



Next Generation
Teaching, Education
and Learning for Life



Deliverable D5.9

Evaluation of Needs Assessment Method and Strategic Planning Method

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Table of Contents

1	Executive Summary	5
1.1	Purpose of this Document	5
1.2	Scope of this Document	5
1.3	Status of this Document.....	5
1.4	Related Documents.....	5
2	Evaluation of TISL methods and tools	6
2.1	UK studies	7
2.1.1	<i>Individual teachers</i>	7
2.1.2	<i>Collaborative TISL</i>	9
2.1.3	<i>Distributed TISL</i>	11
2.1.4	<i>Extending the TISL model to support distributed inquiry</i>	12
2.2	Norway studies	14
2.2.1	<i>Organisation of the study</i>	15
2.3	Germany studies	19
2.4	Leadership support for TISL	21
3	Conclusions.....	22
4	References.....	23
5	Definitions	24
6	Glossary	26





1 Executive Summary

This document presents a summary of studies evaluating the TISL (teacher inquiry into student learning) method. Research has been conducted in the UK, Norway and Germany, across a range of inquiry contexts: individual, collaborative and distributed TISL (where a lead teacher leads an inquiry involving many teachers).

The results of this work show the need to adapt the TISL method to suit the inquiry context. The original 5-step method (see D5.1) was adapted in the UK to support distributed TISL, connecting individual inquiry with wider processes of strategic planning and bottom-up change in schools. In Norway and Germany, work with teachers led to the development of the TISL heart. In terms of leadership support, work with a school which had established its own research centre allowed for an understanding of best practice in creating a culture and process that supports collaborative inquiries as a form of professional learning. The final report on the development of the TISL tools, which are based on the TISL heart, was included in D5.7.

1.1 Purpose of this Document

The purpose of this document (D5.9) is to give an overview of studies on teacher inquiry into students' learning (TISL), and from this to draw conclusions on the development of the TISL method and the process of supporting teacher inquiry using the TISL method.

1.2 Scope of this Document

This deliverable gives an overview of the TISL studies conducted in the UK, Norway and Germany. It provides a description of individual teacher inquiries and the modifications to the TISL method that resulted from this work. It also provides discussion of a leadership support study, to provide an understanding of best practice in creating a cultures and processes which support collaborative inquiries.

Definitions of key terms used throughout this document are provided in Section 7 and abbreviations and acronyms used in NEXT-TELL are listed in the Glossary in Section 8.

1.3 Status of this Document

This is the final version, D5.9.4.

1.4 Related Documents

Before, or in conjunction with, this document it is recommended that the reader be familiar with the following documents and appendices:

Related Deliverables: D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D6.1, D6.2, D6.3, D6.4, D6.5, D6.6, D6.7, D7.1

2 Evaluation of TISL methods and tools

The review undertaken as part of D5.1 identified a double challenge for teachers: they are increasingly expected to use ICTs to support teaching, and are also being required to operate in a more explicitly evidence-informed manner. Approaches existing at that point were considered either to require specialist training (design-based research) or as disconnected from strategic priorities (action research). The review identified teacher inquiry as an approach that, with development, would meet the requirements of being evidence-based; connected to strategic priorities; linked to teacher development; and supporting a focus on technology use.

The TISL method developed in response to these priorities combined existing approaches to Teacher Inquiry with approaches to Teacher Design Research (Bannan-Ritland, 2008), as described in D5.1. It consists of 5 steps shown in Table 1.

TISL Method	TISL Tools and Data handling
Establishing a trigger	Identifying tools and potential data sources
Choosing a lens	Planning for data capture and data sharing
Planning for and collecting evidence	Collaborative data analysis and interpretation
Analysing practices	Evaluating data and reflecting on inquiry process
Enacting and adapting an action / innovation	Data-driven decision-making for innovative practice

Table 1: Teacher inquiry with TISL

The TISL method supports a process of teacher inquiry that can:

- Extend reflective practice through teacher research
- Challenge research paradigms of 'outside experts', by placing teachers as central stakeholders of the research process
- Encourage teachers' collaborative pedagogical conversations surrounding inquiries
- Capture and make sense of students' digital learning data, which can allow for evidence-based planning on a class, or whole school level
- Benefit from immersive continuing professional development in the active combination of theory and practice, explored in the context of the classroom
- Provide evidence which can inform school strategies
- Offer professional learning opportunities relating directly to teachers' own classroom practices
- Develop skills in using technology effectively in the classroom incrementally and offer support for teachers to act upon research findings (when participating in the research process).

The TISL method was used in three partner countries, the UK, Norway and Germany, and was adapted over the course of our collaboration with teachers. The core purpose of this work was to refine and apply the TISL method, which included developing the software components that supported this approach. (The final release of the software associated with this work is described in D5.7, "TISL Components Code Release and Documentation".)

In the UK, the original 5-step method was retained in our work with individual and groups of teachers (sections 1.2.1 and 1.2.2) with slight modification in the wording of the steps to make it more understandable. However, two challenges arose within this work that warranted further investigation. It had originally been assumed, based on the review, that teachers' inquiries would be driven by strategic priorities set at the school level, and that the evidence gathered could be aggregated to provide school-level insights. However, educational change



within schools did not follow this linear model, but follows a model of distributed leadership (Spillane, 2012), and so it was proposed (in D5.6) that the separation between TISL (teacher-led inquiry) and SPICE (strategic inquiry) be reconsidered, allowing iterative, cyclical discussions around evidence to be supported. Reflecting this, two studies were undertaken in the UK in the context of distributed teacher inquiry, where a lead teacher (a middle manager) explored the impact of top-down change with a team of teachers (section 1.2.3). The TISL method was revised in the light of this experience to one that could better support lead teachers in this context.

Work with teachers in Norway and Germany led to the adaptation of the 5-step method to the TISL method (sections 1.2.4 and 1.2.5). This work led directly to the specification of the software tools, which incorporated the TISL heart representation of the inquiry method into its interface.

The development of tools to support teacher inquiry is reported in D5.7.

2.1 UK studies

As noted above, studies in the UK context initially explored individual teachers' inquiry, but later moved to consider the role of inquiry as one element within a wider school context, involving multiple staff members, while using separate studies. To reflect this, the current section differentiates between initial studies with only one teacher, and later studies in which teachers operated collaboratively or in a distributed team (sections 2.1.2 and 2.1.3).

During our initial collaboration with teachers, we found that a simplified version of the TISL steps and explanation of each step (shown in Table 2) were easier to follow. We, therefore, subsequently used this version.

TISL method	Description of activities
Step 1: trigger	Establishing a question that leads to the inquiry. This is formalised as a research question
Step 2: refine question	Identifying what aspect of the learning experience is examined. (e.g. using new technology to support collaboration)
Step 3: collect data	Determining what data will be collected and which technology tools will aid this process
Step 4: analyse	Examining and evaluating the data. Reflecting upon students' learning and practitioners' teaching
Step 5: enact change	Deciding upon and undertaking any changes in practice that may result from new knowledge gained

Table 2: Teacher inquiry with simplified steps.

2.1.1 Individual teachers

We supported 3 individual teachers to conduct inquiries using the TISL method. (Note that all names are pseudonyms.)

Maria

Our collaboration with this teacher was reported in D6.4 (p.68 - referred to in that report as R1).

Inquiry context

Maria is a computer science teacher, who teaches Java programming and ICT skills. Our collaboration with her grew out of an initial workshop that introduced the TISL method to 8 teachers.



Inquiry

Her TISL plan was to investigate how Java Programming students perform on an online version of a quiz that has previously been administered on paper. The quiz is part of her formative assessment and is on the subject of specific Java Programming skills. Her TISL plan was to create an online version of the paper quiz, and ask her students to complete the quiz. She then planned to analyse the results of the quiz as compared to paper versions taken by the same students several months prior, and to elicit comments from her students about their preferences (paper versus online). She augmented this analysis with qualitative data in the form of informal discussions with students about their experiences taking the online test.

Outcomes

The inquiry resulted in changes in Maria's teaching practice. She found the online version of the quiz increased students' engagement when compared to the previous paper based test. She also reflected on other aspects of her teaching and began to seek new ways of engaging students using technology. She shared the process of her inquiry with other staff across the school, during staff meetings.

Sam

Our collaboration with this teacher was initially reported in D6.6 (p.40).

Inquiry context

Sam is a teacher of a BTEC qualification in Art & Design, leading a module on 3D Animation in a Further Education college in London. Our collaboration with him was developed through his expression of interest in engaging with the project after a preliminary email introducing NEXT-TELL. Sam wanted to further his own research experience, focusing on student collaboration as an area of college-driven initiative.

Inquiry

Sam's TISL plan focused on the ways in which Google Docs might affect the collaborative skills of learners in supporting the preparatory work for one of his course modules. Learners' coursework for the module focused on the creation of an animated monster, which would be summatively assessed at the end of the unit. Google Docs was to be used to facilitate learners' group work and for monitoring and formative assessment of students' work by the teacher. His TISL plan included data collection from students in the form of shared collaboration documents (for example narratives which were developed collaboratively within small groups of learners for use in the animation). Sam maintained his own research notes, and used classroom-based reflections to structure informal discussions with his learners, relating to their group work.

Outcomes

Sam found refining the focus of the inquiry problematic. Initial assumptions that Google Docs would positively enhance collaborative skills were flagged and reconsidered. There were additional barriers for Sam in working as an independent teacher-researcher, including communications with senior leadership. The teacher's initial motivations for conducting the inquiry were to develop his research experience and to further explore a college-wide initiative to implement Google Docs into classroom teaching. Though this initiative was a 'top-down' strategy, the decision to focus on the use of the tool to support student collaboration was teacher-driven. Senior management were made aware of the teachers' inquiry, though there were a number of delays in the teacher meeting and obtaining consent for research participation from one of the college's management representatives. Sam also identified that there was a 'missing' management system within the department: due to reorganisation within the college, there was no department-specific curriculum manager. Unlike the collaborative school studies in later sections, Sam was not supported in communicating with members of staff (notably members of management) outside of his immediate teaching department. This lack of support was also clear when discussing the sharing of research findings. Sam suggested that he would share his findings with other teachers through a resource pack, but this would not be formally distributed through a college dissemination infrastructure.



There was a tendency for the reflective journal to act more as a log of events, rather than a reflective tool (for example, 'Have bought story cubes and hope to use them in the classroom') and for this to use predominantly anecdotal rather than rigorous analysis (e.g. 'super-organised'). However it was clear from the informal meetings and a summary document produced by the teacher that the inquiry had developed through reflective observations ('... I need to clarify how group work could be used for this task in the first place, let alone assessing potentially new tools for the job') and that the teacher had demonstrated a preference for qualitative data from his students throughout the study.

These observations highlighted the fact that teachers' inquiry can be valuable whilst remaining informal; indeed, the decision not to spend time documenting reflections for which there was no obvious audience was entirely reasonable given the time pressures that teachers operate under. However, Sam's interest in sharing findings as a resource pack, coupled with the absence of documented reflections and the lack of support in communicating findings to others, drew attention to the challenges of sharing the outputs of inquiry. This issue was returned to in subsequent theoretical and empirical work.

Hayley

Hayley is a British teacher of Key Stage 2, who was adjusting to a new post at an international school in Italy.

Inquiry Context

After completing a Master's degree in Teaching at IOE, Hayley wanted to further expand her experiences of classroom-based inquiry and sought participation in the NEXT-TELL project after being made aware of it while in the UK, through her IOE tutors. This study was supported remotely by IOE through an initial Skype meeting, the use of Google Docs to share teacher plans, and emails on a needs basis. Collaboration with this teacher was initially reported in D6.6, and inquiry findings will be reported in D6.7.

Inquiry

Members of Hayley's class each had access to an iPad in their classroom. The overall focus of Hayley's inquiry was to explore the ways in which iPads could be used to support teaching and learning. Her TISL plan focused on evaluating the use of a planning app, Popplet, to support learners' story-planning skills. She planned to formatively assess story plans created using Popplet, in addition to summatively assessing completed plans. Hayley used reflections from these assessments to structure informal discussions with learners surrounding their experiences of the app.

Outcomes

Unlike Sam, Hayley did not seek to disseminate research findings among teaching colleagues, and instead planned to change her teaching practice to reflect her findings. She viewed the app as useful in providing students with a dynamic and flexible approach to story-planning skills. Hayley saw the specific value in using the app with EAL (English as an Additional Language) learners to support language development with the inclusion of associated images - *'I was not even aware that you could add photos before the children informed me. Certainly I will use this feature in the future for further differentiation - especially for the EAL learners in my class.'*

2.1.2 Collaborative TISL

The studies reported in section 2.1.1 demonstrate the feasibility of using a structured approach to support teachers' inquiry into their use of ICT. However, these experiences drew attention to the challenges of sharing the outcomes from inquiry work. Whilst further studies were undertaken to develop the TISL method (reported below), the subsequent work in the UK focused on this issue of sharing outcomes. One approach to achieving this involved teachers working together – this approach is the focus here.



Inquiry facilitator: Stephanie

Our collaboration with Stephanie and colleagues engaged in collaborative inquiry cycles developed after the school expressed an interest in project participation after a preliminary e-mail. Work with this school is discussed in D6.6 (p.40).

Inquiry context

We collaborated with a Jewish school in London that supports teachers to conduct collaborative inquiries. We worked with the lead teacher, Stephanie, who is responsible for organising and supporting the inquiries. The school had initially undertaken cycles of collaborative inquiry as a tool to improve teaching and learning and as a form of professional development. Inquiry cycles were followed by training sessions led by staff, and were viewed as a method of CPD which could support change in schools (though there was limited information available about the impact of these sessions on teaching practice across the school).

Inquiry

Stephanie had been interested in sourcing external support for the collaborative inquiry programme which could provide some support in understanding the impact which inquiry-based work had on teaching and learning at the school, and in shaping initial inquiry ideas. Researchers met with Stephanie, the collaborative inquiry facilitator (who fulfilled this role in addition to her teaching duties) and group leaders on four occasions at the school. Data collection involved informal meeting notes, as well as an audio-recorded group interview with Stephanie and two collaborative inquiry team leaders, Rachael and Adam. These meetings allowed for an insight into the collaborative inquiry model employed by the school.

Outcomes

Whereas Sam, (discussed in 2.1.1.) as an individual teacher undertaking inquiry, found refining his research plan and achieving cross-departmental communication problematic, these were issues which were combated by Stephanie's role as facilitator for the members of the collaborative inquiry groups. The facilitator role allowed for a balance of structure and flexibility to be achieved for the inquiry groups, through the selection of a number of research areas in which teachers involved in collaborative inquiry groups could then decide their focus, with support from the facilitator. These research areas were decided by the facilitator with school plans and broader teaching and learning themes in mind. The teachers who engaged in collaborative inquiry were positive about the support which they received from their facilitator, explaining that on-going support for leading their inquiry groups was offered, and that they felt confident in learning from the facilitator's leadership skills. An inquiry group team leader outlined that when communicating with members of her team, she reviewed past e-mails from the facilitator as exemplars of 'gentle leadership' style which she believed had been effective.

The teachers interviewed described that their motivations for undertaking inquiries in their classrooms were that they viewed such classroom-based research as a form of professional development which could encourage collaboration and sharing of practice across departments. This was flagged as something which was not otherwise achieved within the school. The teachers also discussed that undertaking the research allowed them to create conversations which could inform the strategic plans of the school. Though there was little evidence of the inquiries informing school strategic plans, inquiries could provide an empowering channel of communication for collaborative inquiry members.

Though fewer challenges were described by teachers acting as group leaders, the facilitator outlined a number of issues that she had encountered in her organisational and mentoring role. School management had provided resources (in terms of an allocated facilitator) for completion of inquiries, though additional time to complete research was not provided for teachers. The facilitator described how the lack of time meant that developing rigorous research plans proved problematic, with teachers providing varying levels of support in forming their plans. She also outlined the complexities of organisational change, explaining that converting findings into strategies for teaching and learning and demonstrating their impact was dependent on achieving buy-in across the school and that enacting this was complex - *"In a very large school, it's a bit like it's a very large boat...and*



turning it around takes a huge amount of effort. So changing practice in terms of the way things are organised, you have to convince a lot of people’.

Findings from the inquiry project were presented to their peers by each group at school enrichment sessions. These were scheduled opportunities for colleagues to attend professional development sessions and talks conducted by members of the collaborative inquiry group.

2.1.3 Distributed TISL

The collaborative inquiry described in section 2.1.2 represents a ‘bottom up’ approach to change, with sharing of practice facilitated by the school’s commitment to professional development and inquiry. However, the initial assumptions, as outlined in D5.1, were that schools might commit to a strategic priority, and that this would lead subsequent teacher inquiry. This section reports on a study in which a school came close to achieving this directed change process. Further discussion of these issues can be found in section 2.4, below.

We collaborated with two lead Science teachers to support them conduct a distributed inquiry, that is, an inquiry into a change in teaching practice that was top-down and involved their colleagues. In this case, the lead teacher is not conducting an individual inquiry: they identify the question for inquiry, but the innovation changes all teachers’ learning designs. The context is not one of a collaborative inquiry either, because one person led the change and introduced the innovation in teaching practice. Consequently, this case was classified as closely resembling the initial assumptions made about schools’ strategic planning.

Tom

Tom is the Head of Science at an Academy school for secondary-school aged learners located in Cambridgeshire. Our collaboration with Tom grew out of an initial workshop with 8 teachers that introduced the TISL method.

Inquiry context

This teacher engaged in two cycles of inquiry to evaluate the implementation of novel assessment methods during cross-curricular STEM projects affecting teachers and Year 8 students of Science, Technology, ICT and Maths. The first inquiry is reported in D6.4 (p.70) and the second inquiry is reported in D6.6 (p.39).

Inquiry

Tom engaged in two cycles of inquiry across two cross-curricular STEM projects. The trigger for the first project in 2011 had been to evaluate the effectiveness of a new STEM project structure at the school. It also aimed to encourage collaboration between colleagues at the school on how to shape the best method of formative assessment for their students. Tom planned to use Soundcloud to capture audio for collaborative formative assessment; data obtained from the collaborative data analysis sessions and responses from a post-project survey. Responses were sought from the 49 teachers involved in the STEM project.

This was followed by the 2013 TISL cycle (described in more detail in D5.6, p.31), in which the teacher sought to evaluate Google Forms as a potentially more time-efficient tool for collaborative formative assessment. Tom used Google Forms as a formative assessment tool, to allow teachers and students access outside the school premises, allowing for self-assessment by students, and standardised and streamlined assessment by teachers. By encouraging self-assessment, it was hoped that learner’s independent learning skills would be developed. The study focused on the Futures project, aiming to develop STEM skills for 300 learners, and involving the work of 57 teachers of Science, Technology, Maths and ICT subjects.

Tom’s inquiry included data collected from a staff survey which he set up himself. This survey was anonymous and was administered online using Google Forms. Tom also collected data from the ongoing formative assessment of learners’ work using Google Forms. Learners self-assessed their skills development throughout the project in a learning diary.



Outcomes

A number of challenges were encountered by teachers engaged in both STEM cross-curricular projects (in 2011 and 2013). Some teachers found teaching outside of their specialist subject problematic, finding that they did not feel confident in their knowledge. This lack of teacher confidence was also evident in relation to the use of technology.

The first TISL inquiry in 2011 demonstrated changes to practice as after using Soundcloud audio assessment. A more tightly planned and collaboratively designed scheme of work was evident. Discussion development points for students were streamlined and simplified, discouraging 'staged' responses. Teachers in other departments also began using the audio recorders. A key outcome of the initial inquiry was increasingly reflective practice, as Tom then engaged in a second cycle of inquiry in 2013, seeking a tool which allowed for formative assessment without being based on audio recordings (because of the impact which assessing audio in 'real time' had on teachers' time).

Key outcomes of the inquiry undertaken by Tom in 2013 included the use of Google Forms in later STEM projects, though with refined questions and on fewer occasions. This reflected inquiry findings included that teachers felt overwhelmed by the amount of data which students were required to input into the Google Forms learning diary.

Mark

We collaborated with, Mark, a Head of Science at an Academy School for secondary-aged learners in Essex, who had expressed an interest in engaging in inquiry-based work as part of the project after a preliminary email exchange after being introduced to the NEXT-TELL project. Mark's inquiry is first mentioned in D6.5 (p.12).

Inquiry context

Mark's TISL plan had an initial focus on the use of Moodle to standardise homework procedures across his department (to provide evidence for a broader school-based initiative). The inquiry was planned in response to a management-initiated change in the homework cycle of the school, which included the use of another software tool in addition to Moodle. As a consequence, the inquiry shifted in focus. The science department operated optional study support sessions for learners, and the inquiry evolved to include a focus on these classroom based sessions and the impact of Moodle on learner attainment. Mark planned to conduct a distributed TISL, involving feedback from four other Science teachers on their experiences using the tool. He also planned to include findings from informal discussions with learners, in addition to analysis of final summative grades (available at the end of August 2014).

Outcomes

As Mark's inquiry is still underway, there are currently only anticipated outcomes. A key motivation for the lead teacher's participation in the inquiry was to provide evidence for management which justified the existence of student support sessions. As Mark is required to provide feedback to senior management in meetings on this subject, it is anticipated that his findings will inform decisions surrounding whether to maintain the student support sessions within the school timetable.

2.1.4 Extending the TISL model to support distributed inquiry

Studying the above two cases of distributed teacher inquiry (2.1.2, 2.1.3) enabled us to identify a series of places in which the conventional 5-step model failed to support the planning process. To address these shortcomings, we developed a method designed to support teachers trying to undertake such inquiries while working in teams, or even simply in a co-ordinated way. The method steps are shown in Table 3 and Figure 1.

TISL method	Step-by-step actions	Description of activities
Question	Step 1: trigger	Establishing a question that leads to the inquiry. This can be formalised as a research question (e.g. is the introduction of new technology improving learning).
	Step 2: refine question	Identifying what aspect of the learning experience is examined. (e.g. using new technology to support collaboration).
	<i>Step 3: identify teacher ownership</i>	<i>Identify the scope for teachers to take ownership of the inquiry (e.g. new technology to support collaboration in various contexts of learning: inquiry-based, subject-specific etc.). Identify collaborative tools to aid this process.</i>
Data collection	Step 4: collect data	Determine what data will be collected and which technology tools will aid this process.
	<i>Step 5: support data collection</i>	<i>Determine who else will be collecting data and how to provide support for them. Identify strategy to support and monitor communication.</i>
Analysis	Step 6: overall analysis	Examining and evaluating the data. Reflecting upon students' learning and practitioners' teaching. Revise based on Step 7.
	<i>Step 7: synthesis</i>	<i>Examine and evaluate teachers' data. What questions have they addressed? Can their findings be combined?</i>
Change	<i>Step 8: new inquiries</i>	<i>Can teachers' questions lead to new inquiries?</i>
	Step 9: enact change	Deciding upon and undertaking any changes in practice that may result from new knowledge gained.

Table 3: A modified method for distributed TISL (additional steps in italics)

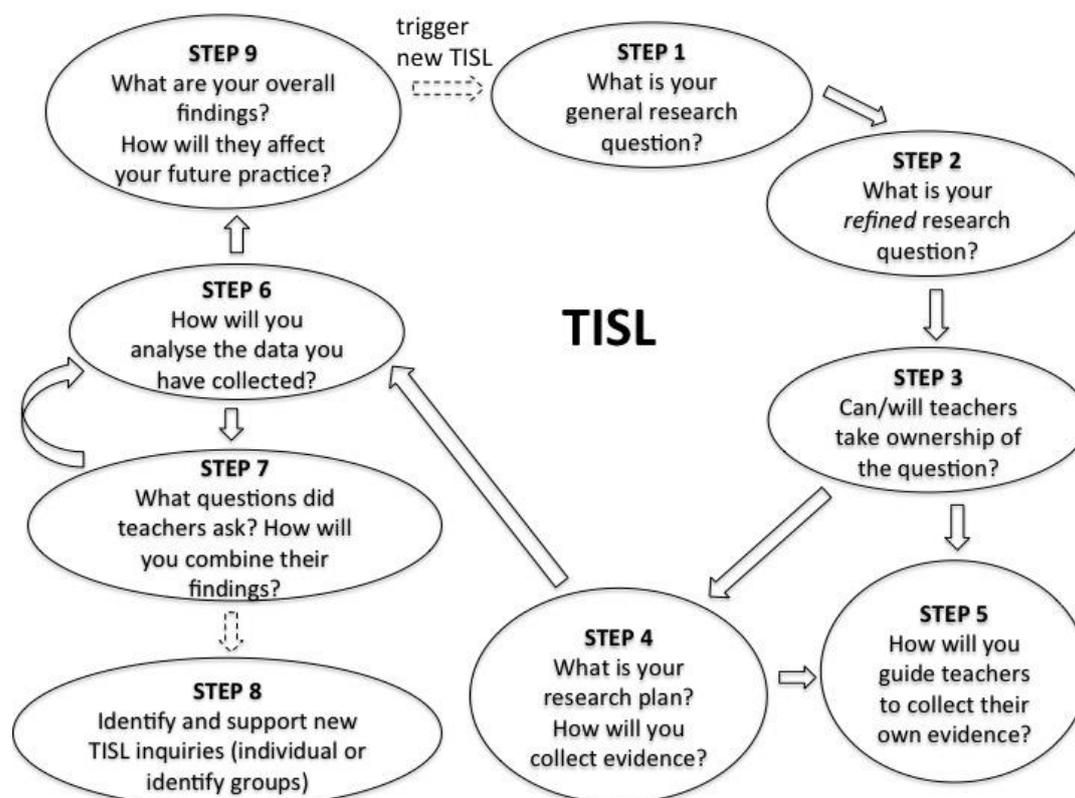


Figure 1. Process of the modified TISL method

These developments represent an important bridge between the individual inquiry work undertaken by teachers, and the strategic planning that was assumed to have taken place at the start of the project (D5.1). Specific questions remain about the forms in which the outcomes from inquiry can best be shared (e.g. in person, as revised teaching materials, as a case study account etc.) These considerations also led to modifications of the TISL software so that the plans and outcomes can be shared, as reported in D5.7.

2.2 Norway studies

The Norwegian report is organised in a different manner than the studies from the UK and Germany, due to problems with conducting the study as planned. The problems were caused by technical issues, resulting in teachers not being able to investigate the TISL method through the use of the tool. This section reports on the methods and tools development at TISL level, evaluation of the aim to use the provided tools and investigate their effects on teachers and the schools internal working processes. Previously related work has been reported in D6.4, which described the original focus group workshop that produced data on current teacher practices in using student data to improve practice, D5.5 that presents the TISL Heart method and its model, and D5.6 that presented the TISL Heart workshop held in January 2013, with seven teachers who investigated the different steps in the TISL method. The results of this workshop were used to improve the TISL Heart method and model, and to identify requirements for a tool to be developed to scaffold teacher's use of the TISL Heart method in their practice.

Aims

The aim of the study reported in this section was to engage teachers in the use the TISL Heart method and its tool in their practice, and to identify if and how teachers received support in professional development by using the TISL Heart method and its tool. We were particularly interested in whether or not the teachers



thought that the TISL Heart model and its method gave a more unified and systematic approach to teacher inquiry, and how it changed their inquiry practice.

Thus the aims of this study were:

- 1) To investigate how teachers use the TISL Heart method and model.
- 2) To identify if TISL could give a more unified and systematic approach to teacher inquiry
- 3) To investigate how TISL changed the teachers' inquiry practice.

Summary of data collected

The study was part of the teacher-led study carried out in one upper secondary school in Bergen, Norway. It is a public school, which comprises three grades (VG1, VG2, VG3) with students from ages 16-19; it is a digital school and has previously been described in D6.2. Two STEM teachers participated in the workshop (in D 5.6 referred to as Group 1), and the data is reported previously. Data collected for this study comprises of three interviews and one questionnaire.

2.2.1 Organisation of the study

The Norwegian teachers participating in using the TISL method and tool, were at the same time participating in a study, aiming at using RGFA, OLM and OLMlets in their teaching. The use of these tools is reported in D2.8, D6.5, and D6.6. TISL was an additional activity in which the teachers were planning to participate.

The teachers were busy with using the other NEXT-TELL tools in their teaching, but had a good idea about TISL, both participating in the focus group (D6.4), and the workshop (D5.6).

A workshop in January 2013 was useful in order to see how teachers could use the TISL Heart method to plan an inquiry project related to a problem relevant within *their own practice*. After reading through our observations and studying the post-it notes, our main conclusion was that teachers needed to be scaffolded with guiding questions throughout the process, challenged with expressing their ideas in short sentences. Also, the step: "Analyse! What is the result of changed practice?" was expressed as difficult in the workshop, as they were not sure how they would analyse the data they collected. The tool would have to support such action.

Professional development through a TISL process where teachers investigate students' assessment results and data to improve their teaching practice can be seen as extra workload, resulting in a time consuming and tedious process for teachers. Through the earlier reported focus group study (D6.4, Hansen & Wasson, forthcoming), we knew that these teachers were already using student data to improve teaching, although not in a unified, systematic manner. Since the tool was not ready for use in spring 2013, we still wanted the teachers to reflect on their teaching, and prepare to start the use of the tool in autumn 2013. We therefore interviewed the teachers on why they choose to teach in a certain way, and on what background they choose their teaching approaches. One of the teachers described:

T2: There are a lot of reasons for that. Experience is one reason, you know, we have quite some experience. The methods, there are some methods that you know works. And then there's also something about the curriculum that you know, or goals that you know are difficult. For example, having to go through in several ways. So that's something, there is of course something about that ... It does not mean we should just ... because we use modern methods, but it ... but there is something about the experience that we bring with us which is very important! (S1-2013)

This teacher explains how teaching and the use of methods are selected based on experience. Such experience was also tied to knowing what competence students found difficult. T1 supported this issue when, in the same interview, explained how complicated subjects had to be taught in several ways, where students should be active in the process of learning, not sit still and just listen ((S1-2013).

According to the teachers, experience is stated as most important when it comes to selecting a teaching approach. Still, inquiring the teaching methods in a unified systematic way was something that the teachers were not used to, according to the findings in the focus group (D6.4) and the workshop (D5.6). We know from the teachers participating in the workshop (D5.6) that finding a question, *something to inquire*, was not that

hard - but *formulating the question into a research question, and finding a method to inquire this question*, was not as easily formulated.

Thus, a tool to support such a process seems necessary, if an inquiring method was to be implemented in teachers' practices. Still, such a tool would have to fit into teachers' *on-going-practice*, due to an already tight work scheme. Certain features shown to be necessary, according to interviews, in order for teachers to be able to succeed with implementing inquiry methods, in their practice:

1. *The TISL Heart method and the tool needed to make the inquiry process quick, since time is something teachers miss in their everyday working situations.*
2. *The tool had to help teachers find the inquiry process to be less tedious, and lead to a more unified and systematic process that would make it easy to share results with colleagues and school leaders.*

Together with NEXT-TELL partner BOC Information Technologies Consulting Sp. z.o.o., Poland, we developed the TISL Heart Tool to support the TISL Heart method. Discussions with teachers resulted in a prioritised list of high-level requirements for the tool:

1. First, it had to support professional development.
2. Visually it had to look like the TISL Heart Model and outline the steps of the TISL Heart method.
3. The scaffolding and leading questions following each step had to be easily viewed.
4. It had to be a quick and easy tool to use.
5. It had to be easy to connect steps in the process to student learning data; just-one-click-away.
6. It had to be easy to share findings.
7. It had to be easy to generate a report for management and school leaders.

These priorities clearly identify that the teachers meant that the tool had to be easy to use and support the TISL Heart method with which that they had already worked. A later interview supported these findings:

Researcher: Do you think that this kind of tool may be useful for yourselves, and for other teachers, that there might be others who are wondering, how did it really go?

T1: Yes, this this is something that we are really bad at! To evaluate! In a proper way!

T2: Yes, we are! And this has, again, to do with time. It has to do with this time aspect! Always!

T1: Yes!

T2: Yes, it is!

T1: Yes! I find that if this is going to work (the tool), if it should be like that (looking at the template), it has to be more like a questionnaire. (...) "Was it like that? Ok! Or like that? Yes! Maybe!" It could not have too many options. So that you, in a way ... Was it good or less good? Bad, worked fine, did not work. Something medium ...

T2: Yes, plain and simple!

T1: (...) we have many subjects and we have many settings.

T2: ... and many students!

T1: ... and much ... many students! And if this should be meaningful, it has to be simple, with just ticking out the alternatives.

(...)

T1: At least for my part then!

T2: Yes, but I think everybody agrees in that! I completely agree! Yes, yes, yes!



T1: Then it may be feasible to do such a thing. Not too big and too much – just “ok”. (Our translation) (S1-2013)

During the time with teachers we learned that in school in general there is clearly a focus on teachers getting further education, through formal and informal courses. Hence, there is less time to evaluate and inquire one's own practice, according to our teachers. It was therefore exciting to see if the teachers were able to start use the TISL tool to inquire in their own practice. In autumn 2013, the teachers were planned to start their inquiring process, using the TISL tool. To support this process the teachers were asked to feed into the TISL tool. In order to do this they got the following assignment:

Create a project and the TISL model.

Dear teacher!

Please try to enter the TISL tool.

To use the tool, please use the address: <http://85.124.32.234/TISLPlanner/V3>

Maybe you need to copy the link into a browser since you may have difficulties with entering the link directly from Outlook.

Investigating the tool will be something we also will do together, at a later date, but it would be useful if you also try to do this on your own:

1. Create a project name.
2. Add name and school, country (optional in the next window)
3. You get the message: 'Model was edited successfully'. (It may take some time)
4. When you see the TISL Heart can you add the details into the different steps
5. Remember to save
6. Close the project. At the top of the window there is a small 'X'.
7. Having closed the Heart, you return to the main page and can search previous projects and add new project.

This information was sent to the teachers via e-mail, and the teachers were left on their own to investigate the TISL tool. The teachers were able to contact the researcher by phone or mail at any time, if any problems occurred. The teachers got a date for a *follow-up-meeting*, but did not make any contact with the researcher prior to this.

At the *follow-up-meeting*, however it turned out that the teachers had had problems. They were not able to get the tool to work. They had not contacted the researcher, due to lack of time, and knowing that they were having a *follow-up-meeting* they waited for the meeting to learn more about the tool.

In the meeting, the researchers presented the task for the teachers. They were able to enter the tool but the TISL Heart was not usable, as it occurred in a split screen. The teachers were using an iPad, and were not able to get it to work. After some trouble shooting, without any results, the teachers were asked to use the time left to investigate the OLM. The teachers had a focus on the OLM, and were eager to work with the OLM and the OLMlets.



It was obvious that focusing on three different tools was too much work for the teachers, and added to their already tight program. They were not able to put in extra resources to investigate a tool that was not directly involving students and classroom activity. The teachers were motivated at the start for this inquiring part of their practice, but with technology not working, motivation was lost. We therefore decided to wait with TISL until spring.

In order to have the teachers not to forget the idea about TISL, we wanted them to give us a little feedback on the tool, in which they answered "We have not used TISL much, since there has been a lot of problems to get it working, because of access to the browser.", and "TISL: Difficult because of technology and access to browser".

Another workshop was planned in February 2014 during a project meeting in Vienna. The teachers were invited to a workshop, where Day 1 was related to OLM (This will be reported in D6.7), and Day 2 was related to inquiring via TISL. The Norwegian teachers were eager to start investigating the tool. Once more they experienced problems with accessing the tool. This resulted in a list of challenges and requests for the developers to solve:

- 1) Compliance with Internet Explorer
- 2) Allow creating project in demo mode
- 3) Help text/support for each step
- 4) Generic info: how to start
- 5) Printing (heart graphic + text)
- 6) Upload of documents
- 7) Make "share" available
- 8) Add logout button
- 9) Open 'notebook', i.e. is it possible to have all tabs of notebook opened at that same time? (E.g. button "show all")
- 10) How do I find my projects - in browse view open left panel by default and open folder with my projects
- 11) Add 'Theme' attribute next to the subject (and include it in live search)

In addition to these, German would be added to the list of languages (currently English and Norwegian).

As a result, it is applicable to say that TISL, though highly relevant for the teachers, was not fit to be tested/used as planned. They were not able to use the tool to support TISL investigation into their own practice. Thus we cannot say whether TISL support professional development or not. Having teachers use tools that are not functioning made them less motivated for the project, though BOC Information Technologies was able eventually fix the problems. The issue of the technology was once more mentioned in a later interview in spring 2014, where T1 tells about the lack of support from school leaders when participating in a research project. During this interview, one of the leaders had been asking the teachers if they could have an update on how the TISL project was going on, the teacher had replied that they had not got to work with TISL due to technical problems. (S2-2014). In addition, later in the spring 2014 the teachers were busy and had little or no time to investigate TISL, as they were very involved in understanding the use of the OLM (this activity will be reported in D6.7). As a lesson learned, implementing several concepts such as RGFA, OLMlets, OLM, and TISL was problematic due to resources, capacity, time, and motivation. TISL as a method could have been implemented without the tool, though this would cause issues in a paperless school, and would not have saved time. TISL should be the one-and-only-focus for the teachers when using it the first time, and if this was the case, we believe there would be different results in relation to resources, capacity, time, and motivation.

2.3 Germany studies

The work summarised here is reported in full in D6.5 and D6.6. Together with the studies conducted in Norway, this study led to the development of a TISL heart model. The model was collaboratively designed with a German teacher after the usage of the OLM in 2013.

Inquiry context

A teacher in Hamburg introduced the OLM to his Geography students in March 2013 (D6.5) in order to make self-assessment more attractive to his students. He had also offered this possibility beforehand on paper but only a few of his students used the opportunity. Due to this reservation in doing self-assessments on paper, the teacher thought the OLM might raise learner interest in doing self-assessments. He furthermore hoped that the transparency of learning goals (competencies) might help students to do the self-assessment.

After this first usage of the OLM, the teacher realized that it was not the paper that had made self-assessment unattractive to students. Rather, they were very challenged by the task of self-assessment itself. The introduction of the OLM and competency goals did not help to make this task easier for them. Talks with his students revealed furthermore that hardly any of their other teachers put an emphasis on self-assessment and reflection. Students neither knew exactly how to do it nor did they see any specific value in self-assessment. This was despite the fact that the ministerial school plan expects students at this class level to already be self-reflective and self-regulated, so they *should* know it. In addition, the OLM usage revealed that the use of ICT (especially LMS) is criticized by some of his students (see D6.5).

The use of the OLM revealed misconceptions on the part of the teacher:

- my students do not like to self-assess on paper,
- my students like the use of ICT in classroom,
- my students are self-reflective and self-regulated learners.

It also gave insight into students' learning:

- my students do not know *how* to self-assess,
- my students do not know *why* the ability to self-assess is an important skill.

The OLM induced the teacher to think about his teaching practices.

Inquiry

Out of this experience, he asked himself what he needed to change in his teaching to familiarize his students with self-assessment and make the value of self- (and also peer-) assessment more clear for them. In a reflection interview during the summer break 2013 he further formulated some intentions about how to approach this at the beginning of the new school year (see D6.5 and D6.6).

Outcomes

Together with the researchers, these considerations (TISL question) and change intentions (TISL methods) were formulated into a TISL model that has later on also been documented as the TISL heart (already reported in D6.6, p.28).

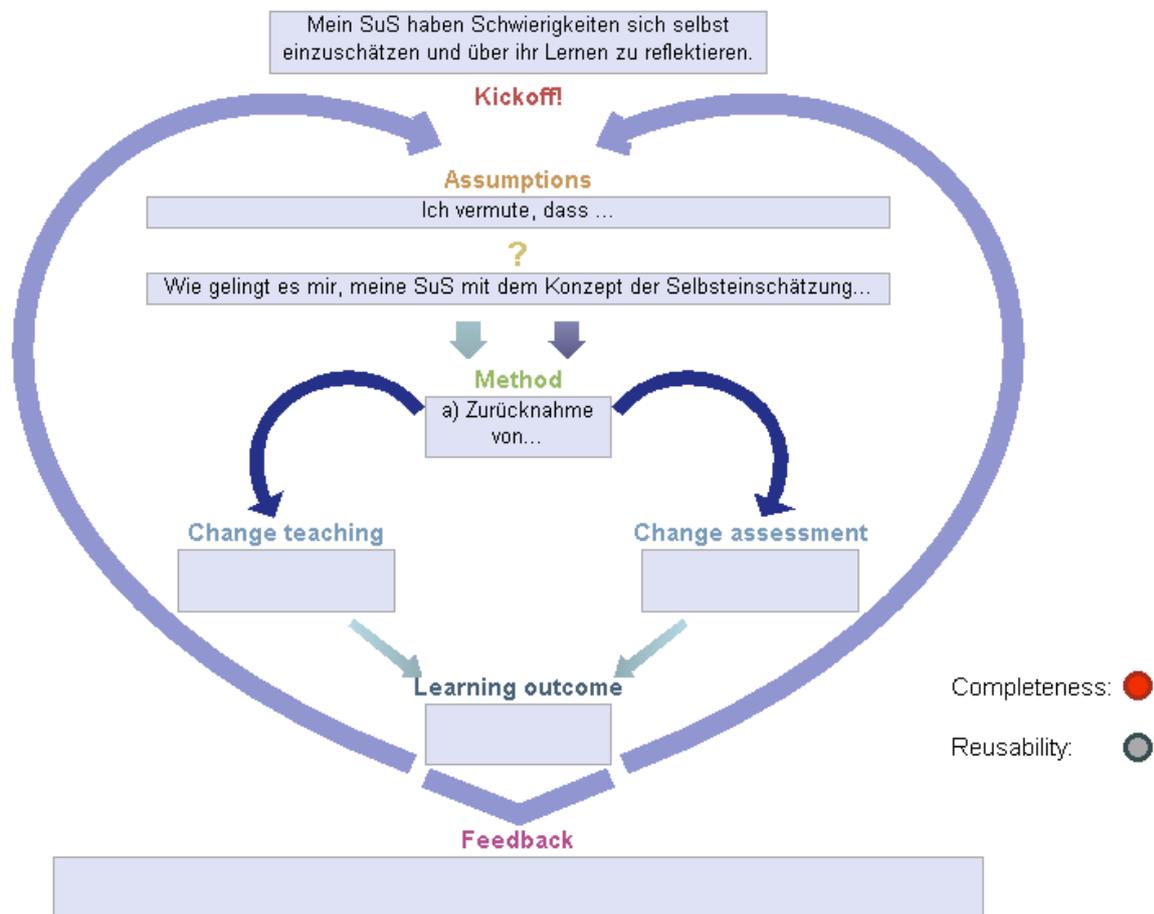


Figure 2. TISL heart model for introducing self-assessment to students.

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

2.4 Leadership support for TISL

It is generally accepted that successful school leadership does not involve imposition of goals, but the creation of a shared sense of purpose and direction, and the distribution of leadership practice throughout the school community (Leithwood and Riehl, 2003). The goal of those in leadership roles is to manage the relationships within the school in order to utilise the expertise that is available in the organization. Therefore, understanding successful leadership must go beyond head teachers' accounts, to explore the "collective interaction among leaders, followers, and their situation" (Spillane, 2012). However, the literature is less clear about what forms of distributed leadership activity are effective (Harris, 2003). The implication for the relationship between strategic planning and teacher inquiry is that we need to better understand how to support a distributed process of inquiry that enables management or lead teachers to implement a participatory, rather than top-down approach.

Our work on distributed inquiry (section 1.2.3) led to the development of a TISL model and method that can support a lead teacher wanting to involve their colleagues in the evaluation of an innovation. However, more generally, a school that wants to enable their teachers to contribute their expertise to the wider organisation needs to implement a structure that supports teachers to come forward with their own ideas, and enables them to contribute to collaborative inquiries.

One of the schools we worked with has created a centre within the school to support collaborative teacher inquiry. Teachers are given the opportunity to come forward with their ideas for an inquiry and are supported in formulating the idea into a concrete plan. Clear outcomes are specified and a team of two or more colleagues is set up to conduct the inquiry.

We conducted a series of interviews with 18 teachers who participated in a collaborative inquiry supported by the centre (10 as project leaders, and 8 as project team members). Our aim was to better understand best practice in creating a culture and process that supports collaborative inquiries.

Our findings highlighted the following:

- The existence of a process within the school for supporting collaborative inquiries creates and enables communication between teachers and management staff. The centre provides teachers with a point of contact through which they can identify the person they needed to talk to. In addition, the fact that the teacher's inquiry had been recognised by the centre gives the teacher confidence to approach their colleagues, especially school management staff.
- Support to teachers during the development and process of their inquiry helps them develop not only their skills in conducting an inquiry, but also their collaboration and leadership skills.
- The fact that a teacher's inquiry is conducted with the centre's support means that the relevance of the inquiry's outcomes to other teachers can be identified. It, therefore, becomes easier to share the outcomes from the inquiry more widely within the school.
- The collaboration between colleagues that is initiated by a collaborative inquiry is lasting. Teachers who have worked together during an inquiry find it easier to approach the same colleague in the future.
- Many teachers reported being inspired by their colleagues, and valuing the opportunity of participating in inquiry projects that they would not be in a position to initiate.



3 Conclusions

This document has reported on the teacher inquiry into students' learning (TISL) studies conducted across 3 partner countries, the UK, Norway and Germany. We collaborated with teachers and supported them to conduct inquiries into their students' learning across several different contexts (individual, collaborative, distributed). The studies show how we adapted the TISL method to the context of inquiry, to best support teachers' needs.

This work has resulted in the development and refinement of a structured approach to teacher inquiry (the TISL heart), its implementation as a software tool, a development of our theoretical understanding about approaches to sharing inquiry, and a deeper understanding of the change processes in schools surrounding inquiry work. Our experience indicates that while individual teacher inquiries can lead to improved teacher practice in individual classrooms, setting up structures for collaborative or distributed inquiry ensures wider impact on students learning, and sharing of best practice across the school. Time will always be a challenging barrier, but can be more easily overcome with the involvement of teams of teachers, supported by school structures that enable inquiry.

In addition, the work has had a material benefit to learning and teaching practice in schools internationally. As can be seen from the sections 2.1-3, cumulatively, the teacher inquiries supported by NEXT TELL have led to improvements in practice that affect at least 17 schools, 183 teachers and 300 pupils.

Whilst this represents a major step forward from the position described in the initial review of literature (D5.1), new challenges have emerged that warrant further investigation. The processes of change in schools clearly cannot be assumed to be linear and strategically driven; they also represent the priorities of individual teachers, responding to concerns they experience in their day-to-day teaching practice. We have extended our structured approach to inquiry to support such distributed, complex change processes, but additional work could be undertaken to identify additional models, beyond that identified in section 2.4, for schools to implement; and also to explore the different kinds of representations of practice that are best suited to different inquiry contexts.



4 References

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5 Definitions

This section provides an overview of key terms used in this deliverable. The key terms and definitions provided in Table 3 are provided to bridge the dialogue between designer/developers and social researchers, teachers, school leaders and other stakeholders participating in the NEXT-TELL project. They relate to the various inquiry, modelling and planning processes, tools and related components described in previous sections of this deliverable.

Term	Definition
Academy school	In the UK educational system in England (i.e., not Scotland, Wales, or Northern Ireland), a school that is directly funded by central government and independent of control by local government in England. An academy may receive additional support from personal or corporate sponsors, either financially or in kind. They must meet the National Curriculum core subject requirements and are subject to UK government inspection regimes. They are self-governing and most are constituted as registered charities or operated by other educational charities. Most are secondary schools for pupils aged 11 to 16.
boundary	scope of inquiry
dashboard	provides visualisations of the results of the inquiry process
data adapter	adapts data elements/artefacts contributing to values/indicators in TISL process
data element	informational artefacts that contribute to/shape/inform the inquiry process, e.g. student test results
data filter	filters data elements (e.g. filters log files for data that can be assessed/quantified)
domain map	a map of the Knowledge Domain
domain map model	models contributory values from Knowledge Domain, e.g. integer operations, knowledge of integers
influences	relates to the modelling of relations between strategic goals and their level of importance (strong, moderate, weak, critical, positive/negative)
inquiry process	use of TISL method and related tools as a systematic procedure for inquiring into students' learning
inquiry project	a single instance of inquiry which may comprise multiple inquiry processes
International school	In the UK educational system in England (i.e., not Scotland, Wales, or Northern Ireland), a school that is not directly funded by central government and which is independent of control by local government in England. International schools may define their own curricula independent of the UK National Curriculum and cater mainly to students who are not nationals of the UK, such as the children of the staff of international businesses, international organizations, foreign embassies, missions, or missionary programs.
modelling element	an object or process block
“least best-fit”	a specification of the minimum features set in a user interface that is needed to successfully complete a task
model type	variable model types within the overall TISL modelling set, e.g. Indicator model, Planning model, Assessment model, etc.

Term	Definition
note	permits 'open text' to be included within the TISL model during the inquiry process.
operational goal	relates to division of strategic goal(s) into short term (operational) goal(s)
process step	a way of visualising each step in the inquiry process using the TISL inquiry process planner, cf process blocks in workflow modelling or flow charts
Progressive disclosure	an interaction design technique often used in human computer interaction to help maintain the focus of a user's attention by reducing clutter, confusion, and cognitive workload.
step	one step within the TISL inquiry process, a block attribute depicting processes
strategic goal	the goal(s) or outcome(s) of teachers' inquiry (what they want to achieve through application of TISL methods and tools)
sub-model	detailed view of subset of processes within a specified inquiry project
TISL indicator model	identification of contributory artefacts and potential value indicators, e.g. test sheet, score, count as average test score
TISL planning model	a research plan comprised of a workflow model generated by teachers using the TISL inquiry process planner; single view; iterative design
TISL score card model	a way of modelling goals (outcomes) and indicators (contributory values) within the inquiry process
User acceptance	Refers to the likelihood that software users will be willing to adopt a tool for use in their task completion and goals
web form	an HTML-based input template for user data
wizard	a computer user interface that leads a user through a dialog of procedural steps/tasks to complete a clearly defined goal

Table 4: Definitions of key terms used in this document

6 Glossary

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

BSCW	The document store used in NEXT-TELL used for storing internal documents
Document store	see BSCW
EuresTools	The reporting tool used in NEXT-TELL
PM	Person month
T	Task
WP	Work package

Partner Acronyms

JRS	JOANNEUM RESEARCH Forschungsgesellschaft mbH, AT
UniRes	UNI RESEARCH AS, NO
KMRC	Medien in der Bildung Stiftung, DE
TUG	Technische Universität Graz, AT
CBS	Copenhagen Business School, DM
BHAM	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

ACS	ACS Cobham International School
BS	Baseline Study
CbKST	Competence-based Knowledge Space Theory Training Course
CBT	Computer Based Training
CPD	Continuing Professional Development
DBR	Design-Based Research
ECAAD	Evidence Centered Activity and Appraisal Design (builds on the ECD)
ECD	Evidence Centered assessment Design (e.g. PADI project)
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

D5.9 Evaluation of Needs Assessment Method and Strategic Planning Method



ESL	English as a Second Language; refers to learning English in the target language environment
EVA	Educational Video with Collaborative Annotations, Analysis and Assessment
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
SRI	Stanford Research Institute
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
TDA	Thomas Deacon Academy
TDR	Teacher Design Research
TDS	Teacher-led Design Study
TEL	Technology Enhanced Learning
TESL	Teaching English as Second Language
TISL	Teachers Inquiry into Students Learning
TISL-W	A web-based TISL planning form based on least-best fit specifications
UI	User interface

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