table 2, the absolute number of completed tasks is in all cases higher in the second session. In session 1, students worked on nearly 26 tasks (M=25.80, SD=8.30), in session 2 on nearly 32 tasks (M=31.63, SD=9.33). In general, girls completed fewer tasks with M=24.73

(SD=7.68; session 1) and M=29.32 (SD=7.86; session 2) than boys with M=27.10 (SD=8.81; session 1) and M=33.71 (SD=10.22; session 2).

When having a closer look at both feedback types presented to the learner, students receiving feedback completed more tasks (M=30.67, SD=10.73) than students receiving no feedback (M=27.30, SD=6.69). A similar picture reveals when having a closer look at both sessions: students getting feedback completed on average 27.28 tasks (SD=9.86) in the first session and 34.06 (SD=11.59) in the second session contrary to student getting no feedback who completed on average 24.59 (SD=6.78) in session 1 and 29.64 tasks (SD=6.60) in session 2. Concerning the student group receiving feedback, boys (session1: M=28.70, SD=10.49; session 2: M=36.30, SD=12.89) completed on average more tasks than girls (M_{S1}=25.50, SD_{S1}=9.38; M_{S2}=31.25, SD_{S2}=9.28). Considering results for the student group receiving no feedback, a similar picture can be identified: in both sessions, boys (M_{S1}=25.64, SD_{S1}=7.16; M_{S2}=31.36, SD_{S2}=6.82) worked on more tasks than girls did (M_{S1}=23.55, SD_{S1}=6.55; M_{S2}=27.91, SD_{S2}=6.20).

		Session 1	Session 2
Feedback	male	28.70 (10.49)	36.30 (12.89)
	female	25.5 (9.38)	31.25 (9.82)
	overall	**27.28 (9.86)**	**34.06 (11.59)**
No Feedback	male	25.64 (7.16)	31.36 (6.82)
	female	23.55 (6.55)	27.91 (6.20)
	overall	**24.59 (6.78)**	**29.64 (6.60)**
Overall	male	27.10 (8.81)	33.71 (10.22)
	female	24.37 (7.68)	29.32 (7.86)
	overall	**25.80 (8.30)**	**31.63 (9.33)**

Table 2. Quantity of completed tasks for each session and each feedback group (mean values and standard deviations)

4.3.2.1.2 Learning Performance

To investigate the learning efficacy of the tool and at the same time to examine whether students actually learn something by working and playing with the tool, the error performance of both sessions were compared. Furthermore, the effect of different feedback types on these error rates was investigated. Firstly, the relative frequencies of errors made by students were calculated to ensure making results of different students in different sessions comparable. An overview of the results is given in Table 3.

		Session 1	Session 2
Feedback	male	0.39 (0.25)	0.27 (0.08)
	female	0.38 (0.27)	0.23 (0.16)
	overall	**0.39 (0.26)**	**0.25 (0.12)**
No Feedback	male	0.36 (0.21)	0.25 (0.17)
	female	0.32 (0.19)	0.22 (0.17)
	overall	**0.34 (0.20)**	**0.24 (0.17)**
Overall	male	0.37 (0.23)	0.26 (0.14)
	female	0.34 (0.22)	0.23 (0.16)

		Session 1	Session 2
	overall	**0.36 (0.22)**	**0.24 (0.15)**

Table 3. Relative frequencies of errors for each session separately for both feedback types & gender

When comparing session 1 and session 2 without taking into account gender as well as feedback type, the overall error performance – errors made by students while working on tasks during a learning session – decrease over the different sessions (M_{S1}=0.36, SD_{S1}=0.22; M_{S2}=0.24, SD_{S2}=0.15). This difference is statistically significant (T34=2.085; p<.05).

When having a closer look at the results for both feedback groups separately, a similar picture emerged: mean values for both feedback groups are lower in the second session (M_{S2Fb1}=0.25, SD_{S2Fb1}=0.12; M_{S2Fb2}=0.24, SD_{S2Fb2}=0.17) compared to mean values obtained in the first session (M_{S1Fb1}=0.39, SD_{S1Fb1}=0.26; M_{S1Fb2}=0.34, SD_{S1Fb1}=0.20). Considering the results for male and female separately, it became obvious that girls generally had a lower error performance than boys in all conditions (see Figure 5). Nevertheless, these differences are not statistically significant.

In order to find out more about differences between both feedback types, gender, and measuring point (i.e., both sessions), a repeated-measures analyses of variance was calculated. Analysis revealed a main effect of measuring point with F_1=10.388, p<.01, that was not qualified by type of feedback (F_1=0.376, p=.544) and gender (F_1=0.335, p=.566).

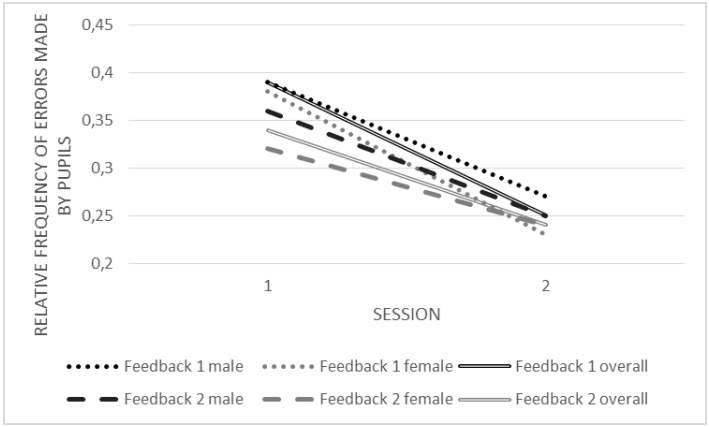


Figure 5. Profile diagram of the results (absolute frequency of errors for each session separately for both feedback types & gender)

4.3.3 Conclusion

The results indicate that the children much appreciated using the Sonic Divider for practicing divisions. Informal discussions with the children revealed that using the tool was more attractive and motivating than regular work on paper. This is remarkable to a certain extent because in fact the tool is not a game but incorporates very basic gamification elements such as scoring and the feedback by the smileys. One reason for these findings might also be the fact that children were not evaluated or monitored by a human teacher but got some performance feedback directly by the system. All in all, boys did rate the Sonic Divider and the feedback features slightly better than the girls. One distinct difference was the rating of the scoring feature. The possibility to obtain high scores was much more liked by the boys – which confirms a gender cliché to a certain extend. We also observed that boys immediately started comparing the scores among them without being told to do so or without even mentioning the possibility to do so. This result is also reflected in the performance data. Boys tend to accomplish more tasks, meaning they work faster, but there is a speed-accuracy trade-off, in general error rates of boys are higher at the same time.

What concerns the effects of the feedback (smart feedback vs. no feedback), we could not obtain statistically significant difference, however, there is a tendency that the smart feedback results in slightly superior results.

As shown in Figure 6, for both boys and girls, the feedback group yielded somewhat better results in terms of task completion as well as error rates (Figure 4). This is an indicator that the smart feedback function is able to raise awareness about one's own performance and in particular specific errors. This, in turn, appears being beneficial for learning (or practicing) performance. This interpretation is emphasized by the fact that in the feedback group also a somewhat stronger increase of task completion rates from session 1 to session 2 occurred (on average 6.74 in vs5.05 tasks) in comparison to the no feedback group. Similarly, the error rates decreased a bit more (-3.11 errors vs. -1.32 errors).

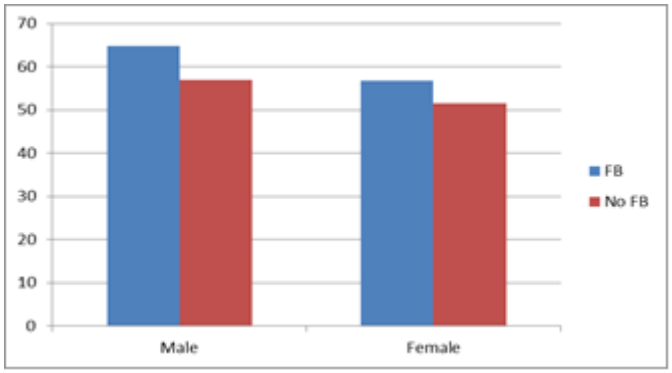


Figure 6. Overall number of completed tasks

Given that the practice sessions with the Sonic Divider were rather limited and therefore also the exposition to specific CbKST-based formative feedback was limited (for example, students with very low error rates, with highly unsystematic errors, or students who performed a very small number of tasks, did not received formative feedback because in those cases the system is unable to identify potential problems), we consider these first results as promising evidence for the beneficial aspects of CbKST-based formative feedback. Future work will gather more systematically information about the gamification and feedback features and their effects. A focus will be on comparing learning performances and also on the effects on the attitude towards mathematics. Moreover, the feedback modes (e.g., written versus audio feedback) or the presentation (e.g., in form of animated characters) likely plays a crucial role for the effectiveness of formative feedback.

Concluding, we argue that such minor and cost effective form of gamifying learning tools can boost motivation and engagement. Moreover, theoretically sound, formative feedback provided by an autonomous system can improve learning (even if not dramatically or as in our case statistically significant).

4.4 Norway: Using OLM in everyday teaching?

4.4.1 Introduction

The presented research reports on a teacher-led study (TLS) carried out in Norway during the Autumn 2013 and Spring 2014 (still on-going at writing time). With experienced gained from earlier researcher-led studies (project years 2 and 3) where teachers that were already experienced in assessment for learning taught the science unit, *Energy for the Future* (*cf.* D2.8, D6.4, D6.5), using RGFA, OLMlets and OLM under our guidance, the same teachers now led their own study. In the current teacher-led study, these same teachers led their own unit on *Nutrition and Health*, themselves choosing NEXT-TELL tools and how to implement them. In our research reported here, we investigated how the Unit was planned and implemented, and how the NEXT-TELL tools were used in the TLS.

4.4.2 The Research Study

The teachers planned and taught a unit on *Nutrition and Health*, with support of NEXT-TELL tools.

The *Nutrition and Health* unit in Science is for first year students in General Studies at Upper secondary school, in Norway. The competence aims for this unit [UDIR 2010] are found at NDLA (National Digital Learning Arena), a platform for digital learning resources for upper secondary schools.

There are six competence goals in this unit:

1. Describe chemical characteristics and differences of the most important nutrition substances
2. Elaborate on the most important trace elements, minerals and salts in the human body
3. Carry out simple chemical detection of nutrients in food
4. Explain the main characteristics of digestion, transport and transformation of the most important nutrients
5. Elaborate on some main components in cosmetic products and make such a product with its own content declaration
6. Discuss and elaborate on issues in connection with nutrition, exercise, dieting, eating disorders, lifestyle diseases, and sunbathing

The Unit should begin mid-November 2013 and run for 7 weeks, thus crossing into the New Year.

Methodology

The aim of this research was two-fold: (1) to investigate if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching, and (2) to determine if the OLM could support formative assessment in relation to teacher inquiry into student learning (TISL).

As our research aims were exploratory, a case study methodology was used in order to investigate if the teachers were able to use the NEXT-TELL tools in their everyday teaching. A number of data generation methods were used during the initial planning meeting through the teaching of the unit, to discussions after the unit was complete.

Participants

The participants in the research study were two teachers at our collaborating high school in Bergen, Norway, who had previously participated in researcher-led studies in project years 2 and 3, and their 2 classes of comprising approximately 60 students.

Each teacher, see table 4, teaches more than one subject, but both teach Natural Science, and both have taught for more than 20 years. The participating students are enrolled in General Studies (i.e., University preparation), and their ages ranged from 16-19.

T1	T2
Female	Female
Taught 30 years	Taught 24 years
Mathematics, Natural Science, Physical Education	Geography, Natural Science

Table 4. Teacher characteristics

Data collection

Data was collected during one planning meetings, two 90-minute classroom teaching sessions, one workshop, three follow-up meetings, and on-going email exchanges. The data comprises email, field notes, observations, photos, assessment results, teacher-tool-reflecting tasks, video, digitally recorded interview data, a questionnaire, and email. The digital sound recordings were transcribed (in Norwegian) and excerpts used in this report have been translated to English by the researchers.

There is still data to be collected in late Spring 2014, an analysis of which will be reported in the last deliverable D6.7. Table 5 identifies which data was collected.

Planning meeting	Field notes
Classrooms	Observation, field notes, OLMlets data
Workshops, 11 February (OLM), 12 February (TISL)	Field notes
Meeting, 3 March 2014	Questionnaire, interview
Meeting, 28 March 2014	Field notes, Interview
Meeting, 9 May 2014	Photos, video (with iPad), field notes, OLM and Configuration tool data, Interview
On-going	Email between teachers and researchers

Table 5. Data collected under Teacher-Led Study of Nutrition and Health Unit

4.4.3 Implementing the Unit

This is a brief description of how the planning and the implementation of the unit unfolded.

Planning Meeting

The teachers had a planning meeting in early November 2013 to plan the unit. Their planning included deciding (1) how to address the competence goals in their teaching, (2) which NEXT-TELL tools to use, and (3) which assessment activities to include.

The teachers decided to use the OLMlets, the Configuration Tool, and the OLM. They also were interested in using the TISL tool, but during the planning meeting it did not function technically, so it was decided to put off decisions about this tool until later.

A rough plan, related to the use of the tools and assessments, for the unit ended at:

1. Training on OLMlets and OLM for students
2. Assessment using OLMlets test
3. A second assessment using OLMlets test
4. Assessment using a test delivered in It's Learning
5. Assessment though a self-assessment assignment delivered in the OLM

At each stage the students will explore the OLM and their competence model.

OLMlets Quiz development

The teachers developed an OLMlets quiz to identify possible misconceptions that the class held. An OLMlets quiz comprises a set of competence goals, related questions, answer options for each question, and related misconceptions. For each competence goal a question, or set of questions and possible answers are designed such that each possible answer is either correct, or has an associated misconception. If the student choses an answer with an associated misconception it indicates that they might hold that misconception. Table 6 gives some examples. In the first example, the competence goal "Can make skin cream with a list of ingredients", the teachers designed the question "What is an ingredients list?" with three possible answers: A1: A list of substances the product does not contains (M1); A2: A list of what substances a product contains (correct); A3: A seal of approval for the skin cream (M2). A2 is the correct answer. If the student choses A1, it might mean that they hold the misconception "M1: An ingredients list tells what substances that are not found in the cream", or if they choose A3, it might mean that they hold the misconception "M2: Ingredients list tells that the skin cream is approved by the authorities". Feedback to the students if there is a suspected misconception is of the form "You may hold the misconception ...". The full quiz can be found in Appendix 9.1.

Competence Goal:	**Can make skin cream with a list of ingredients**
M1:	An ingredients list tells what substances that are not found in the cream
M2:	Ingredients list tells that the skin cream is approved by the authorities
Q1:	**What is an ingredients list?**
A1:	A list of substances the product does not contains (M1)
A2:	A list of what substances a product contains (C)
A3:	A seal of approval for the skin cream (M2)
Competence Goal:	**Detection of monosaccharides**
Topic:	Can detect monosaccharides
M1:	Fehlings solution detects proteins
M2:	Fehlings solution detects disaccharides
Q1:	**What colour does Fehlings solution change to when monosaccharides have been detected?**
A1:	Fehlings solution changes color to orange/reddish brown (C)
A2:	Fehlings solution changes color to purple (M1)
A3:	Fehlings solution turns blue (M2)

Table 6. Examples of competence goals, a related question (Q), misconceptions (M), and answer options (A) that are either correct (C) or related to a misconception (M)

Classroom activities

The classroom activities unfolded as follows:

1. Training OLMlets and OLM
   - The students were introduced to OLMlets and the OLM
   - The students took the OLMlets quiz
   - The students were also going to log into the OLM to see their competence model with the OLMlets results, but due to lack of time it was decided that the researchers would make a homework assignment instead
2. Ordinary classroom teaching
   - Teachers taught, tailoring their teaching based on the findings from OLMlets
3. Unit test
   - The students took a unit test on paper, instead of in It's Learning (as the teachers had planned)
4. OLMlets revised
   - Based on results from the Unit test, the teachers revised the OLMlets quiz
   - The students took the OLMlets quiz
5. Self-evaluation form developed by teachers in OLM
   - The teachers are developing a self-evaluation form in the OLM
   - The student will do their self-evaluation on June 2nd

Follow-up Meetings

In order to investigate how the teacher-led study was progressing, the researchers had a number of follow-up meetings with the teachers during Spring 2014. The meetings were focused on the use of the tools.

Tuesday 11th February - Workshop about OLM in Vienna

Wednesday 12th February - Workshop about TISL in Vienna (due to problems with the TISL tool - the teachers had to continue working on OLM)

Monday 3rd March - What they had done with the OLM

Friday 28th of March - What they had done with the OLM

Friday 9th May - What they had done with the OLM

4.4.4 Findings

This section presents a number of findings from the different stages in the teacher-led study.

Planning meeting

At the beginning of the meeting the researchers reminded the teachers on the procedure they followed, and tools they used, during the Spring researcher-led study in the Energy for the Future Unit: RGFA was used to identify misconceptions; the identified misconceptions were used to formulate questions in OLMlets; and the OLM was used for students' self- and peer assessment and learner reflection. NB: At this point the Configuration tool was still integrated in the OLM.

After being reminded of the procedure and tools, the teachers discussed between themselves, and decided how to proceed in using the tools in their teaching. One of the first things they decided was not to use the RGFA tool. When the researchers asked why not, the teachers explained that they did not have time to use all the tools and that they did not find RGFA that useful. We found this very strange as in the Spring they actually were very enthusiastic about the concept the tool supports, and we suspect that it was the time they would have to invest in the preparation of the tool for use that was the problem. During the Spring study we had several sessions where the researchers worked tightly with the teachers getting the RGFA configured; there were also technical problems with the tool at that point so this might have influenced the decision as well. This is a good example where they are enthusiastic about the pedagogical concept, but the technical problems and interfaces to the tool get in the way and override the positive. There is too much time needed for preparation in proportion to the benefits of using the tool.

When it came to the use of OLMlets, the situation was totally the opposite. They found the OLMlets to be something worth using time on, both for themselves and for the students.

The teachers decided to start the unit by letting the students take quizzes in the OLMlets. Though the students had not been introduced for the Unit yet, the teachers wanted to use the test to see what the students knew from beforehand, and also to have them reflect and discuss between themselves when trying to find the correct answers. The immediate feedback that students receive in OLMlets was something the teachers found very useful. The teachers were also eager to see if this would intrigue the students to become more self-regulated learners, and reflect better on their learning situation. In addition, it gives the teachers an easy overview of the students' learning progress, enabling them to adjust their teaching accordingly. In the Spring the teachers had found that the OLMlets quizzes helped them tailor their teaching, which was useful, as there are not many hours for natural science in the first year of upper secondary school.

The teachers also planned to have the students retake the OLMlets quiz in the middle of the unit to see if they experienced fewer misconceptions. This would be followed by a larger unit test, an electronic test delivered through It's Learning, the learning management system used at the school. Throughout the whole unit it was meant that the students would enter the OLM and investigate their competence model and how it was developing.

During the planning, one concern of the teachers was how assessment data could be entered into the OLM. An important aspect of OLMlets for the teachers is that the data from an OLMlets quiz are automatically added to OLM. Thus, the majority of the discussion focused on how the results from the unit test could be added to OLM, without extra work. It is possible to add results automatically to the OLM through a Google worksheet,

but the worksheet would have to be developed and the results from the unit text be exported to the worksheet. This would be possible as the tests taken in It's Learning can be exported to an Excel worksheet, but someone would have to make an API to take the Excel results and convert them to the Google worksheet format. A second option is to create the unit text in the google worksheet. The teachers decided to investigate this possibility when planning in more detail. As a final assessment the teachers planned that the students would do a self-assessment in OLM.

After the planning meeting the teachers tried to get the google worksheet to function with the OLM, but did not succeed, so this option fell by the wayside. The teachers asked if there were other possibilities to have the assessment data from other assessment tools exported into the OLM automatically. Such an option does not exist. The teachers would have to manually enter the data, however, this was not very interesting as it would take too much of their time.

In addition to planning the different assessments, planning also consists of creating and entering the content in the OLMlets tool. While this in itself is not difficult, what is difficult is understanding that one first has to use the Configuration tool to specify the unit competences, assessment activities, and students who will use the OLMlets quiz (this is discussed in the next section). Thus, just deciding to use the OLMlets creates a lot of extra work that the teachers have to fit in between their other regular duties.

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching one has to begin with this planning phase. Using the NEXT-TELL tools requires not only accepting the conceptual idea behind the tool and how that will fit pedagogically into their teaching, it also requires a lot of time to plan, formulate content and configure the tools for use by the students; time the teachers rarely have. In this study the researchers are unsure whether the planning would happened if the researchers had not initiated the planning meeting and been there to remind them of how the Spring unit had been developed, and to answer their questions on how they technically use the tools; there were new versions of the tools, they did not remember how to use them, and they did not go to the training materials that were available in Moodle.

Technically, it is not straightforward for the teacher to understand how the different tools interact. For example, if they are focused on using OLMlets they are not thinking about having to first use the Configuration tool to specify the competences. Not only that, they have to also enter the OLM (even if they are not thinking about the OLM at this point) to create the OLMlets activity and to assign students to the activity so that the OLMlets data gets added to the competence models. When the teachers already have problems with their time, and the planning processes to use the tools steals more time from other tasks, the use of the tools is already problematic *before* being taken into use in the classroom. This is a highly relevant issue for the teachers to be able to use the tools in their everyday teaching. The teachers find the concepts of the tools highly interesting, see the positive factors related to learning for their students, and for improving their own teaching, but the planning process (the technical issues) seem to be an obstacle. For them it is a long path to get to what they actually want to do.

OLMlets Quiz development

As reported previously teachers plan not only which topics to teach, but also have to determine the knowledge level of the class. What knowledge do the students already have from before? The teachers had decided to use an OLMlets quiz to find out. OLMlets would give the students a kick-start to the unit, and provide the teachers with information as to the competence level of the class, as well the individual students. As mentioned in D6.5 the idea of connecting questions and their answers to misconceptions, is a new way of thinking for the teachers.

To configure an OLMlets quiz, they first have to use the Configuration tool and the OLM as described in the previous section. The reason for this is how the OLMlets quiz has to be defined as an activity in the Configuration tool, before being imported into OLMlets. To access the configuration tool, the teachers have to log into the OLM. In the OLM tool they will find the Configuration tool. This tool is very central, and also the tool on which the teachers used much time. They made the competence goals from the curricula unit fit by breaking the competences into sub parts (see D6.5 for examples from last year). In addition, setting up the different activities and linking them to the different competences took a lot of time. Tying competences to activities is how the data from an activity can automatically update competence models in the OLM.

After defining competences and activities, the teachers found a list of the activities in the OLMlets tool. Then teachers then developed their questions, related answers, and misconceptions on paper before typing them in to the OLMlets tool. Since the OLMlets is not a NEXT-TELL tool the same issues that arose in the last study are still there, as reported in D6.5. Most of these issues are related to technical problems: 1) some of the misconceptions are not being saved; 2) writing Norwegian letters is problematic as they do not display properly and thus are not readable; and, 3) The tool is quite slow, and the teachers had to save all the time as they were afraid of losing their work. All in all configuring a quiz in the tool took more time than the teachers had planned for.

In summary, to develop the OLMlets quiz the teachers had to:

1. Define competences in the Configuration tool
2. Define activities in the Configuration tool
3. Tie students to a student group, and tie a student group to an activity
4. Export defined activities from the Competence tool to the OLMlets tool
5. Develop questions, answers and misconceptions on paper
6. Type in developed questions, answers, and misconceptions to the OLMlets tool

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching we experienced that although they used the tool last year, they still asked a lot of questions in this TLS. They found that setting up an OLMlets quiz was not that straightforward, especially as they have to use first use the OLM and Configuration tools. Breaking the curricula competence goals into minor competences and defining activities for assessment situations is already part of what the teachers do, although making them fit to the Configuration tool was not that straightforward (see D.6.4). It was surprising that they still needed so much guidance. Even though the configuration of the OLMlets quiz is time consuming, they find it intriguing and worth the effort as they see a benefit for the students, and for their own adjustment of teaching. The identified misconceptions allow them to tailor their teaching to those misconceptions that they see that the students have. In this way, the use of OLMlets can been seen as contributing to the further development of their teaching practices.

Ordinary classroom teaching - 1

The researchers attended two classes during the TLS. The first class is described here.

In the first class the students were informed about the TLS and those that wanted to participate filled out their confirmation forms. Some of the students were anxious about sharing data and had good and relevant questions about ethics, both regarding the research itself, and regarding the tools.

The teachers had requested a training session for the students on the OLMlets and the OLM tool, and this was planned for the first session. The teachers wanted training material in the form of short stepwise instruction leaflets with screenshots. They also felt that it would be best to have on-site training with small groups of students, where the researchers were available to answer questions that arose. Unfortunately, these training requests were not fulfilled and instead the tools were introduced via a PowerPoint presentation. During this session there were no questions from the students.

The students received their usernames, and passwords from the teachers, and logged into the OLMlets tool. This is described in the next session.

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching it seemed like the teachers needed help to train the students in the use of the tools. It is not clear whether this was because they knew that they had access to the researchers, or if they really felt like they could not train the students themselves. This will be a topic for the final interview.

There were no changes in the second class, regarding this activity.

Students taking the OLMlets Quiz

The first class of 30 students logged on to OLMlets and navigated through the different quizzes prepared by the teachers. Although they were introduced to the tools in a PowerPoint presentation, the students had a lot of

questions, and as the teachers could not deal with them alone, the researchers, who should have only been observing, were asked to help.

As mentioned above, the OLMlets tool is not a part of the NEXT-TELL tool portfolio, so just as the teachers encountered the same problems as last year, so did the students. These included difficulties in starting a quiz and understanding how to find a new quiz (cf. D6.5). After some guidance, the students quickly learned to navigate in the tool. The biggest problem related to using the OLMlets tool, is its concept. The students were looking for a feedback as to whether they answered correct or not, but this is not possible as they are only told if they have a misconception, and as a result the students were confused.

As they answer the OLMlets quiz, a competence model is being updated for each student. This competence model can be explored after they have taken a quiz. There are different possibilities to visualisations of the competence model. For example, one of the visualisation shows a bar with green, red, or white – according to students' answers – and a list of misconceptions related to their answers.

To illustrate on type of student confusion, we use observation data from one student. After taking the OLMlets quizzes the student went into the model to have a look. There was a list of four misconceptions and a red bar indicating that the student had not demonstrated the competence. The student went back to the quiz to take it once again, and then went back to look at their model. There were still four misconceptions listed, but now the bar was a little green as some of the questions had been answered correctly and thus the demonstrated some competence. She did not know, however, which of the questions she had answered right or wrong. The student went back to the questions again, trying to remember what she had answered last time, try to eliminate to the list of misconceptions. This did not happen - no matter what she answered the student still got the same list of misconceptions. The student asked for help from a researcher, telling:

- I don’t understand what is wrong.
- I get totally confused. All the misconceptions are there, though I gave another answer this time.
- I don’t know what is wrong or correct anymore, and I don't remember what I answered last time anymore!

She was trying to make a system in order to find out how the misconceptions and the colour of the bar changed. The student got more and more confused. Finally she gave up - there were too many questions (four) with too many options (three in each) that made up the list of misconceptions and the competence model. The colour of the bar changed, but not the list of misconceptions. The student tells the researcher that she is more confused about the topic now than before she took the quiz.

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching we found that the teacher’s did not have the capacity to answer all the student questions and the researchers needed to help. It is not clear what would have happened had we not been there, but they might have just given up.

The results of the OLMlets quizzes feed automatically into the OLM, and it was planned that the students would log into the OLM and inspect their competence models. There was no time left, however, so the OLM has to be dropped for today. Together, the teachers and the researchers decide that the investigation of the OLM could be given as homework, and as the teachers did not have the time, they asked the researchers to develop a homework task that would be distributed to the students at a later point.

The second class had the same session some days later. Based on experience from the first class, the teachers and researchers agree to make some changed. Instead of 30 students in the classroom at the same time, the class is divided into two groups, leaving 15 students in each group and in the classroom. As there are fewer students there was better follow-up on the students when they had questions both related to the subject being taught and to the OLMlets tool.

Ordinary classroom teaching - 2

The teachers use the findings in OLMlets to adjust their teaching, but with Christmas approaching fast, the teachers found no time to introduce OLM for the students. As agreed the researchers developed a homework assignment where the students would investigate their OLM. The "Get to know the OLM!" (see Appendix 9.2) assignment, which should take approximately 30 minutes, explained the OLM and gave them 3 tasks: 1)

Explore your competence model; 2) Enter a self-evaluation; 3) Post in the discussion forum. Unfortunately, the teacher never gave the homework to the students. Why this was so will be asked during the final interview.

The teachers continued teaching the unit, but did not find the time to introduce the OLM, or have the use it. In the questionnaire given to them the teachers explain that the concept of the OLM is interesting, but the tool is too difficult to use.

Thus, when trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching, we would have to conclude that the OLM is too complicated for them, even though we have several times guided them through its use. Even though they are very interested in the tool, they do not manage to find time to invest in learning to use it well enough that they can incorporate it into their everyday teaching.

Paper test (instead of It's learning)

In early Spring 2014, during one of the follow-up meetings where the plan was to investigate the teacher's use of the OLM, the teachers inform us that they have not had a second round with OLMlets, but have had a Unit test with the students - on paper. Just the idea of having students take a test on paper is unusual for this school, being a paperless school. The teachers explain that the reason for their choice is related to the issue that they were tired of some of the students cheating during on-line tests. One of the teachers explains that it is a problem that the students have too many windows open on the computer making it difficult to monitor the students, and see if they are searching for and finding answers on the Internet. Thus, instead of a computer based test, this time the teachers took the students by surprise and had them write on paper. One of the teachers then tells that when grading the tests she found that the students had several misconceptions and that she has thought that she would make a new OLMlets quiz based on these findings.

The OLM did not become part of their teaching routine

OLMlets revised

The teachers revised the OLMlets quiz, and have the students take the OLMlets quiz once more. The reason for having them to do so is to make student be aware of competences and the possibility to regulate their own learning based on this knowledge. Using the OLMlets once more can contribute to the students becoming more self-regulated and thus raise their competence and understanding of the subject matter in the Unit. This approach is supported by previous literature where students' prior knowledge is believed to be one of the most important factors affecting learning effectiveness [Dolchy, 1992, Dolchy, 2002; Hailikari, 2008; O'Donnell, 2000].

The teachers report problems that are the same as the students had first time they used the OLMlets tool, both with the use of the tool and with understanding the feedback. In the interviews one teacher reported, "We have now had one lesson where students have answered the questions and looked at their results. (...) One of the students reported that she did not find what is correct or wrong, when seeing answers to the questions. Other students report that they find it very confusing to read a mix of English and Norwegian, but finds the results with smileys and radar plot are nice." This issue is not reported as a problem for all students, however.

The students still have not investigated the competence model in the OLM. It may be that the students would have understood the visualisations in the OLM, but we do not know.

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching, we saw that this time they initiated and configured the OLMlets tool on their own and had the students take the quiz. We see that the OLMlets feature of listing misconceptions is really liked by the teachers and motivates them to use the tool. If they were to only use the OLM they would really miss this feature, as the OLM does not identify or list the misconceptions (i.e., the students still have to investigate the competence model in the OLMlets tool itself).

OLM

Although the original plan for the TLS was to have the students enter the OLM and investigate their OLMlets results in their competence models, the teachers did not prioritise this.

When teachers investigate the OLM competence models the teachers are able then able to look at a model of an individual student or a model of all the students combined. Students are able to look at her/his own

competence model where they can see visualisations of the different competence goals. In a negotiation with the teacher they can address the different goals and how to improve. Relating this to formative assessment, the OLM can be used for feedback, feed forward, and negotiation with the student. Using the notion of the zone of proximal development from Vygotsky [Vygotsky, 1978], the teacher may be able to use this tool in order to understand and find the student's proximal development zone in order to give better feedback and feed forward.

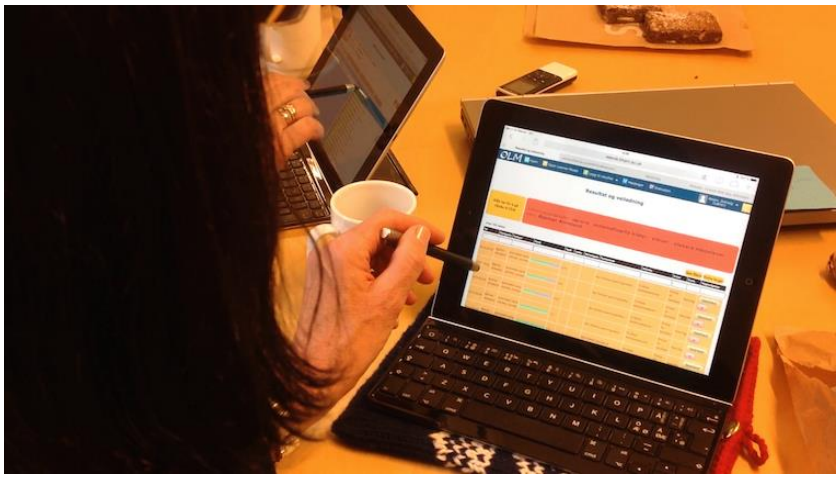


Figure 7. Norwegian teacher in front of OLM

The question to ask would therefore be, why after using so much time at in the configuration tool, defining the competences and the activities, do the teachers not get the students to use the OLM?

In an interview from Spring 2013 study the teachers were very optimistic about the tool, and wanted to use it for their autumn class. This did not happen, mostly because of time constraints.

Starting up again in spring the question raised on how the researchers could get the going with this tool? The study was supposed to be teachers-led, but this included the teachers to use the tools.

In the first meeting in spring the researchers were told, as explained above, that the students had taken the Unit test on paper and now the teachers wondered how to get the results into the OLM, thus giving more data to the competence models of the students. The researchers explained how the teachers would have to put the data in manually. As this led to quite a bit more work, the teachers would have to see the benefit of this extra work in order for them to do spend the time entering the test results manually. The work would entail filling in the results of the test and tying the results to the different competences. The researcher showed them how this could be done. Using one of her students' competence models and the web form for teacher feedback, we showed her how to edit the form to change the number rating stars. She was also shown how to manually add the grades, comments, and upload a scanned paper test, if she has made comments on the paper that she wants to share with the students.

Wanting to look at one student competence model again, the teacher finds it difficult to navigate through all the groups and models to find back to one student; it is clearly too much information and there are issues with interface. Finding the competence model of the student, they can see it has been updated, and she tells the researcher that she would like to put in more results in order that the competence model is more developed. She finds this procedure interesting, though it not being automatic, it will take time. Still, she informs us that she will put in the results for the other students as well.

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching, we see that for the teachers to use OLM, given the premises of how the tool works now, means that they have to see the benefit of the tool before they will choose to invest time in using it. When the one teacher saw how the model of the students developed based on assessment data she was able to map what was happening with the data onto the benefits of having data from all assessment situations into OLM. It was an a-ha moment when she understands that it is on-going assessment data that makes the model develop.

Viewing the use of the OLM in teaching practice from a teacher perspective puts their "old" practice in a new context. Their old practice is transformed into a new practice when using OLM:

Old Practice

- Assessment
- Feedback, Feedforward

New Practice

- Assessment
- Results added to the OLM
- Feedback, Feedforward

Here the assessment is the same, but there is a new step where the assessment results are added to the OLM. The feedback and feed forward will be richer as they can be based on the competence model, which gives the teachers new information on their students that they did not have before.

During Spring 2014 the teachers reported that they had put the Unit test results into the OLM, although it took a lot of time, and that they finally had introduced the OLM for their students. While they report that the students have looked at their competence models, there is not really much progress in the actual use of the tool. With no ability to get new data from different assessment results (e.g., It's Learning tests) into OLM, the competence model would not be updated, thus there is nothing new with the competence models. The only possibility to have the competence model develop would be through the OLMlets quiz, or manually filling in data from other assessments, or through self- and peer assessment. The teacher's tell us that they plan to have the students carry out a self-assessment in early June.

4.4.5 Conclusions

When trying to answer if the participating teachers were able to use the NEXT-TELL tools in their everyday teaching, we see that there are small glimpses of hope that the tools ***might***, in the future, be able to become an integrated feature of their everyday teacher. While after two years the teachers seem to be beginning to grasp the conceptual ideas of the tool, although they are still discovering new things, the interface design and some technical issues with the use of the tools, limited the teachers in being able to carry out the TLS on their own. Furthermore, the use of the tools is very time consuming and at times clumsy. For example, one of the students had not been added to the group, and this meant that the teacher had to add her to all the different relevant activities in the configuration tool in order for the student to be able to participate in the different assessment activities (e.g., OLMlets, Unit test) and have a competence model developed in the OLM.

4.5 Germany: A Teacher-led approach to leverage students' final exam preparation

The presented research reports on a teacher-led study carried out in Germany during spring 2014.

4.5.1 Introduction

In D6.5 we reported how a teacher used the OLM as a digital gradebook and as a tool to leverage self-reflection (see D6.5, chapter 4.2.1). One of the teacher's intentions back then was to use the OLM to make self-assessment more attractive to his students because he was and still is convinced that the ability to self-assess oneself adequately is one of the key skills in the 21st century. He already gave his students the opportunity to self-assess on paper before he introduced the OLM in March 2013, but only few did.

We are reporting here on his second attempt of using the OLM in his classroom.

4.5.2 The Research Study

A German teacher who already used the OLM last year with two classes became aware through the application of OLM that his students have difficulties in self-assessing and that there is a lack of acceptance of this because students stated they do not see the benefit in it. As a follow up on this experience the teacher decided to

change his way of teaching after the summer break in order to increase his students awareness for the concepts of self- and also peer-assessment and then use the OLM in a second attempt.

Methodology

Back then the teacher had several aims when introducing the OLM. (1) He saw the OLM as a possibility to give his students more transparency in relation to the expected competencies for the final exams which is an important principle in an assessment for learning approach [Black, 2004; 2009]. (2) He wanted to better structure and follow the competency development of each student and (3) furthermore, he thought the OLM could make self-assessment more attractive to his students because of the visualisation features.

When expected to self-assess in the OLM, his students had several difficulties. Some of those related to the OLM in general, but more critically, students found it rather difficult to assess themselves adequately and did not see why it could help them in their development because to them assessment is something that the teacher does.

Based on this experience, the teacher specified his aims for a second attempt and decided to use the OLM in a slightly different way because he was still convinced that the OLM and its several features could be a valuable tool to make his teaching and his students' learning more effective because he believes that it could help him "to gain insight into the Black Box of my students".

When talking to the KMRC researchers last August it became clear that - apart from the already described possible future use in D6.5 of OLM to facilitate students' final exam preparation - the teacher more or less had a TISL question in mind: "What do I need to change in order to get my students to adequately self-assess themselves?"

From last August on, he wanted to change his way of teaching, reduce the usage of LMS in class (he found out that it is too demanding for his students to investigate the provided information in there on their own) and put more emphasis on step-by-step descriptions in order to familiarize his students not only with the teaching content but also with the concepts of self-assessment and reflection before he wanted to use the OLM again.

In collaboration with the KMRC researchers a TISL heart was created out of his assumptions and questions on this to document his approach. Due to internal class issues, the teacher was forced to change his planned approach and switched back to his initial intended follow-up attempt, took some time for recapitulation of the situation and reconsidered in cooperation with the KMRC researchers his configured competencies in order to use the OLM again with only one class (15 students) at the end of term for students' preparation of their final exams.

Participants

The participants in the reported research are a male German Geography and History teacher (male, 36 years, 7 years of teaching experience, Grammar school) and 15 students.

We will report in the following on the data we gathered through interviews and email exchange.

Data collection

Data was collected during three digitally recorded telephone interviews with the teacher and several emails between teacher and researcher. The study took place in two 90-minute classroom teaching sessions and generated some OLM logfile data that will also be reported here. The digital sound recordings were transcribed (in German) and excerpts used in this report have been translated to English by the researcher.

4.5.3 Implementation

TISL approach

In cooperation with the researcher, a TISL heart model was created out of the teachers' considerations (see Figure 8) in order to document the procedure (translation of single boxes see below).

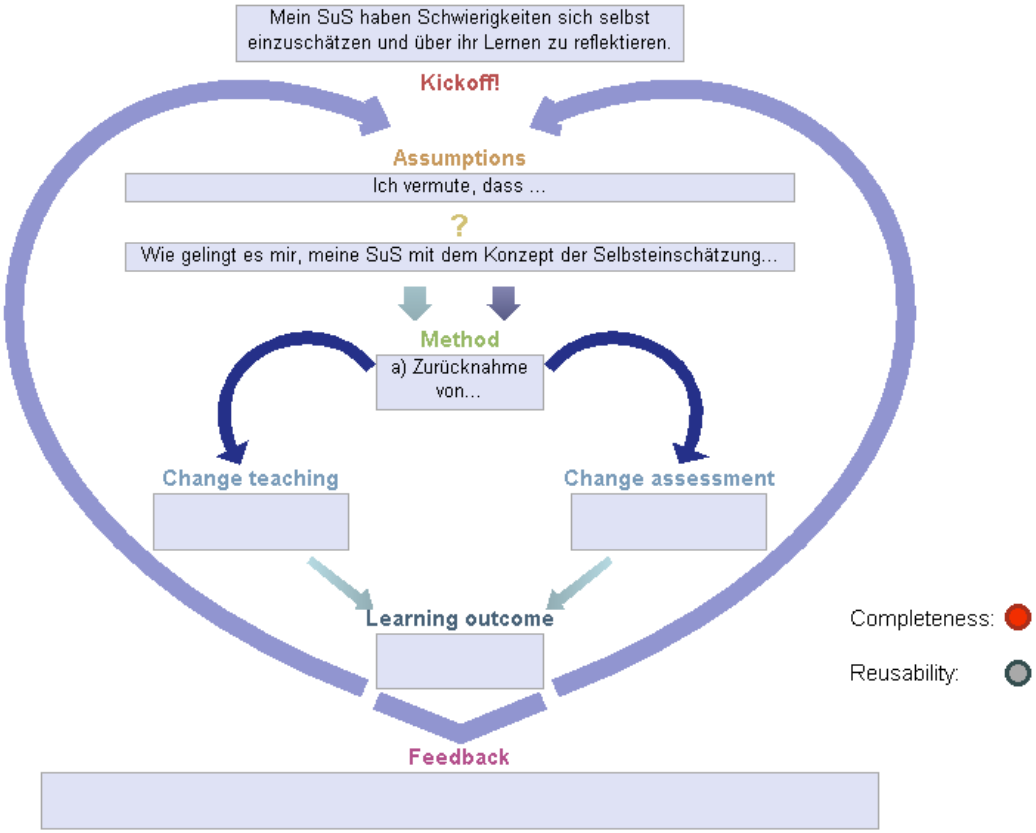


Figure 8. TISL Heart model for introducting self-assessment to students

Kickoff

My students have difficulties in self-assessment and reflecting on their learning.

Assumptions

I assume

a) my students are not aware why self-assessment and reflection might be good for their own learning.
b) there never was any emphasis on self-assessment in their school life.
c) my students are too challenged by grading and performance pressure that they never felt free enough to self-assess more or less casually.

Research Questions

How can I familiarize my students with the concept of self-assessment?

Method

a) Reduction of demanding activities with the LMS.
b) More guidelines during each lesson (step-by-step).
c) Introduction of casual self-assessment with no influence on students grading.
d) Re-introduction of OLM

The boxes for “Change Teaching” and “Change Assessment” were left open because those contain the application of the method. It was planned to fill the boxes for “Learning Outcome” and “Feedback” after the reapplication of the OLM in classroom.

Due to class internal issues, the approach did not take place as planned in the autumn season (first exams were quite bad, parents and students put pressure on teacher that only final exam related things may take place - this ruled out a second use of OLM at that point in time). In addition, these issues led to the transfer of one of his classes to another teacher on his students own wish because they were not in line with how the teacher was planning to prepare them for their final exams in the last school term of senior year.

However, the teacher used the time to further elaborate his understanding of necessary competencies for the final exams in cooperation with the KMRC researchers in order to use those for upcoming classes. Furthermore, he stuck to his idea to use the OLM with his remaining class at the end of term again, when all necessary content is taught, for recapitulation of needed competencies for the final exam in order to let his students self- and also peer-assess. His intention with this approach was, that his students gain valuable information about their competency level for the preparation of their final exams (in terms of formative assessment: the teacher hoped that students will get more insight where their gaps are for their final preparation phase). He decided to only let them self- and peer-assess on this because he wanted to take away some grade and performance pressure and again stuck to his idea to not further use the OLM as a grading tool. With this in mind, he aimed at keeping one of his TISL methods (c from above) to introduce his students more or less casual to the matter of self-assessment in order to familiarize them with the concept and gain more knowledge for himself for future uses of the OLM.

Second attempt of OLM usage

For the above described usage of the OLM, the teacher planned in total three lessons (each 90 minutes) in which his students should use the OLM to self- and peer-assess themselves on the necessary competencies for the final exams.

In order to do so, the teacher configured a new activity ("ABITUR Preparation 2014") in the Configuration tool and assigned all necessary key competencies of the first three semesters of senior class to this activity. Apart from last years approach, in which he divided three required areas of study into several sub-competencies (cf. D6.5), he now expressed five to nine key competencies for each term of senior class on which his students should assess themselves (see Figure 9. "S1 - Recapitulation" to "S3 - Recapitulation"; the fourth semester of senior class is reserved for preparation of final exams).

Due to last years challenges for students to self-assess themselves, it came to mind that his students not only found the concept of self-assessment difficult but furthermore had difficulties to abstract the 10-star rating of their current competency level for they are only familiar with either the grammar schools 15-points system (15 points as the best result) or the general German 6-point grading system (1 as the best result).

As it is possible since OLM V3 to configure the number of stars and as this was already mentioned as an obstacle during last year's summer break, the teacher changed the number of stars to a 6-star rating in his OLM and therefore in the students' OLMs as well.

Figure 9. Competencies for final exams in Configuration Tool

For the planned three 90 Minutes lessons in late March and early April the teacher requested his students to pair up. Their assignment was as follows:

(1) put together what you think are necessary concepts, ideas and related competencies to know for the final exam (use books, worksheets or other material that might help with that),

(2) assess yourself in OLM on each final exam related competency,

(3) exchange with your partner and explain to each other different concepts and ideas,

(4) assess your partner in OLM on his/her level of competency in relation to explained concepts and ideas.

Apart from the assignment, the teacher re-introduced the concept of self- and peer-assessment roughly. Based on this assignment, the teacher wanted to find out what students think their gaps are, in order to actively approach these gaps in repetition lessons before the final exams in May. He was therefore aiming at using the OLM in a more student-centred way to collect evidence for his future lesson planning.

Two out of this three planned lessons took place. In the third lesson, the teacher needed to split the class because seven of his students needed to re-do an exam. The other eight were sent to the computer room with the assignment and the teacher stayed with the seven who sat the exam. A few minutes later the teacher received a text message by one of the other group, saying they think it might be easier for them to work on the OLM at home. Later on when the teacher logged into his OLM he saw due to the lack of notifications that his students did not do it.

4.5.4 Findings

OLM Usage and usefulness of features (Self-reporting and logfile data)

In this scenario the teacher used the OLM solely as a “viewing tool”, he did not perform any competency assessments himself this time.

The teacher reported that he used different visualisations in order to get an impression where his students see themselves. The teacher had already sorted out the treemap as well as the competency network out of his viewings via the preferences feature for he did not see any benefit in these visualisations for his work. According to his statements, he mainly used the skill meter and the table visualisations because with both he is able to gain a quick overview of the whole class and of different competencies by scrolling down. This statement is in line with the log file data of the teachers account (see below).

During the second class usage of OLM, the teacher said he developed a preference for the table view because the more data there is in OLM the more confusing the skill meter gets for him. He assumes this is due to the fact that the skill meter is more fine grained and also shows slight differences. However, these are differences he does not need, so he preferred the table view later on because of the more general categories (very weak – weak – ok – strong – very strong) (see Figure 10 and 11 for comparison of views on the same filtered set of competencies).

Figure 10. Skillmeter on final exam competencies (self- and peer-assessments together)

Figure 11. Table on final exam competencies (self- and peer-assessment together)

When being asked what his opinion of the word cloud visualisation or the radar plot is, the teacher stated that he liked both but did not find them very readable and useful. He elaborated that due to the length (in words) of

his defined competencies he was not able to read the radar plot because there were overlapping and/or cutting offs of words (see Figure 12). In reference to the word cloud visualisation (see Figure 13) the teacher expressed that his dream scenario for this visualisation was to have a very quick overview of all strong and weak competencies as well as of all strong and weak students to leverage his further lesson planning accordingly. He reported to be a little disappointed that this was not the case because he found all competencies displayed there and explained that it was hard for him to see what competencies were in focus right now. Consequently to this statement the researcher asked about the use of filtering options. It turned out that these options were not being used by the teacher until the day of the reflection interview. He explained he was aware that there were filtering options but never was curious enough to try them. With the now filtered view on the word cloud the teacher was enthusiastic about it and described the OLM as a "dream tool" that will leverage his future lesson planning and that will give him early warnings if students are running the risk of falling behind.

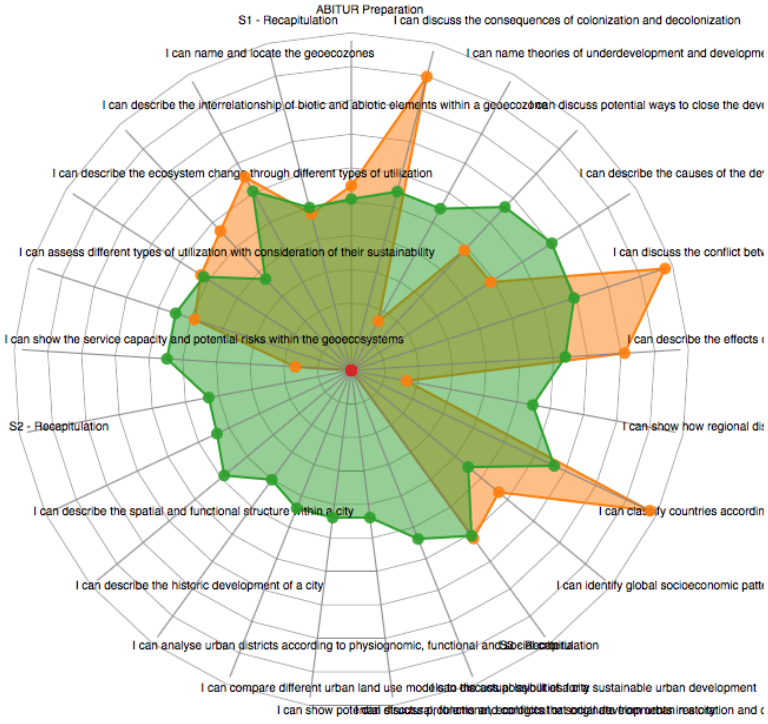


Figure 12. Radar plot on final exam competencies (self- and peer-assessment together)

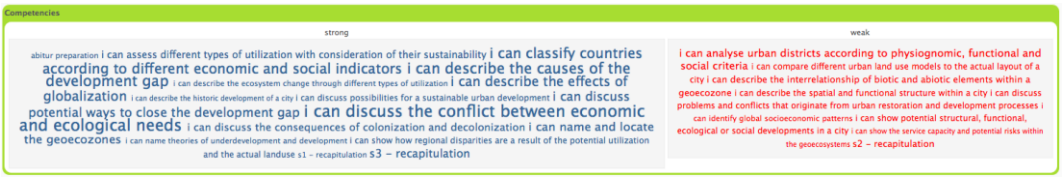


Figure 13. Word cloud on final exam competencies (self- and peer-assessment together)

Apart from using the visualisations, the teacher found the notification function useful in certain situations. He described is as not useful in situations like the actual one when he knows that his students are working in OLM and he got over 450 notifications at a time. "I simply marked all notifications as read because I know my students are working in OLM and I don't want to see the single entries. I want to see the cumulative view." But he thought of a situation in which he thinks the notifications would be useful: "In the next school year my principal would like me to take some junior classes. When I then tell those 8th graders they should self-assess

on a lesson in OLM as homework in order to confirm for me if they understood the lessons content – I then could easily use the notifications to see who did it and who did not... Well that would really facilitate my workday."

In general, the teacher found out that the acceptance of self-assessment of his students is in close relation of their perception of the assignment in which they should self-assess and also of how self-assessment relate to their own goals (here: best results for final exam). Furthermore, he got evidence that his assumptions on potential gaps in his students' competencies in general are the same as in his students' perception and was able to develop new ideas and usage scenarios for his future OLM use.

As to the students' use of OLM, we only can report the logfile data (see Table 7).

Although all students logged-in to OLM (some even outside the lessons) several times, only 12 out of 15 followed the assignment to self-assess their competencies and only two students peer-assessed each other.

Regarding the visualisations function, nine students used this function. Out of these nine, four students only used it one or two times, two students used it four to six times and two other students even ten to thirteen times. Furthermore, only two students used it on more than one day. All other students' selections of views (if there was more than one) took place within one minute so it is possible that they simply clicked around to get familiar with the tool and to have a look at everything but did not really "use" this functionality.

Two students tried the discussion function but more in a chat-like way. They did not reference to the accompanied competence but talked about what they were doing in that moment.

As we unfortunately neither had the opportunity to talk to the students directly nor they filled in any questionnaires, we could not further elaborate the specific usage of them.

	teacher	**students (N=15)**
logins	24	total: 89 (N=15) outside of OLM lessons: 39 (N=7)
visualisation views	**all views: 65** histogram: 3 radar plot: 9 skill meter: 20 table: 15 word cloud: 8 not specified in log: 10	**all views: 39** (N=9) histogram: 2 network: 3 skill meter: 18 radar plot: 2 smiley: 8 treemap: 2 word cloud: 2 not specified in log: 2
quantitative self-assessment	n/a	519 (N=12)
quantitative peer-assessment	n/a	72 (N=2)
usage of communication functionalities	view discussion: 5 notification pageload: 14 help box: 3 preferences: 4	message posted in discussion: 15 (N=2 - discussion was used off topic) notification pageload: 26 (N=9) help box: 2 (N=2) preferences: 2 (N=2)
usage of filter functionality (unit, activity, student, subject)	13 (on day of reflection interview)	6 (N=2)

Table 7. Logfile data of OLM (between 13th March and 25th April)

Reported students' reactions to OLM

Due to the fact that, as mentioned above, there neither was the opportunity to interview the students directly nor the students fill in any questionnaires after their OLM usage, the KMRC researcher invited the teacher to reflect about the usage and report on students' reactions in an interview that took place in April.

According to the teacher, his students reacted very positively to the OLM this time because the usage scenario was more in line with their expectations for this phase of their school life. They stated that they had liked the clear structure and presentation of needed competencies for the final exams and that they were able to make it more understandable for themselves through the alignment of books and worksheets. Furthermore, the teacher explained that the benefit of self- and peer-assessment became clearer to them when they saw what is expected of them, and that this was their chance to influence the content of the remaining lessons. The only critique they mentioned were performance issues which, according to the developers, should be sorted out in R4.

Apart from that, one of the students of the other class that decided to be transferred to another teacher came to the participating teacher as a representative of her class. Both classes had talked to each other during their preparation phase and now the class expressed they were envious about the transparency of competencies and the opportunity the teacher had given the OLM class. Although her class decided last year not to use the OLM due to privacy issues, she now explained that it might have been a mistake not wanting to use the OLM and to engage in a teacher change. The teacher is now very curious if his efforts in engaging with OLM and his given transparency and opportunities might lead to different results in the final exams between his OLM class and the other one because both classes did not differ much in their performance before using OLM and the teacher switch.

4.5.5 Conclusions and future use

According to the teacher, he experienced several differences in usage and described this time's use as more successful than the first one last year.

1. The teacher was able to manage all the configuration by himself (just some minor CAS issues needed to be addressed),
2. he perceived this use as less demanding in terms of time and resources (he was now already familiar with the tool and its possibilities as well as with the structure; his school extended the technical infrastructure why it is easier to get access to a computer lab),
3. he only used it with one class (15 students) instead of one and a half (because the other half of the class refused the usage which made the organisation of his lessons more difficult),
4. there was only self- and peer-assessment (also mainly on a quantitative level - only one comment on strength/guidance in peer-assessment),
5. he changed the 10 star rating system to 6 (something students are more familiar with),
6. his students were in general more open to the OLM (this might be due to the fact that the usage was more in line with their current school life and that they now were already familiar with the teachers' general competency understanding because of the competency posters (see D6.5, p.24) that still exist in class and are visible all the time).

The teacher reported in an interview with the researcher in April that he is willing to use the OLM for his future classes in the next years because the whole process of setting up and first rounds of using helped him very much in making himself aware what really is required by students for the final exams. He himself was forced to think intensely about competencies and how they could be phrased in order to be understood by students. The feedback about the first use of OLM from his students furthermore clarified for him, what obstacles there are for his students.

Up to this point, he described that he was only guessing what students' obstacles might be on a competency level but the OLM and the conducted self-assessments provided and documented evidence and proof that his guesses were correct.

After the familiarization with the filtering feature in OLM, he furthermore described OLM as a *dream tool* (especially in relation to the word cloud visualisation) that might leverage his lesson planning because it will

give him very quickly an overview which students see themselves behind and what content (in relation to a competency) remained unclear to his students.

As the teacher would like to use the OLM in the future and is also very interested in a school server installation after the end of the project, he already made considerations for other implementation scenarios and aims. Apart from the scenarios and aims, he already used the OLM in and for (general transparency of competencies, exam and final exam preparation, structured competency development to gain insight into the students' learning and understanding, leveraging lesson planning), he furthermore would like to use it in a project week for 10th graders that is held each year at his school. This project week takes place two weeks before the summer break and aims at raising awareness in students of what is expected of them in the senior years. The teacher would like to use the OLM to show those students expected History and Geography competencies and let them also self-assess on those and talk with each other about it. He is hoping that students then are able to make a reasonable choice for their intensive courses in senior year.

4.6 Singapore: Supporting students in the art of questioning

4.6.1 Introduction

In Singapore, there are two schools working with the OLM. Although there was no one of the NEXT-TELL project members on the ground in Singapore and the schools are no project schools as they are not based in the EC, we would like to report shortly what we gathered from their teacher-led studies (see also D6.5).

Our initial goal with these schools was to support them in a science-questioning project that started last year through the use of the NEXT-TELL Mahara along with the OLM. Our report is about their second round of usage, which was carried out with the OLM. They conducted their exploratory study by themselves with some assistance for setting up the OLM (via email support) and presented their experiences and outcomes at the iCTLT Conference 2014 (international Conference on Teaching and Learning with Technology), where they were able to raise some attention in several participants for the NEXT-TELL OLM [Tan, 2014].

4.6.2 The Research Study

Methodology

The teachers' aim in the HCI school with this science-questioning project was to develop global, independent lifelong learners by enhancing the research culture among both students and teachers [Tan, 2014]. Their focus thereby was on the improvement and evaluation of project ideas through the use of questioning structure. In order to achieve this, they used the method of six thinking hats [de Bono, 1985] and mind mapping tools, leverage on the affordances of google apps to strengthen collaboration and communication of project groups and the NEXT-TELL OLM to facilitate students' reflection, planning and monitoring by the use of visualisations.

They had this aim and focus in mind because they experienced that students are often too concentrated on project outcomes and achievements and are not able to ask each other sufficient questions to improve and advance the quality of their project ideas. Furthermore, students rather use cooperative than collaborative learning strategies [Tan, 2014].

Participants

The two schools that conducted studies are placed in Singapore.

- The Jurong Sec School (JSS) is a Secondary school with approx. 1400 students (age range 13 to 16 years) and 93 teachers. One teacher and 40 students in one class participated from this school.
- The Hwa Chong Institution (HCI) is an independent Secondary school and College with approx. 4300 students (age range 13 to 18 years) and 500 teachers. Two teachers and 24 students in one class participated from this school.

For we have more information on the study that took place at the HCI school, our report focuses on that.

Data Collection

We collected data through email conversations with the teachers, a small questionnaire on teachers' usage that was filled in by a member of the Ministry of Education (MOE) who was involved with the teachers, log file data, and teachers' presentation at the iCTLT [Tan, 2014].

4.6.3 Design and Implementation

The science project intervention at the HCI had a duration of 8 weeks in which the students accessed the OLM twice. During this intervention phase the students were introduced to the method of six thinking hats and to the tools deployed (i.e., mind mapping, several google apps, OLM). The students grouped themselves in six groups of four members each and their assignment was to generate solutions for two similar survival scenarios. One was taken out as a pre-test, the other one as a post-test. The survival scenarios both describe how some travellers (i.e., the group members of the different groups) are stranded in space (and for scenario two in sea) and have 15 undamaged items of which they can carry only six. The students have about half an hour of time to (1) generate as many combinations of six items they can possibly take with them, (2) rank those and justify their rankings, (3) list their questions, and (4) draw a mind map of their discussion [Tan, 2014]. They should use google apps to communicate, consolidate and document their discussions and findings, and furthermore were asked to use the OLM after this task to peer assess each of their other group members and also to self-assess on the levels of competency in the areas of (1) collaboration, (2) communication, (3) formulating range of questions, and (4) managing ambiguity and complexity. Besides this, students received teacher assessments in each of these competency areas and were furthermore able to view their peers' models in order to compare themselves against them (see Figure 14 taken from the iCTLT presentation [Tan, 2014]). These competency areas were generated by the use of the 21st Century Competency framework that is provided by the Singaporean MOE. In order to fit their rubrics' descriptions, the number of stars in the OLM assessments was changed to a five star rating.

The teachers hypothesized that (1) there will be an improvement in the variety of questions generated that demonstrate divergent thinking and that will advance the quality of project, and (2) that ICT based environments will leverage communication and connectivity in order to acquire necessary skills for collaborative learning [Tan, 2014].

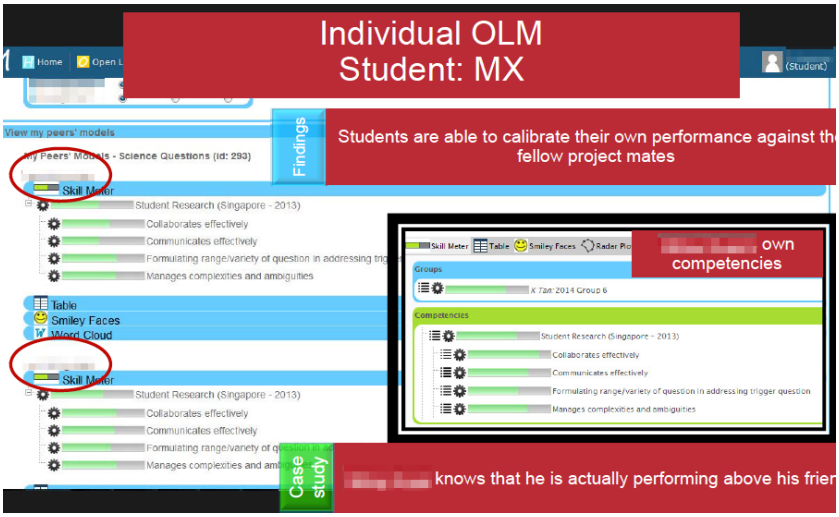


Figure 14. Peer model viewing (Screenshot taken from Tan, 2014)

4.6.4 Findings

The teachers analysed the data gathered in pre- and post-test, the learning artefacts (mind maps, questions lists), chat logs and discussion notes as well as the visualizations that were modelled in OLM. They found that the majority of groups were able to find more combinations of six items, to generate more questions and to better elaborate the drawn mind maps in the post-test [Tan, 2014].

The teachers generally described the OLM as helpful in presenting the process of students' progress in the various competencies over time and reported that the visualisations helped them to provide better formative feedback to their students. They are of the opinion that they themselves became more reflective in that matter and gained a better understanding of how students collaborate and communicate with each other for project work and how some of them tend to overestimate themselves what the teachers would like to use to get in close contact with the respective students to discuss their individual needs (see Figures 15 and 16) [Tan, 2014].

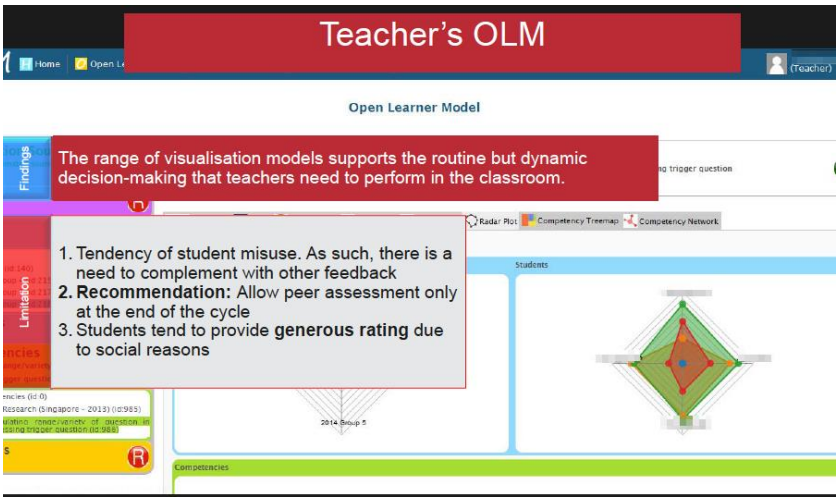


Figure 15. Teachers' view on OLM (screenshot taken from Tan, 2014)

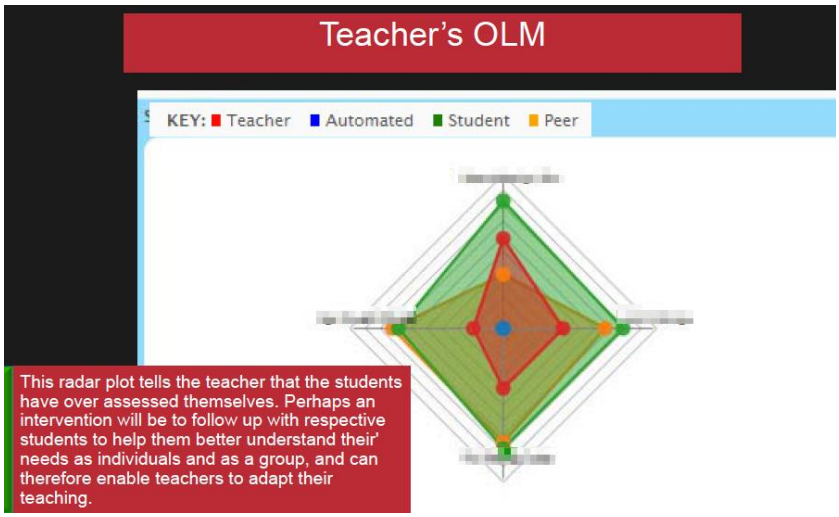


Figure 16. Teachers' view on Radar Plot (screenshot taken from Tan, 2014)

4.6.5 Technical issues

Due to some technical issues (delayed responses from platform) the teachers were forced to first carry out the assessments by pen and paper and to transfer them later on into OLM. This issue has already been communicated to the developers and should be sorted out in OLM R4.

4.6.6 Conclusion: limitations and potential future studies

The teachers recognized some limitations of their study and findings (e.g., short duration, group dynamics, students' experiences in group work) and would like to conduct further studies to not only track the quantity but also the quality of questions by students. Furthermore, they also see potential benefit for other subject

from the non-academic areas to which they would like to scale up their sample and also to increase the number of students participating [Tan, 2014].

From our perspective there are also some limitations to add to the already mentioned ones because the results have to be seen from both perspectives. The teachers reported that they in their perception were able to provide more and better formative feedback to students due to the visual learner models in OLM but as there are no questionnaire data from students, we can only assume what actually led to better performance in the post-test compared to the pre-test. It could be that the external representation of their discussion via mind map helped them to coordinate their group work. Potentially, their visualised learner model through self-/peer and teacher assessment in OLM helped them to better reflect upon their learning task and their performance resulting in a better performance in the post-test but as the log files of OLM indicate students did not use this function very much. The enhanced result could also be triggered by the provided formative feedback by their teachers or due to the fact that students were more familiar with the task in the post-test because they were assimilable.

5 Teachers' Inquiry into Students' Learning (TISL)

TISL forms part of the nextPRACTICE package, which includes a tool and a model to support teacher inquiry. The tool and model development has been informed by school study research into teacher inquiry processes. The TISL studies include:

1. Two science teachers at Academy schools, who are leading an inquiry involving a team of science teachers.
2. Two schools who are supporting collaborative teacher inquiry
3. Two individual teachers conducting inquiry in their classroom practice

5.1 One-to-many inquiry

Thomas Deacon Academy, a school with pre-existing participation in NEXT-TELL research, engaged in an inquiry into the use of Google Forms as an assessment tool in July 2013. The inquiry took place in an annual cross-curricular STEM project for Year 8 learners that aimed to incorporate learning from science, technology, ICT and maths, and to contextualise skills in product research and production as relevant to the real-world industries of STEM. An initial overview of the study has been reported in D6.5 [Cierniak, 2013].

Drawing upon previous TISL findings, Teacher A was interested in exploring and evaluating the use of Google Forms to track and share student learning data with teaching colleagues. Due to the large scale of the project (with involvement of over 50 staff and over 300 students) Teacher A outlined a need for simple and time-efficient formative assessment, which could be accessed by the number of teachers responsible for each group. The study at Thomas Deacon Academy was notable because of its context, as it was not an inquiry solely involving one teacher, nor was it a study conducted by a collaborative inquiry group. Studying the context of the one-to-many inquiry proved important from a TISL perspective, as such projects involve a number of staff who, though not in charge of decision-making in the school, can offer important contributions as stakeholders to decision-making processes. The one-to-many inquiry allowed for increased stakeholder involvement in decision-making, without the need to train a large number of staff in inquiry processes. This allowed for the involvement of staff while maintaining a top-down, evaluative consultation process that could feed into school strategic plans. The original TISL model was consequently developed into a 'one-to-many' inquiry model for use in such contexts (figure 17).

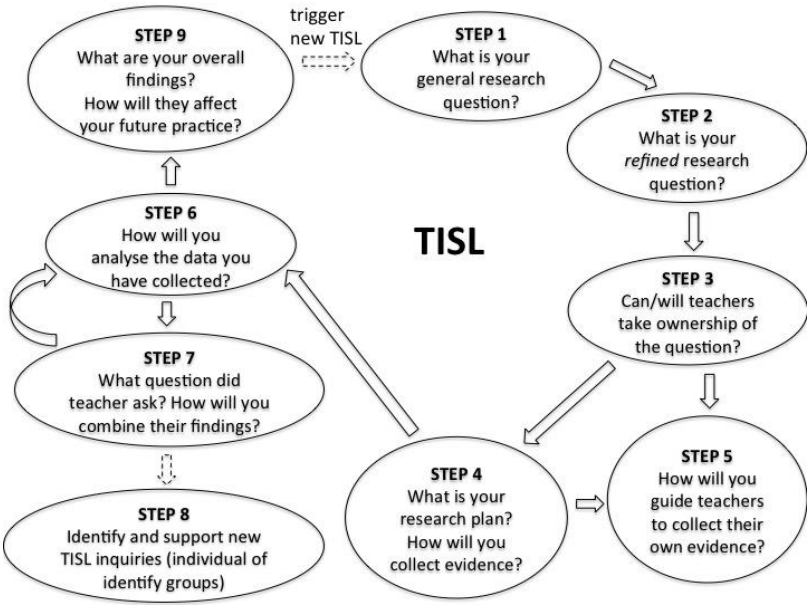


Figure 17. One-to-many model

IOE is also currently working on an on-going study which focuses on the use of Moodle homework in developing standardised marking across a science department and in nurturing learner engagement in class (during science support lessons, and outside of school). Though this is an inquiry initiated by one teacher, it is anticipated that teachers from across the Science department will contribute data. Consequently, findings from this study will allow for further development of the one-to-many TISL model. This is the teacher's first experience of inquiry, and researcher support has been provided for the planning of data collection and analysis. The inquiry is underway and is likely to be completed in August 2014, when the practitioner has planned to implement summative assessment results as part of data analysis plans.

5.2 Collaborative inquiry

IOE is currently working with two schools, an international school and a state school that are supporting collaborative inquiry, with the aim of sharing and improving practice beyond the individual teachers' classroom. These studies are still underway in April 2014; therefore findings will be reported in the next WP6 Deliverable. The context of the two schools is very different. The international school has more resources and a team of two staff to support collaborative inquiry across four campuses. However, the issues of supporting collaborative inquiries are similar between the two schools. For example, how to support teachers collaborative identify inquiry questions, link them to school practice, share their findings and achieve impact by changing practice.

The international school supports a range of collaborative inquiry projects. Each project is led by one teacher and targets an inquiry question that has relevance beyond an individual teachers' practice. For example, establishing procedures for outdoor primary education, defining the meaning of global citizenship and integrating it in the school curriculum, or supporting children with English as a second language. The state school supports inquiry as a process of professional development. Teachers work in groups based on their subject. Rather than identifying a common inquiry question, the group identifies a common focus, such as use of technology, with individual teachers conducting their own inquiry. For both schools, however, there is a strong emphasis on sharing the results of inquiries. The focus of IOE's studies is principally on understanding the support that teachers need to formulate inquiries, identifying examples of best practice in how to share the results of inquiries with other teachers, and understanding how the wider school management can support or hinder teachers' engagement in inquiry.

5.2.1 Individual teacher inquiries

IOE is also working with two individual teachers who are conducting individual inquiries. The first is an inquiry on the impact of Popplet (a mind-mapping app on iPads) on learners' construction of stories (according to narrative planning, written style, story setting and characters) in literacy lessons. The inquiry has been supported remotely through online discussions and sharing of learning journals to plan the inquiry. The teacher intends to measure the impact of the app on the children's writing, using assessment structures so as to understand effects to attainment. In addition, discussions with learners on their use of the app will be recorded in a learning journal. The teacher's data collection focuses on formative assessment records of each story plan constructed using the app, as well as the summative assessment of each piece of finished work. Interviews with learners and a reflective log of classroom activities will also be used for data collection and analysis. This study is anticipated to conclude by the end of the academic year.

The second individual teacher inquiry evaluates the use of Google Docs in the development of learners' collaborative learning skills (while maintaining individual learning skills). It is being completed by a teacher in charge of a 3D animation course. The inquiry focus is of specific interest to the practitioner, as he works on an assignment-based course where students are required to work in groups, though are provided with a summative individual grade. Definitions and measurements of individual learning skills are yet to be defined, though it is anticipated that the forthcoming inquiry will use Google Docs to facilitate the self-managed group work of learners, which will be monitored and formatively assessed by the teacher. Data collection for the study will include learners' project plans and students' learning journals. At the end of the study, interviews and focus groups will be conducted with the students to obtain a qualitative understanding of the ways in which Google Docs facilitated the development of collaborative learning skills. It is likely that the structure of

questions for these collection methods will be drawn from a teacher's learning journal kept throughout the study. The documentation of this study and a detailed overview of its results will be given in the upcoming Deliverable D6.7.

6 Conclusions

In this chapter we would like to summarize the key outcomes described in this deliverable and try to connect some of those to our proposed model of student-aware teaching and self-aware learning.

The LIP studies in Austria showed that the tool supported the teachers in their everyday practices and even enhanced the frequency of given feedback to the students. In regard to our SAT/SAL-model, LIP is probably the tool that fits best to it because it was intentionally designed with the purpose of documentation in the way it is understood by Reggio pedagogy. LIP is used to leverage communication with students and also with parents and it turned out that – at least in the teachers perception – some students are now engaging more in their learning because of the feedback talks they have with their teachers based on the LIP visualisations. It could be that these students are now more aware of what they are doing and maybe more able to connect their learning progressions with the material or methods they used. However, so far this is only the impression of the teachers that their students are more engaged than before. As there is only one of the schools that we reported about using the LIP tool for about two years now, we can furthermore not be sure if this impression of higher engagement and the frequency of given feedback by the teachers of the other schools are due to novelty effects of LIP and general tablet usage.

The evaluation study on the Sonic Divider in Austria had two questions in mind. (1) We wanted to find out if the gamification of a mathematics division tool could lead to more motivation and engagement within students in performing division tasks, (2) we asked, if anonymous formative feedback provided by a tool could lower error rates and increase performance. In fact, the results indicated that the first question could be answered positively, although there are of course certain limitations. In relation to the second question, we found out that the performance of students increased in both conditions (“feedback” vs. “no feedback”) with slightly better results in the “feedback” condition that however were not significant. We are assuming, in relation to our SAT/SAL model, that the feedback raised awareness in students in regard to their capabilities and furthermore gave hints what obstacles there are what might have led to the slightly better performance in relation to the “no feedback” group.

Our teachers in Norway tried to accomplish a way to use the OLM on a daily basis. Although they reported the value of the OLM regarding their students’ competency development, we also saw that this value always needs to be seen in relation to the preparation time spent. As long as not both balance each other, it is still difficult to implement NEXT-TELL tools in everyday practices. This in fact is kind of a circle because as long as the tools are not used on a more regular basis, the preparation time will probably not decrease. At present, teachers report there is always something new for them to find out and to grasp more insight into the underlying concepts of the tool that hinders an experienced usage. As in regards to the development of SRL competencies and our SAT/SAL model, a more regular usage is of course also necessary because both are not one time only things but need time for growth.

The teacher of the reported study in Germany sees his hopes in OLM to gain more insight into the Black Box of his students as fulfilled. Although it is still a long way to a daily or at least weekly usage of the OLM for him, we can assume, in relation to our proposed SAT/SAL model, that the teacher could engage in a more student-aware teaching. This is due to the use of OLM because he now knows more about the learning processes and obstacles there are for his students. Furthermore, he found a way to start implementing self-assessments, peer-assessments as well as general formative practices in his teachings in order to leverage self-regulation. He is still very interested in using the OLM further in order to facilitate his lesson planning through insight in the students’ Black Box and is always very keen to find out what else is possible with the OLM. Although the OLM is still not used in the way that it is supposed to be used in regard to the underlying modelling concept, we are on a very good path with this teacher because he is absolutely convinced of the value of the OLM, has already reflected upon and changed some of his teaching practices and now wants to get his new senior classes from the very beginning of their intense courses into the OLM.

From perspective of the Singaporean teachers, the use of ICT helped to enhance science questioning processes in students. Although we cannot say if the better performance was caused by the use of ICT in the first place, we anyway can say that teachers saw a benefit of using OLM and other tools to support their feedback

processes and to engage in more reflection about their teaching due to the learning artefacts (i.e., learner models, mind maps, questioning lists, etc.) generated by students.

The inquiries in England were used to further develop the TISL methodology to a 'one-to-many' model inquiry model that allows for increased stakeholder involvement. The 'one-to-many' model is more applicable for contexts in which teachers like to share learning data with colleagues and draw on them as stakeholders in decision-making processes.

As an overall conclusion for our SAT/SAL-model we see that – although we are trying to take both teachers' and students' perspectives into account – most of our tools are nearly only used out of a SAT view. This might be on the one hand due to the fact that some of the tools (e.g. LIP) so far only have the teacher view as an entry point (although in case of LIP it is already used in a way that it could support the SAL perspective – i.e., teacher-student-parents conversation based on data in LIP). If there is the student view available in the tool (e.g. in OLM) on the other hand, students use it according to the log files we gathered quite seldom which might be due to the fact that there still is very little data on the single student side in it in order to build the individual students' model and to make it interesting for students to use it in a SAL way. But since the tools are now in a mature state and available in their final version and several of our teachers declared their interest to further work with them on a more regular basis, we are confident that it will soon be possible to have a deeper look into the SAL perspective.

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8 Glossary

Terms used within the NEXT-TELL project, sorted alphabetically.

Partner Acronyms

JRS	JOANNEUM RESEARCH Forschungsgesellschaft mbH, AT
Uni Research	UNI RESEARCH AS, NO
KMRC	Medien in der Bildung Stiftung, DE
TUG	Technische Universität Graz, AT
CBS	Cobenhagen Business School, DK
BHAM	The University of Birmingham, UK
IOE	Institute of Education, University of London, UK
LL	Lattanzio Learning SpA, IT (former eXact Learning Solutions SpA, IT)
TALK	Verein offenes Lernen, AT
BOC-AT	BOC Asset Management GmbH, AT
BOC-PL	BOC Information Technologies Consulting SP.Z.O.O., PL
MTO	MTO Psychologische Forschung und Beratung GmbH, DE

Abbreviations

AfL	Assessment for Learning
BS	Baseline Study
CbKST	Competence-based Knowledge Space Theory
CBT	Computer Based Training
DBR	Design-Based Research
ECAAD	Evidence Centered Activity and Appraisal Design (builds on the ECD)
ECD	Evidence Centered assessment Design (PADI project eg)
EFL	'English as a Foreign Language'; EFL refers to learning English in a non-English-speaking region, such as studying English in an Asian or Latin American nation. Typically, EFL is learned as part of a student's school curriculum or for career purposes if working for an international corporation.
ENA	Epistemic Network Analysis
ESL	English as a Second Language
HCI	Human Computer Interaction
ICT	Information and Communication Technology
IT	Information Technology
LEPP	Longitudinal Evaluation of Performance in Psychology (2nd generation e-portfolio)
NEXT-TELL	Next Generation Teaching, Education and Learning for Life
OLM	Open Learner Model
PADI	The PADI project aims to provide a practical, theory-based approach to developing quality assessments of science inquiry by combining developments in cognitive psychology and research on science inquiry with advances in measurement theory and technology.
RA	Requirement Analysis

RDS	Researcher-led Design Study
SAL	Self-aware Learning
SAT	Student-aware Teaching
SRI	Stanford Research Institute
SRL	Self-regulated Learning
STEM	The Science, Technology, Engineering, and Mathematics (STEM) fields are collectively considered core technological underpinnings of an advanced society, according to both the National Research Council and the National Science Foundation
TDS	Teacher-led Design Study
TEL	Technology Enhanced Learning
TESL	Teaching English as Second Language
TISL	Teachers Inquiry into Students Learning

NEXT-TELL partners responsible for generating tools and methods

BOC-AT	ECAAD
BOC-PL	SPICE
LL	Moodle
JRS/ LL	Google Docs and Google Spreadsheet
TALK	OpenSim, LIP
CBS	RGFA
JRS	EVE
LL	Mahara ePortfolio
BHAM	OLM
TUG	ProNIFA, myClass, Sonic Divider, 1x1 Ninja

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9 Appendices

9.1 OLMlets quiz

The teachers developed the following questions (Q), misconceptions (M), and answer options (A) for the OLMlets quiz:

Competence Goal:	**Can make skin cream with an list of ingredients**
Q1:	**What is an ingredients list?**
M1:	Ingredients list tells what substances that are not found in the cream
M2:	Ingredients list tells that the skin cream is approved by the authorities
A1:	A list of substances the product does not contains (M1)
A2:	A list of what substances a product contains (correct)
A3:	A seal of approval for the skin cream (M2)
Competence Goal:	**Oral discussion of issues related to dieting, eating disorders, exercise and lifestyle.**
Subgoal 1:	**Can discuss questions related to how lifestyle can be influenced health**
Q1:	**Health is not affected by:**
M1:	It is not important what you eat
M2:	Activity does not influence health
A1:	What you eat (M1)
A2:	Whether or not you are active (M2)
A3:	Whether or not you do your homework (Correct)
Subgoal 2:	**Can discuss questions related to dieting**
Q2:	**Examples of eating disorders are:**
M1:	Dioxsin is a disorder related to dieting
M2:	Paraben is a disorder related to dieting
A1:	Anorexia and dioxsin (M1)
A2:	Anorexia and bulimia (Correct)
A3:	Orthorexia and paraben (M2)
Subgoal 3:	**Can discuss questions related to eating disorders and exercise**
Q3:	**A healthy lifestyle includes:**
M1:	Orthorexia is lifestyle
M2:	Eating a lot of unhealthy food
A1:	Getting orthorexia (M1)
A2:	Eating unhealthy food (M2)
A3:	Being active (M2)

Competence Goal:	**Can make skin cream with an list of ingredients**
Competence Goal:	**Detection of fat**
Subgoal 1:	**Can detect fat by Iselighets test**
Q1:	**How do we detect fat?**
M1:	Fat can be washed away
M2:	We can detect fat in the same way as monosaccharides
A1:	Using liquid dish (M1)
A2:	Using 2-propanol (correct)
A3:	Using Fehilng's solution (M2)
Competence Goal:	**Detection of monosaccharides**
Subgoal 1:	**Can detect monosaccharides**
Q1:	**What color change indicates monosaccharides?**
M1:	Fehling's solution detects proteins
M2:	Fehling's solution detects disaccharides
A1:	Fehlings solution changes turns orange/reddish brown (Correct)
A2:	Fehlings solution turns purple (M1)
A3:	Fehling's solution turns blue (M2)
Competence Goal:	**Detection of monosaccharides**
Subgoal 1:	**Can detect monosaccharides**
Q1:	**What color change indicates monosaccharides?**
M1:	Fehling's solution detects proteins
M2:	Fehling's solution detects disaccharides
A1:	Fehling's solution changes turns orange/reddish brown (Correct)
A2:	Fehling's solution turns purple (M1)
A3:	Fehling's solution turns blue (M2)
Competence Goal:	**Detection of proteins**
Q1:	**What do we use to detect proteins?**
M1:	Fehling's solution detects proteins
M2:	The same way as we detect starch
A1:	Fehling's solution (M1)
A2:	Sodium hydroxide and copper sulfate (Correct)
A3:	Iodine (M2)
Competence Goal:	**Detection of starch**
Q1:	**What do we use to detect starch?**
M1:	Fehling's solution detects starch

Competence Goal:	**Can make skin cream with an list of ingredients**
M2:	The same way we detect fat
A1:	Fehling's solution (M1)
A2:	2-propanol (M2)
A3:	Iodine (Correct)
Competence Goal:	**Theories on energising nutrients**
Topic:	**Understands the chemical characteristics of energising nutrients**
M1:	Nitrogen is a carbohydrates
M2:	glycerol is a carbohydrates
M3:	there are 5 carbon atoms in a glucose molecule
M4:	there are 12 carbon atoms in a glucose molecule
M5:	there are 12 carbon atoms in a glucose molecule fats and proteins have the same structure
M6:	fat containing glucose
M7:	protein is a carbohydrate
M8:	proteins are a type of fat
Q1:	**Chemical characteristics of carbohydrates?**
A1:	Carbohydrates have a "ring structure" (Correct)
A2:	Carbohydrates contain an amino group (M1)
A3:	Carbohydrates containing glycerol (M2)
Q2:	**The formula for glucose is:**
A1:	C5H10O5 (M3)
A2:	C12H22O11 (M4)
A3:	C6H12O6 (Correct)
Q3:	What are a characteristic of fat?
A1:	Fats contain an amino group (M5)
A2:	Fats contain three fatty acids and glycerol (Correct)
A3:	Contains a glucose ring (M6)
Q4:	**What is a characteristic of protein?**
A1:	Proteins are composed of amino acids (Correct)
A2:	Proteins are made up of glucose molecules (M7)
A3:	Proteins are made up of fatty acids (M8)
Competence Goal:	**Theories on cosmetic products**
Topic:	**Understands the main ingredients in cosmetic products and be able to create such an ingredients list**
M1:	Skin cream contains only Delphi fat

Competence Goal:	Can make skin cream with an list of ingredients
M2:	Skin cream consists only of water and alcohol
M3:	An emulsifier lumps fat
M4:	An emulsifier emits an odor
Q1:	**Skin cream consists of:**
A1:	Only fat-soluble substances (M1)
A2:	Only water-soluble substances (M2)
A3:	Both fat-soluble and water-soluble substances (Correct)
Q2:	**An emulsifier:**
A1:	Causes fat to clump together (M3)
A2:	Ensures that the skin cream smells strong (M4)
A3:	Binds together the fat-soluble and water-soluble substances in the cream (Correct)

9.2 Get to Know the OLM!

The OLM (Open Learner Model) uses visualisations of models to show your knowledge, related to a subjects' competence goals. In this way you get a competency model that provides an overview of the subjects' goals and where you stand in relation to these goals.

The competence model is built up as information is added. This gives you an overview of what you can and are good at, and what you need to work on. The model is updated based on information that comes from various sources and assessment situations such as quizzes and assignments you have done in OLMlets, etc. In addition, the teacher can manually add information from various assessment situations. Self-assessment and assessment by peers are other ways to build the model.

The tasks below provide insight into the most basic functionality of OLM. They are expected to take approx. 30 minutes.

9.2.1 Task 1: Look at your model

1. Go to the website: sandbox.next-tell.eu
2. Click on the link called Open Learner Model (OLM)
3. Log into the OLM with the username and password you've been given

Once inside, you can change the language by clicking on your name in the top right of the screen. Your task is to explore the different figures / models. These should tell you something about your knowledge in relation to the different competency goals. What you see is based on your answers to the OLMlets quiz plus information the teacher has entered.

To explore the OLM:

1. Click the "Open Learner Model", located at the top of the page
2. Select "Nutrition and Health" under "Competencies"
3. Scroll through the different visualisations of the model (Competence Histogram, Table, Smiley, etc.) thinking about these questions, which you will answer later in task:
    a. Do you understand the different visualisations?
    b. Do you see any patterns in terms of your your strengths and weaknesses when looking at the different competencies?

c. Which of the visualisation do you think is easiest to understand?

9.2.2 Task 2: Carry out a self-assessment

Make an assessment of your own knowledge in relation to the competencies:

1. Click on the "Add a result" tab, located at the top of the page
2. Click on "Self Assessment"
3. Click the Group Name link under "Groups and activities" and a list of competencies and activities will be shown
4. Click "Add information" (you may have to scroll at the bottom of the page to see the form you are about to use)
5. Click on the stars next to "New" to indicate what you believe is your level for that competence
6. Describe your strengths and difficulties in the text box
7. Save your input by clicking on "Submit information to the Learner Model", at bottom of the page

9.2.3 Task 3: Post in the discussion forum

Submit a post to the discussion forum with reflections over the questions you were given in task 1 “To explore the OLM”:

a. Do you understand the different visualisations?
b. Do you see any patterns in terms of your strengths and weaknesses when looking at the different competencies?
c. Which of the visualisation do you think is easiest to understand?

1. Click on the "Talk" tab at the top of the page
2. Click on "Filters" icon (a button with a blue bow and a funnel)
3. Click “Competencies” and scroll to the right competence using the plus sign
4. Click the little blue bubble that appears
5. Write your post in the comment section on the right of the screen.

LOG out:

Press the log out button in the top.