

Deliverable work package 6
S-Team NTNU



Combining art and science through the Scottish storyline method in explorations of themes connected to water locally, nationally and globally

4 tutorials for teachers and teacher educators

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Attachment:

1. Huseby @quarelle, a pedagogical documentation of four storyline projects carried out in Trondheim

1 The Scottish storyline method in inquiry based science education

“Storyline is not only about knowledge and skills but also about feelings and attitudes.”
(Steve Bell)

The idea underpinning the four tutorials, which are outlined in work package 6 from NTNU, is the potential of combining art and science in order to develop science literacy.

The Scottish storyline method offers an aesthetic approach through a fictive frame for exploring issues of relevance.

The structure with teacher organized key questions and a firm storyline planning structure provide an open architecture learning space. In this open architecture the students explore, investigate, learn and produce knowledge actively. The knowledge produced can be factual knowledge, insight and understanding, as well as action competence. The storyline model encourages models of democracy and good citizenship. The storyline approach can be used for learners of any ages. The tutorials presented in this work package have been carried out in secondary school grades 8-10.

According to Steve Bell (www.storyline-scotland.com) storyline is a strategy for teaching in an enterprising and creative way:

Storyline is a partnership between teacher and the learners. The teacher designs the line (the chapters of the story) and the learners create and develop the story. The line aims at curricular content and skill practice while the story provides the context within which the pupils will feel motivation through ownership. They create characters that will bring the story to life. The line is designed in the form of key questions. Storyline is not only about knowledge and skills but also about feelings & attitudes.

The storyline principles can be summed up as the following (Bell, 2011):

- The teacher starts with what the learners know by asking key questions.
- These are open questions which require imaginative and creative thinking.
- The questions have a sequence that forms the chapters of a story.
- Learners produce their answers in the form of conceptual models (or hypotheses).
- They then test their hypotheses by questioning and research.
- A wide variety of techniques is used to explore and present their ideas including visualizations in two and three dimensions.
- Teachers use co-operative learning techniques and appropriate grouping.
- Teaching structures are employed which support success.
- Pupils’ work is assessed in a relevant and constructive way.

To plan a storyline

Storyline is used for designing topic work, integrating perspectives from more than one subject in the study of a phenomenon. In attachment 1, Pedagogical documentation of a three year storyline R&D-project “Huseby @aquarell”, a planning suggestion by Sallie Harkness (2005) is enclosed. In the planning it is necessary to pay attention to the following:

The story has three elements: people (the characters), time (past, present or future) and setting (place or situation). The story can start either with the setting or with the characters.

In order to be effective it is necessary to involve the learners regularly so that the 'red thread' is maintained. If the gaps in the participation become too long or if there is digression from the main line the thread can be broken. It is the very difficult to return to the story.

A storyline is planned using key questions which provide a sequence called episodes (chapters)

The story is always chosen with curricular targets in mind. Why I am teaching this story?

The science loops are important ingredients in a storyline. A science loop or expert witness is a sequence where necessary facts are provided as for instance lecture, demonstration, film, teacher in role.

The water storyline projects we describe in the four tutorials are developed in collaboration with a teacher team and teacher students in practice and they have consisted of 20-30 hours of work with pupils in secondary school. A devoted teacher team representing different subjects is necessary for the quality of the storyline experience. In the storyline projects explored the participants have been one group of pupils (29 throughout the three years), a teacher team at the local secondary school (teacher of Norwegian language and literature Randi Farstad, teacher of English and drama Anne Christine Walbye, science teacher Rune Kvilvang. Some other teachers have also participated in some of the projects); student teachers in practicum periods, and researchers Anna-Lena Østern (professor arts education) and Alex Strømme (professor biology education), and research assistant Nora Sitter from Programme for Teacher Education. Artist Hannah kaihovirta-Rosvik has repeatedly been invited to supervise the pupils in visual art expression. Some other art teachers and artists have contributed to the project in short periods.

A storyline planning scheme, modified by us, is used in the tutorials.

2 Tutorial 1: Storyline about the water cycle, our dependence on water, local level

In the storyline project we create a fictive frame consisting of a block building in the local community. The different family types in the block are visualized and their need for water problematized in two ways. A fictive blocking of water supply brings the inhabitants to discuss how to share limited access to clean water, as well as limited possibilities to visit the toilet. Another comparative perspective is introduced by a letter from a school in Tanzania asking questions about use of water among school children in Norway.

The science issue explored in this storyline is the water cycle.

Storyline Key questions	What the teacher does	What the pupils do	Material	Organization	Product	Aim	Evaluation
What happens if the local community has no water supply, and the cloak system is blocked?	Introducing a problem through a person is role telling about problems with water and cloak. Introducing restrictions in how much water every person could use.	Discuss possible solutions Plan for sharing water.		Whole group meeting a person in role telling about problems	List of suggestions for solutions	Get involvement in the theme. Variation in working modes.	
How are we dependent on water?	Introduce the letter from Tanzania where pupils ask for information	Plan how to answer to the letter. Discussing which possible	The letter from Tanzania			Providing a “hook”- a dramaturgical starting point for	Dialogical response groups Reflection logs

	about dependence of water in Norway. Suggest a fictive frame: the families in the block building and their dependence on water.	characters could be created in a fiction about one block building in our community				exploration. Introducing a global frame for the explorations. The budding researcher. The local community involved in learning processes.	
How do different families use water in our local community?	Organize groups, suggest different family groups. Ask the students to develop characters. Give the task to explore daily use of water. Organize groups with defined tasks	Develop families, fictive characters; visualizations Pupils interview people in the community about estimated use of water. Some make scenes, some power points, some films.	Crayons, sheets, storyline wall Ipod for interview Lap top with editing program; Video camera; documentation camera	In groups Different tasks For different groups	Vizualisations on the storyline wall Graphs with descriptive statistics about use of water; Film based on interviews in the city, about water use. Digital story about the beauty of water. Scenes with focus on	Socio science issues explored Multimodal science literacy developed (basic skills)	Formative assessment; response to tasks
What is water?				One of the		Science	Check through

		Gather information		groups explores and reports.	different family types use of water. Power point about H2O	curriculum (The budding researcher)	testing the factual knowledge
What is the water cycle?	Science loop with demonstration of the water cycle. Ask the pupils to think of one question to ask after the lecture. Introduce the human water cycle	Listen and observe. Produce question regarding the water cycle.			Knowledge in detail about the water cycle	Science curriculum	Check through testing the factual knowledge the understanding of the importance of water; the action competence to solve problems connected to water supply and sharing.
What is an eco system for cleaning of water?	Visit the water cleaning institution	Field studies	Get entrance to the water cleaning place for the group		Diary sheets about reflections regarding cleaning of water		Teacher evaluation through response to Diary sheets.
How did people get water supply in old days in our country?	Give one group a task to interview old people in the community. Ask them to transform the interview into scenes	Find old people to interview, and do it. Transcribe the interview; transform the answers to a story told through drama	Tape recorder (I pod)		Interview Scenes about use of water 70 years ago in the community. Song text produced.	Get a historical perspective on how people got water in earlier days.	

How can we communicate knowledge about water?	Plan a presentation for another group at school, and for documentation to the pupils in Tanzania	Rehearse, plan the presentations, and carry out the presentations.	All equipment in place; video recorder for documentation; welcoming group for the visitors.		Presentation of the answers to the key questions explored.	Basic skills demonstrated and developed.	
Sharing, response, evaluation Decision to invite the pupils in Tanzania to produce a storyline and document and send to us.	Organize a closing session for the exploration of the water cycle, local level. Ask about the experienced learning outcome. Look forward To letting the threads from different explorations meet in a comparison with African perspectives on the water cycle.	Contribute with sharing, response, evaluation orally and written on evaluation sheets. Get the diploma with teacher assessment of the work	Prepare diploma, evaluation sheets, sharing of video and photo documentation.		Reflection about learning experience and knowledge, insight and action competence achieved. Evaluation of the storyline form as learning model		Assessment related to curriculum in science and other subjects involved. Evaluation survey distributed to the pupils, and analysed The teachers giving credits for individual contribution and for group contribution to the success of the project.

3 Tutorial 2: Ecological awareness, glaciers and icetime, book based storyline

The book based storyline had Michelle Paver’s fantasy story “Wolf brother” as fictive frame. The book is rich in characters who could serve as fictive frame for an exploration of nomadic living and challenges to a society depending on ecological balance in nature. They people from Stone Age were dependent on nature, and they experienced glaciers and snow gliding. In the same time there were possibilities to compare Stone Age with our time, and to define earth today as the clan of human beings, which has to elaborate rules for people to be able to live in peace, think ecologically and thus survive. The teacher red some parts of the book, and chose the key questions to explore by inquiry based methods as well as artistic methods.

The science issue explored in this storyline is what ecology in nature is; what ice times ment to people, what gliding glaciers are, what threat gliding snow is; what sustainable development is historically and today in nature as well as in communities.

Storyline (“Wolf brother” as fictive frame from the stone age) Key questions	What the teacher does	What the pupils do	Material	Organization	Product	Aim	Evaluation
Receive the pupils	Artistic opening of the storyline: The main characters in role in the meeting between Torak and the wolf. Read from the first chapter.	Audience Formulate hypotheses about where and when and who.	The book “Wolf brother”; copies of The big wood (from the book); the stone age music sounding: Brummeren fra Tuv; role cards prepared for the two persons in role,	The room organized for performance; and for clan groups; the two persons in role placed in freeze position in the beginning. Acting the scene with the	Performance Reading the first chapter Elaboration of facts and theories about	Art meeting, being touched by the story Curriculum aims: The cooperating	Response to the artistic opening of the storyline.

<p>When was stone age I northern Scandinavia?</p> <p>How can we know about that time, which had no written language?</p>	<p>Ask the first key questions: Where are we? When does this take place?</p>		<p>instructions to them; internet addresses to stone age facts Material prepared: tape stripes for names, material for marking the clan identity (different colours of tape); scissors, crayons, paper sheets; Stone age music instrument: Drums, rain stick, rhythm instruments</p>	<p>meeting between Torak and the wolf.</p>	<p>ecology in stone age</p>	<p>human being, the working human being. Develop ecological awareness, social and cultural competence.</p>	
<p>What was it like to live in a society of the stone age in the country?</p>	<p>Short science loop about stone age living. Divide the tasks: form clan groups of about seven persons. Ask them to</p>	<p>Elaborating the tasks. Sharing</p>			<p>Clan groups, visualized with clan signs, clan greetings, clan roles. Creating the fictive frame.</p>		<p>Discuss the premises for sustainable development.</p>

	change individual name into stone age names, find a clan name, Clan values, Clan greeting.						
What was it like to live during the stone age?	<p>Reading one more chapter from the book.</p> <p>Divide tasks to explore: Hypotheses and historical facts about how the society functioned, how the ecology in nature was at that time, flora and fauna. About artifacts they produced, Fishing, hunting, culture</p>	<p>In groups choose a theme to explore (via the internet, books, films)</p> <p>Formulate hypotheses and report.</p> <p>Make protoypes of artifacts. Produce visual images of the main characters in the book.</p>	Role cards of main characters (from the book)	In groups	<p>Reports, storytelling, digital storytelling, films, music ceated; Prototypes of stone age weapons, useful working tools, and things needed for preparing food.</p> <p>The storyline wall with characters; nature; craft; stone carvings.</p>	Explain main aspects of how the earth and mankind has developed through ages, and the background theories for this development	Self evaluation, Peer evaluation, teacher evaluation of products
What did it imply to belong to a clan?	Read one more chapter of the book.		In groups	Free space			Prallels to our time – reflection

<p>What is a ritual? How think dramaturgically about creating a ritual?</p>	<p>Give a task: Form a rhythmic clan ritual showing the stone age people's believes in values and threats for their existence Instruction about dramaturgical thinking</p> <p>Introduce the reflection log To write some reflections about the issues studied, every workshop</p>	<p>Discussion, choreography of clan ritual in clan groups; Performing, Giving response.</p> <p>Five minutes focused log writing, individually.</p>			<p>Performances</p> <p>Reflection about meaning in ritual, about how people thought about phenomenas and forces in nature</p>		<p>Response from peers, using dramaturgy criteria</p>
<p>Which were the clan rules?</p>	<p>Read one more chapter from the book.</p> <p>Give a task: Formulate three rules for the clan to obey.</p>	<p>In groups formulate clan rules and motivate them</p>	<p>In groups</p>		<p>Written clan rules on the storyline wall</p> <p>Performances</p>	<p>Train nomadic thinking- make comparisons:</p>	

	Form scenes about the lives of the clan members	<p>Create scenes from living in stone age, and perform them.</p> <p>Some groups form music and song; some group make a film with theme from the book; some group produce a digital story; some group work with storytelling; some groups form drama scenes.</p>				how did they think then- how do we think now?	
Where and when was there ice in the icetime? Where do we have glaciers today?	<p>Science loop about icetimes, glaciers, the threat from melting ice, and from snow and ice gliding. With video clips. Formulate questions about the theme of the lecture</p>	Listen and ask questions.	Have prepared the video clips, and visual material for demonstration			The history of earth	Discussion about the cyclical icetimes and the reason for these

<p>Which are your experiences with ice, snow and water?</p> <p>Poetic expressions about water?</p>	<p>Ask the pupils to share memories of experiences with ice, water, snow, rain?</p> <p>Artist teachers guide groups of pupils into artistic expression</p>	<p>Sharing and elaborating in drama.</p> <p>Dance, storytelling, physical theatre, collective visual expression; writing</p>		<p>One group performing, another telling</p> <p>In groups Producing and sharing</p>	<p>Stories shared</p> <p>Poetic expressions in art forms about water</p>		<p>Discussion about how water influences the life of the individual, and the community.</p>
<p>Which could be rules to obey today for clan earth in order to survive?</p>	<p>Ask the pupils to formulate the three most important rules for mankind to obey in order to keep the planet sustainable and a good place to live in.</p> <p>Organising a clima pannel</p>	<p>Discussing in groups, formulating the rules, motivating them, sharing.</p>			<p>A clima panel discussing the rules suggested and voting for some of them.</p>	<p>Discuss the premises for sustainable development</p>	<p>Discussion about prospects for the future regarding climate changes.</p>
<p>Science loop</p>	<p>How to clean water during the stone age, and today</p>	<p>Demonstration, and exploration in groups.</p> <p>Discussion around how big a problem this is globally.</p>				<p>The budding researcher inquiring</p>	<p>Evaluate parallels today</p>

Science loop	<p>About wild life on land and in the sea; animals (wolves inhabitats) then and now – how they are part of the ecology of nature.</p> <p>Mark the entrance to fiction through the rain stick sound</p> <p>Reading the last chapter of the book</p>	Discussion and exploration via internet sources.			<p>Demonstrating dramaturgical tools through use of them in a multimodal artistic expression which makes meaning.</p> <p>The need for empathy; the wish for a glimpse of hope</p>	<p>Understanding the vulnerability of nature; the need to respect nature,</p>	Sharing
Clan meeting as final meeting	In role as clan leader introduce the yearly clan	Perform for the other groups what you have produced of					

	<p>meeting where you report from your different clans, you trade, you make contracts. At this meeting present the clan rules and decide which three are the most important for all clans to obey: then and now.</p> <p>Derole, finally stepping out of the fiction created.</p>	<p>knowledge. Multimodal presentations. Response, sharing and discussion. Writing in the log book, reflections about the ecological balance in nature.</p>					<p>Understand the mutual interdependence between mankind and nature; and the dependence on the solidarity and empathy from other groups of people, globally, in order to create a sustainable ecological balance.</p>
<p>Evaluation What do we know about</p>	<p>Ask the pupils to evaluate the project, the</p>	<p>Give response, fill out evaluation</p>		<p>Whole group as well as individually</p>	<p>Make the project history, look</p>	<p>A three dimensional narrative space</p>	<p>Evaluate the importance of combination of</p>

<p>water, ice, and glaciers? What do we know about nature in terms of sustainable development challenges today and in the future?</p>	<p>learning outcome, the storyline experience</p>	<p>schema.</p>			<p>back and point forward</p>	<p>(= then-now-in the future)</p>	<p>artistic reflection and scientific reflection.</p>
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4 Tutorial 3: The battle about the water power nationally in Norway (The Alta action)

In this storyline issues connected to how to use water as an energy resource is explored through an event in our own time (1979-81) about building a waterfront wall in Alta- Kautokeino in northern Norway. This was a very provocative action and groups were pro or against the use of the wall. The wall formed a big water reservoir, which could be used in order to transform falling water to electric power. The fictive (but documentary) frame was created by pupils framed into groups like: the Sami people (against); the labor parliament (pro); the eco philosophers (against); the local people (pro); the political activists (against); the police and the workers building the wall (obeying political decisions), and the journalists reporting.

Science issues explored: How water is transformed to electric power. How the water power has political dimensions, and power dimensions that influence different groups in society in different ways. To take a standpoint, and be a responsible citizen and actor in the decisions made concerning science issues, to understand and become action competent.

Storyline Alta action Key questions	What the teacher does	What the pupils do	Material	Organization	Product	Aim	Evaluation
The hook, dramaturgy of introducing the conflict around the water system Alta- Kautokeino Who are these people representing? Where are	Teacher students marking the different groups of agents in the conflict Alta action.	Audience producing questions in order to get answers to the questions. The pupils framed as individuals in the different groups. Making photo	Sami jojk CD sound from a loudspeaker; Props to mark workers, police, activist, Sami people Guest teacher expert on	One teacher student as leader of a meeting about the Alta action. The group participants. In groups elaborate the identities and arguments of	A scene giving a taste of the theme explored. Arguments for their standpoint. Storyline wall with posters elaborated through photo shop	To present the Alta action theme in an engaging and provoking way. To get into the historical event, and understand the different aspects of	

we? What is it all about?	Science loop about photo shop use	shop collages with original Alta-action photos mixed with pictures of the pupils in role.	photo shop (supervisor). In groups work on scenes to present the core conflicts.	the group they represent.	manipulation. Scenes about conflicts	power connected to water.	
How can we get energy for the need of the society? Which different opinions can be identified?	Science loop Discuss different options	Explore different sources for energy; present pro et contra. Prepare arguments for a panel debate.	Material for building a water power station Internet studies	Whole group, and small groups	A water power station producing electricity. Arguments written down.	Inquiry based learning about how electricity is produced. Socio science issues explored.	Evaluate the value of the arguments.
What do different groups think about the Alta- power struggle? How are different groups affected by the regulation of the water system?						Socio science issues explored. Ethical aspects, social competence, and cultural competence developed.	

Which are their arguments?							
How are the Sami people as aboriginal people affected? Which are their rights?	Science loop by the Sami teacher visiting	Whole group listening, and asking questions. Write text for newspaper about the Sami people. Discuss how use of language can be discriminating.	Sami clothes, Sami craft; Sami music and film.	Whole group	Cultural knowledge about a specific aboriginal people. Text for newspaper. Examples of how Sami people use the resources in nature. Open new horizonz of understanding.	Connects to aims in the national curriculum to learn about the Sami people, and their life conditions. Democratic participation and understanding.	Peer response
How is a panel discussion about this theme carried out? How do you argue for your standpoint?	Structure the panel debate	Taking roles, and gathering their arguments. Do the argumentation.		One student teacher as pannel debate leader. The groups of pupils arguing for their standpoint, and listening to the others.	Organized panel debate, rehearsing of citizen skills, rhetorical skills.	Basic skills in verbal argumentation. Leadership training.	Self reflective thoughts, peer response and teacher response.
Visiting a waterfall that	Plan and lead the	Participate. Prepare tasks	Get funding; get interest	Ask the pupils to take with	Sensuous experience of	The human being aware of	

has been regulated (Mardøla waterfall) Which were the consequences for the people living nearby?	excursion. Invite biology expert to join the excursion. Contact local people to tell the Mardøla story.	to study during the excursion.	from parents, order bus, guide, school to visit. Preparing material for the pupils. Camera, videocamera.	them suitable clothes; ask the pupils to write reflective logs about their observations at Mardøla waterfall.	the beauty of a waterfall in its ecological context. Describe the feeling of belonging to a larger system in nature.	milieu To be active and curious in exploration.	
Final meeting, presenting your products; summing up how powerful a natural resource water and waterfalls are for a country like Norway.	Have a final meeting with all groups in the class. Share the experiences. Celebrate the free waterfalls and the thought of sustainable development as well in nature as among human beings.	Present their products regarding the theme under study, especially the report from observations at Mardøla. Trying out if the water power station works. Tell and act out the people's stories.			Produce a final event, outdoor.	Communicate	
How do we evaluate this	The teacher guides a	The pupils talk and write					Evaluation schemes. Mention things the pupil has

storyline project? Can we find parallels to other actions taken to save nature?	dialogue about the storyline project carried out,	about their experiences with storyline.					learnt: factual science knowledge, artistic knowledge, insights and changed attitudes; action competence as a citizen of tomorrow.
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5 Tutorial 4: Water as threat and hope, global level

In this storyline the exploration encompasses water as threat and hope on a global level. The fictive frame is formed by family groups from Namsos, Verdalen, The Maldives and from Pakistan. The threats these people meet is in Norway gliding snow, and land gliding because of quick clay. The threat to the Maldives is the raising sea water level, and the threat from tsunamis like in 2004. The threat from flood in Pakistan caused by rain and storm is diseases like cholera spread by dirty water. In this final storyline we sum up the threats, but also look at the hope connected to clean water.

The science issues explored are physics, erosion, climate changes, and health issues connected to dirty water, on a local and global level.

Storyline Key questions	What the teacher does	What the pupils do	Material	Organization	Product	Aim	Evaluation
There has been an “accident” of some sort, related to water as a threat, close to the school. Someone must take action. But who and how?	Establishes a fiction contract. Entering the role as teachers in the school camp, victims of the land/ snow slide/ tsunami or rescuers performing first aid.	Reacting to the situation. Performing first aid. Participating in the search. Two pupils enter the roles as journalists, documenting the event.	Camera. Mobile phone. Two notepads and pencils. Searching sticks. First aid dummies.	Finding a proper site for the event Organizing search for the people missing.	Collected material for making a digital story about the happening later in the process.	Exploring whether we are prepared for acting responsible to a critical situation Deeper understanding of what is necessary to do in an emergency situation.	At the end of part two of the day; Did the pupils know how to react and what to do? Could they have been better prepared?

<p>How do we react when finding yourself at scene of an accident?</p> <p>First aid- what to do, and when?</p>	<p>Teach the students to understand and to perform Cardiopulmonary resuscitation (CPR). Set off a dialogue about first aid and accidents. Answer questions.</p>	<p>Listen, speak, ask questions. Practice CPR.</p> <p>Practical and theoretical first aid course. Dialogue about accidents in general and land/ snow slides in particular.</p>	<p>First aid dummies.</p>	<p>The classroom or outdoors</p>	<p>Performing CPR and articulating the experiences of the day.</p>	<p>Theoretical and practical knowledge about how to react and what to do when arriving at a scene of an accident. Increased awareness.</p>	<p>Reflections on the nature of accidents, natural disasters, locally and globally.</p>
<p>Meeting someone someone bearing witness.</p>	<p>Teacher-in-role as a form of Expert Witness (science loop). Telling or dramatizing a story about his or hers personal experience about water as a threat. Integrating facts and feelings.</p>	<p>Listen. Asking questions after being Introducing the sites of investigation: Two local and two global areas where water is a threat.</p>	<p>Microphone Simple props or costume to mark the shift from teacher to another character.</p>	<p>Classroom or auditorium or outdoor.</p>	<p>Performance, oral storytelling session or short dramatized piece.</p> <p>Science loop.</p>	<p>Develop sensitivity, curiosity and empathy towards the natural and human conditions concerning water as a threat, locally and globally. Increasing the pupils' knowledge disasters threatening each area.</p>	<p>Reflections upon reactions when meeting a person bearing witness. What did we feel/ learn?</p>

How to build role identities by forming family groups through drama exercises.	Guiding pupils in developing identities in family groups. Each family is given a home place, Leading drama exercises where the family members, as individuals, make ethical choices “What would you do if”.	Go deeper into the topic by identifying with a family experiencing a worst case scenario. Pushed to make hasty choices and then argue why they made this choice.	Camera, taking photos of the frozen moments.	Spacey area. Photo shoot: Making frozen moments, form a crucial moment; when the catastrophe hits their home.	A photo of each group taken in the particular frozen moment, up on the storyline wall..	Enter a topic through entering a role, securing empathy, relating them to actual incident by letting them be in the center of things.	Reflection upon Fiction contract- What changed, going into the role? Reflections upon the choice people in emergency situations have to make. Are you sure what would be your choice?
How to develop family identities and relations through drama work.	Drama counseling. Guiding the pupils through a process of getting to know themselves and each other.	Improvisation. Working towards a presentation of each family, including individual presentation. Posing for a new frozen picture from a critical moment in the families coping with the natural disaster.	Camera.	Spacey area.	New pictures put up on the storyline wall.	Explore the power of empathy. Building of identities. Presentation of families; how? A different view when changing the perspective.	Evaluation: What did we learn and how?
Writing-in role, Reader-	Get the pupils going, writing-in-role, with the	Write. Give each other response, in couples.	Pen and paper.		Written text, a story told in first person	The ability to transform one mode (picture)	Make the pupils aware of the transformation

response. Creating a common family-story.	frozen picture as a starting point.	Meet up in the family groups and create a common story/ family story.			about what happened.	to another (writing) and then a common family story in order to elaborate the role and story	process. And introducing them to the question of multimodality and modes.
Theoretical research about the locations and the threat of water. Introduction of the idea of a multimodal performance for primary school pupils.	Designing research questions that are put up on the blackboard.	Answering the questions, using the internet and/ or books as a source.	Books, computers, a printer.		A printed sheet form each groups, up on the storyline wall.	How to quickly do research and extract information about a topic. What are the facts about this country/ and the threat they are facing.	Reflection upon the differences of today's learning methods; drama, writing and research. Why combining them. How is the story developing?

How can we make a presentation for a primary school, and transform the material we have so far into a whole multimodal performance, e.g. a TV-show.	Organizing brainstorm and handing out a scheme for plotting in a scenario for each groups act/ story	Brainstorming in groups to pin down a multimodal presentation in the performance.	Pen and paper. Digital resources.	One of the groups gets the responsibility for putting the show/performance together.	Scheme of scenario.	Make a performance that combines facts and feelings, science and storytelling.	Going through the scenarios. Feedback. Potential and challenges.
Introducing various Expert Witnesses, (science loops) introducing scientific perspectives, technical terms and on the topic and under topics, using multimodal forms of presentation, speech, PowerPoint, film, live experiments e.g.	Teach, welcoming external guests, making sure the needed technical equipment is at hand.	Listen, observe. prepare questions.	Computers, screen, Video projector.	Organizing a room with technical equipment,	Multimodal presentations/ Science loops.	Extend the pupils' knowledge by introducing Expert Witnesses.	What did they learn from the science loop?

How to keep up the hope, when living with the threat of water?	Reintroducing the theme of hope. Organizing a writing-session.	Write comforting letters to each other, in couples, in-role. Reading them out loud to each other.	Pen and paper.	The pupils sit in pairs. One table for each couple.	Handwritten letters of hope.	Empathy and increased consciousness connecting individual local issues, to other individual stories, globally.	Response/ feedback from fellow student.
Formulating the hope with water	The teacher produces a song.	The pupils rehearse the song for the final event.	big space		Articulation of the life necessity of clean water	Social and cultural competence, ethical aspects	
How to make a performance/ show that is both entertaining and informative? How to teach and touch the audience?	Guiding the groups. Distributing tasks. Giving feedback and asking open questions. Invite another group of pupils to a presentation/talk show.	Developing and rehearsing their story in dialogue with the production-group and teachers.	Whatever they need for creating their multimodal story;	In this part it is good to have access to different rooms; arts and crafts/ computer-room	Show/ tell the class what the group roughly wants to do. Outline/draft/	Make the class think about communication with an audience, Target group. Affect and inform.	These session, can last for more than one day, ending up in a dress rehearsal where the class gets a final feedback from the teachers.
Carry out the talk show	Instruct and direct the pupils, be audience and support during	Participate in the talk show.	All equipment needed.	Defined tasks.	Communication contextually connected to a catastrophe in Japan.		

	<p>the talk show. Introducing the light stones (on the front cover) as signs for respects for the people who have lost their lives in nature catastrophies.</p>	<p>Pupils make a ritual carrying the light-stone in remembrance of the victims for a water caused disaster.</p>	<p>Four light stones</p>		<p>Creation of a symbolic expression for empathy. Multimodal literacy.</p>	<p>Use symbolic aesthetic devices to express empathy.</p>	
<p>Evaluation</p>	<p>Give the pupils the Pedagogical documentation of the storyline, and the conference maps which they had designed. Evaluation schemes distributed. Sum up the learning potential.</p>	<p>Filling out evaluation schemes. Giving response. Writing knowledge based texts, and expressive texts emanating from the theme explored.</p>			<p>Comments on the layer upon layer learning.</p>	<p>Express standpoints of one's own. See the connection between the storylines.</p>	<p>Evaluate the science literacy, the insights, the action competence gained.</p>

6 Storyline: Vann som trussel og vann som håp

Trinn 10, ungdomsskole uke 9-12 2011 (This story line scheme is filled out by student teachers in science prcticum; a variation of tutorial 4)

Storyline Uke 9	Nøkkel- spørsmål	Hva læreren gjør	Elevaktivitet	Klasseroms- organiserin g	Resultat	Kompetansemål fra læreplan	Evaluering
Tirsdag: Sneskred (3. og 4. time)	Hva innebærer et snøskred? Hva må man gjøre for å redde liv?	Introduserer storyline. Tar med elevene ut til plassen (ved Kolstad kirke) Organiserer elevene i grupper. Instruerer leting.	Eleven frames som tilskuere til snøskred og inviteres til å bli redningsarbeidere	Grave ned Anne-dukke i snøfonn på forhånd; skaffe letestaver til elevene; be elevene ta på seg uteklær dagen i forveien. Uteskole	Modell for livredning Erfaring av leting, av samarbeid,	Fra læreplanen i kroppsøving, kompetansemål etter 10. årstrinn, hovedområde "Idrett og dans": <i>Mål for opplæringa er at eleven skal kunne forklare og utføre livbergning i vatn og livbergande førstehjelp</i>	
Førstehjelp: (5. og 6. time)	Hva skal man gjøre hvis man finner en bevisstløs person? Hvordan legger man noen i stabilt sideleie? Hva er makspuls og hvilepuls, og hvordan måles disse?	Instruere hjerte-lungeredning. Instruere stabilt sideleie, fortelle om og vise hvordan man måler puls.	Trene HLR på dukke. Øve på stabilt sideleie. Øve på å måle egen puls. Repetere sikkerhetsregler.	Inndeling i tre grupper, rullering på postene	Hjerte-lungeredning Økt kunnskap om hva som	Som over. I tillegg fra læreplanen i naturfag, hovedområde "Forskerspiren": <i>Mål for opplæringa er at eleven skal kunne demonstrere verne- og sikkerhetsutstyr og følge grunnleggende sikkerhetsrutiner i naturfagundervisnin</i>	

	Hva kan være farlig når man gjør forsøk? Hvilke sikkerhetsregler bør man følge? Hvordan bruker man en øyeskylleflaske?	Gå gjennom sikkerhetsregler, hva som kan være farlig. Demonstrere bruk av øyeskylleflasker.	Prøve bruk av øyeskylleflaske.		kan være farlig, og hva man bør gjøre for å unngå skader.	<i>gen</i>	
Torsdag: Truslene Familier	Hvilke trusler i Namsos, på Maldivene og i Pakistan? Hvorfor blir det jordskred? Hvorfor forsvinner boplasser i havet? Hvilke vannbårne sykdommer truer mennesker i ulike deler av verden? Hvordan føles det å leve med vann som trussel? Hva har din	3 faglige sløyfer - lærer i rolle: Maldiver presenterer Maldivene og det å vokse opp der. Namsosing presenterer Namsos og jordskredets innvirkning på lokalsamfunnet Hjelparbeider i Pakistan forteller om kolera som vannbårn sykdom og andre vannbårne	Lytte på presentasjoner Skape familiegrupper fra de tre stedene, lage stillbilder	Elevene sitter på benkene i amfi Bruker gulvet i amfi	Elevene får kunnskap om hvordan det er å leve med vann som trussel i Maldivene, Namsos og Pakistan Elevene lager familie-		

	familie opplevd?	sykdommer Inger Lise leder dramaøvelser Stillbilder fotograferes			grupper som de skal bruke i prosjektet		
Fredag: Familier (1. og 2. time)	Hva er din rolle i familien? Hva har din familie opplevd?	Inger Lise leder dramaøvelser	Lever seg inn i rollene Lager muntlig fortelling: hva skjedde med vår familie? Lager stillbilder: før og etter katastrofen	Bruker amfi	Elevene blir tryggere på sin rolle, sin familie Historier om hva som skjedde Stillbilder til storylinevegg		
Skrive i rolle (5. time)	Fortell om deg selv i jeg-person, hvor du er fra og hvordan du har opplevd ting.	Kine og Nora	Lever seg inn i rollen, hva skjedde og hvordan føltes det?	Skriving i klasserom	Ved å sette seg inn i en vanskelig situasjon i jeg-person utvikler elevene sin empati		
Research (6. time)	Hvordan er det å bo i Namsos/Verdal/Pakistan/Maldivene? Hvordan kan vann være en trussel i	Gi spørsmål, veilede, tips til hvor de bør lete	Søker etter informasjon om stedet og katastrofen/trusselen på internett	Sitter i grupper i klasserommet	Faktaark om stedet og katastrofen/russelen	Se kompetansemål tirsdag uke 10	

	Namsos/Verdal/Pakistan/Maldivene? Hvem (kan) rammes? Hva er konsekvensene?						
Idemyldring talkshow (7. time)	Hva ønsker din gruppe å bidra med under framføringen i uke 11?	Oppsummere uka. Fortelle om plan for fremføring: talkshow	Idemyldring i gruppene: hva ønsker vi å bidra med? Presentasjon av forslagene	Elever sitter i familiegruppene	Forslag til bidrag fra hver enkelt gruppe		

Storyline Uke 10	Nøkkel spørsmål	Hva læreren gjør	Elevaktivitet	Klasseromsorganisasjon	Materialer	Resultat	Kompetansemål i læreplan
Tirsdag: Faglige sløyfer (3. og 4. time)	Hvordan er vann en trussel for Maldivene? Hva er kolera? Hvordan kan man unngå spredning av kolera? Hva er kvikkleire? Hvordan dannes det? Hvordan ser det ut?	Soba (?) fra Maldivene forteller Even forteller og demonstrerer rensing av vann, Alex forteller og viser frem parasitter Iselin forteller og demonstrerer sammen med Alex	Følge med, notere, stille spørsmål	Bruker amfi. Oppfordrer elevene til å sette seg på de fremste radene.	PC, prosjektor Skittent vann og håndkle, Kvikkleire, salt og vanlig leire	Elevene får økt kunnskap som de kan bruke for å utvikle bidragene til forestillingen	Fra læreplanen i naturfag: Fra hovedområdet "Kropp og helse": <i>Mål for opplæringen er at eleven skal kunne</i> - forklare hvordan kroppen beskytter seg mot sykdom - beskrive hvordan man kan forebygge og behandle infeksjonssykdommer Fra hovedområdet

							"Mangfold i naturen": Mål for opplæringen er at eleven skal kunne forklare hovedtrekk i teorier for hvordan jorda endrer seg og har endret seg opp gjennom tidene og grunnlaget for disse teoriene.
(5. og 6. time)	Hvordan skal vi formidle "vann som trussel" i de ulike familiene?	Rune, Even, Nora hjelper elevene med å komme i gang	Avtale og begynne å arbeide med formidlingsmetoden.	Klasserom	Leire, papir, saks og lim, forheng og overhead.	Elevene får startet med fremføringsmetoden sin	
Torsdag: (3. og 4. time) Skriver i rolle Grupperarbeid	Hvordan kan vi få frem håp midt oppi disse katastrofene?	Nora, Kine	Elevene skriver brev som gir håp og trøst og leser de for hverandre	Klasserom		Elevene får reflektert over katastrofene, og får fokusert på noe positivt ved de	
Fredag: (1., 2. og 5. time) Grupperarbeid, øving	Hvordan skal vi best få frem de ulike historiene til familiene?	Even og Alex hjelper til på dataromme	Elevene jobber med hvert sitt prosjekt, der de ferdigstiller det	Klasserom, datarom, amfi	Mac, leire, plastelina, papir og andre	Elevene får trent seg i å produsere et produkt.	

		t, de andre lærerne med sine grupper			effekter		
(6. og 7. time) Gjennomgang i amfi	Hvordan ser de ulike prosjektene ut? Får de frem historiene og faktaene på en god måte?	Nora og lærerne kommer med feedback som hjelper elevene til å finpusse prosjektene	Fremføring	Amfi	Prosjektor og Mac + de ulike prosjektene	Elevene får trent seg i å presentere produktet	

Storyline Uke 11	Nøkkelspørsmål	Hva læreren gjør	Elevaktivitet	Klasseromsorganisasjon	Materiale	Resultat	Kompetansemål I læreplan
Tirsdag (3. og 4. time) Generalprøve	Hvordan formidler trinn ti Kunnskap, holdninger og handlingsberedskap knyttet til vann som trussel og vann som håp?	Gir ”last minute” feedback	Fremføring	Amfi	Mac, projector, presentasjoner	TV-program om vann som trussel og håp	beskrive hvordan man kan forebygge og behandle infeksjonssykdommer
(5. og 6. time) Fremvisning, oppsummering	Hvordan er det endelige resultatet på storyline prosjektet? Får de formidlet fakta om vann som trussel på en overbevisende måte?	Even og Alex tar teknisk	Fremføring	Visning for Kolstad trinn 6	Mac, projector, presentasjoner	”TV-program” om vann som trussel	beskrive hvordan man kan forebygge og behandle infeksjonssykdommer

7 Storyline about water as threat and hope in Tanzania

Storyline planning scheme (to be carried out in June 2011 in Morogoro, with ph.d. Ephraim Kalanje as teacher)

Storyline about water as threat and hope in Tanzania Key questions	What the teacher does	What the pupils do	Material	Organization	Product	Aim	Evaluation
Workshop 1 How do Tanzanian families have different access to clean water? Types of families? What kind of houses do they live in? How is their washing facilities? How do the families get water? When is it rain time in the year? When is it draught? What is the water used to? How much water does the family need per day/use per day? What about animals, and their need for water?							
Workshop 2 Which are the threats of water? How can water be dirty? Which diseases are spread through water?							
Workshop 3 How do you clean water? What do you do with the cloak water from urine and excrements?							
Workshop 4 Do you have nice memories of water?							

<p>Write about these! Make a painting about the blessings of water? Can you songs about rain or water? Can you dancing about rain or water, or longing for water? Sing and dance or create song and dance about water.</p>							
<p>Workshop 5 The pupils report to each other/or to other pupils/parents what they have found out in a closing session, which need to be reported through photo documentation and short video clips. Report to other group/families/show your exhibition (the storyline wall) Dance and sing – what we long for, wish about water in the future!</p>							

8 Art and science combined in storyline in order to promote science literacy

What is the value of combining scientific inquiry based learning of science with arts based exploration of themes related to water issues?

This documentation in form of tutorials shows that the combination gives the teacher a variety of tools to use in order to make the exploration of themes complex and multilayered.

It is still another main reason why we suggest this combination: Art has the potential of engaging, provoking, and touching. Science has a substance of themes, which can be explored in artistic as well as inquirybased multilayered ways.

In science inquiry is based on scientific hypothesis testing. In arts the preunderstanding is guiding the exploration of meaning making through artistic form.

The science literacy and the arts literacy together create an engaging and meaningful learning space.

One research question we have answered in the storyline projects is: What kind of key questions are necessary for the forming of a space for an aesthetic approach to learning combining art and science in storyline?

We have found especially three types of key questions, which can open up for complex exploration and knowledge building. These key questions are about explorations of socio science themes, of ethical aspects of scientific knowledge, and of questions about future development, future threats, and hopes.

9 Plan for DVD in WP & deliverable

One part of the deliverable will be videos, either as a DVD or another suitable digital format (i. e. on the web).

The videos will focus on the role of science loops in storyline projects, and could serve as tutorials for how such loops could be included. They will consist of a mixture of studio comments/explanations, clips from the loops that actually took place in these projects blended with graphics (see <http://vimeo.com/22068697> as an example).

We carried out three science loops that will be presented as explained above:

- ? The global cycle of water, illustrated by i. e. small scale experiments
- ? Ice ages; climate changes influence on development of glaciers
- ? Water born parasites; life cycles, biological impacts, treatment and prophylactically behavior

