

SUSTAINABLE TECHNOLOGY LEARNING BY THEATRE-PLAYING

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At the University of Essen a project for sustainable technology teaching (and learning) has been installed. In this project, teacher students teach technical contents in the grades 1 to 7. Since it is known that sustainable teaching (and learning) is enhanced by teaching (and learning) in interdisciplinary projects, technological contents were integrated in such interdisciplinary projects. To achieve interdisciplinarity and to focus on the desired objectives in these projects, specifically written theatreplays to be performed by the kids, are integrated in the projects. In the theatreplays, technological contents are embedded and dealt with in their specific historical, scientific, economical a.s.o. backgrounds. In addition to that, music (singing and dancing) and arts (painting) play important roles in performing the theatreplays. A large number of theatreplays has been tested in the schools and the student activity has been evaluated, showing that important aspects of sustainable learning are achieved.

Introduction

At the University of Essen we are engaged in Technology teacher education for the Primary, Secondary 1 and Secondary 2 level since 1973. (Haupt, Sanfleber 1976)

During this time concepts for technology teaching have changed. For the Primary level it is clear by now that to achieve sustainable learning the topic to be taught must be dealt with in "interdisciplinary manner". For example when teaching basics of control technology the teacher could try to install an aquarium in the class room for this purpose, thereby dealing with the temperature control technology in the aquarium. But naturally he can not neglect the fishes, the plants (biology), the water quality (chemics), the optical properties of the water (physics) and the interactions between these aspects a.s.o. This is quite obvious since the kids will ask questions about these things too and not only about the temperature control technology.

To achieve sustainable learning the topic must also be dealt with "hands-on", which means that the kids must have the opportunity to do something themselves. For example they should have the opportunity to build, construct or do experiments themselves when installing the aquarium. Last but not least it is quite clear that the topic itself must be interesting to the kids. (Langkau, Haupt 2001)

Technology teaching concept

So technical objects, procedures and methods must be taught together with their physical, chemical, biological a.s.o. aspects. But in addition to that technology has, according to our concept of technology teaching (Theuerkauf et al. 1996), a specific aspect which is typical for all technical objects and is well known to everybody. This is the interaction between technology and society: Technical objects, methods and procedures are influenced by demands of the society but also on the other hand society is influenced by technology. Take for example a car: It's size, the number of seats, the number of headlights, their height above ground, backlights a.s.o. are consequences of the demands of society. From a mainly technical point of view a car could look quite different. This interaction between society and technology has also to be dealt with in

technology education to understand our nowadays technical world, in specific cases it can even be helpful to understand how technical things have developed in interaction between technology and society. This means that also historical aspects are important in understanding technology.

Theatreplays for sustainable technology learning

To achieve sustainable technology learning now means: the topics of technology courses according to our concept of technology learning must be selected such that the kids are interested in the topics, the topics must be dealt with in an interdisciplinary manner and the kids must have the opportunity to do something themselves (hands-on).

About fifteen years ago we had the idea that these demands could very well be fulfilled by playing theatre with the kids, the plays dealing with technological problems. Talking with teachers strengthened our believe in the idea and so we started constructing theatreplays for this purpose. I say "constructing" because the teachers had given us a number of criteria the theatreplays had to fulfill so they could be of use for kids of age 6 to 12. These criteria are as follows:

- Content:
 - The content should be interesting to the kids.
 - The content should not be "too simple" or just a short joke or something like that.
 - Teachers will need many theatreplays with many topics so they can select the one he (or she) just needs for his (her) kids.
 - There should be theatreplays with the same topics but for kids of different age (s. o.).
- Language:
 - The language must be simple (but not too simple), but it should not be "street language".
 - The kids should have the opportunity to enlarge their vocabulary.
 - The sentences should be short (7 - 10 words).
 - The text a player has to speak should not be longer than 3 sentences at a time.
- Music and dance:
 - Should be integrated in the theatreplay, but its use should be flexible (short, long, very long).
- Time length:
 - 15 - 30 minutes, depending on the age of the kids. It should be flexible, for example by using or not music and dance.
- Structure:
 - The play should have a clear structure, for example: different acts should contain different aspects of the main topic.
- Number of players:
 - It should be easily possible to add or take away or combine roles.
 - There should be many easily learnable roles but also a few difficult ones.

According to these criteria at first only a few plays were constructed and given to the interested teachers. Our primary teacher students had the opportunity to work in groups of 3 - 4 with the teachers in the classrooms in practicing the play and in the performance. It turned out that the theatreplays were considered a big success by the kids, the students and the teachers (Haupt 1998; Haupt, Lindemann 1999). So more plays were constructed. After two years a publisher got interested in the plays. Up to now about 30 plays are published, partly as books, partly as CD-Roms (Haupt 1993-1997; Haupt 1999-2001; Haupt 1999). The books and CD-Roms contain not only the

text for the plays but in addition hints for teachers, for example suggestions for the stage settings, casting, suggestions for preparing costumes, photos and videos of the play (CD-Roms only). The teachers can make use of these hints but naturally they also can change everything, even re-write the text with the help of the kids completely. We do not include the text of a play, even not a part in this paper because it would take too much space. To those who are interested I can give copies of a few plays which we have translated. Furthermore I will show here a short part of a video of a play but regrettably it is only in german.

The tables 1 - 4 at the end of this paper give a list of all plays which are published up to now or are planned to be published. In the tables the theatreplays are arranged according to their main topics. Also included is information about the technical (or physical, geographical or historical) contents they are dealing with. When preparing the things necessary for the performances, for example requisites, pictures and stage settings, costumes a.s.o. many technical skills can be practised (tool handling, measuring, drawing a.s.o.). This naturally is independent of the content of the plays.

Evaluation

It's quite clear that it is difficult to evaluate the "sustainability" of the learning process which is initiated by the theatreplaying. What we have done is the following: We asked the students about their experiences when working with the kids and the teachers on the theatreplays. The results of two of the questions asked are shown in the following diagram (Haupt 1998). The question we asked **before** the work in the class was "**What do you think in what areas can theatreplaying help the kids to develop their personality?**" The question **after** the work with the class was "**In what areas did the theatreplaying help the kids to develop their personality?**" The following diagram shows that except in one area the effect of theatreplaying on the kids personality was larger than the students had thought it would be.

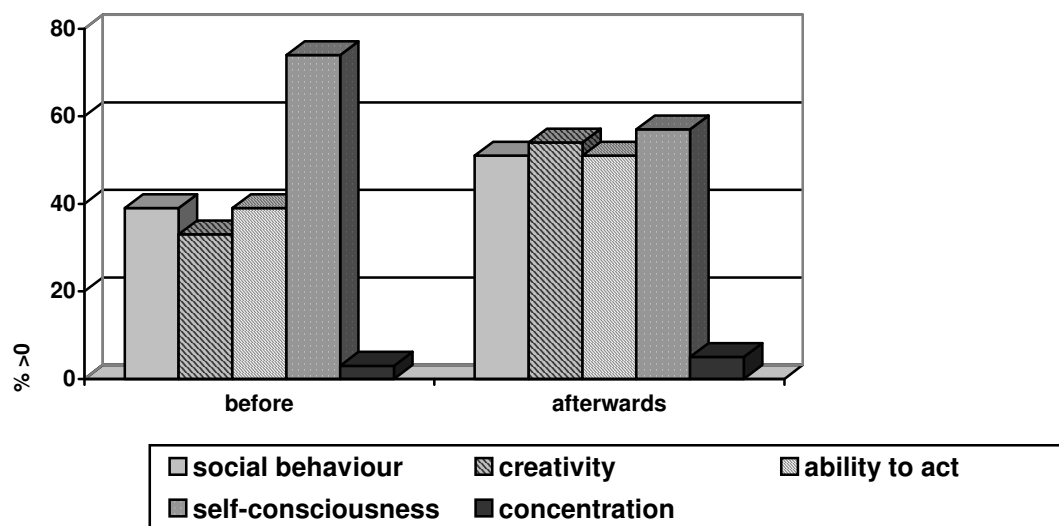


Table 1: Theatreplays for the 1st and 2nd grades arranged according to the main topics of the plays

(Explanations to the abbreviations can be found in table 4)

friendship / partnership	inventions & discoveries	other cultures	respect for the natural environment	against violence and war	realisation of dreams / hope	others
<p>The nicest thing in the world (A story of the little hedgehog and the little hedgehogess) animals and birds Book NV</p> <p>Shadow-jumping (A story of the little hedgehog and the little hedgehogess) light-rays and shadows</p> <p>I am so sad! (A story of the little hedgehog and the little hedgehogess) animals and birds</p> <p>Let's take a walk together (A story of the little hedgehog and the little hedgehogess) animals of the forest</p> <p>The happy moment animals IBK</p>		<p>The creation of men with different colour / How the moon got on the sky firing ceramics, basic astronomy Book Kamp</p> <p>The pond fishes, basic optics IBK</p>	<p>Great imagination (A story of the little hedgehog and the little hedgehogess) animals CD NV</p> <p>How the milky way got on the sky / How the flowers came back to the earth basic astronomy, plants, production of honey Book Kamp</p>	<p>Birds of passage (A story of the little hedgehog and the little hedgehogess)</p>	<p>I'd like so much to be a king! (A story of the little hedgehog and the little hedgehogess) animals, pirates Book NV</p> <p>The dream (A story of the little hedgehog and the little hedgehogess) balloon flying buoyancy</p> <p>The colourful bird / Starjourney (A story of the little hedgehog and the little hedgehogess) animals, basic geography, ships/ basic astronomy Book Kamp, IBK</p>	<p>The paradise / The horizon (A story of the little hedgehog and the little hedgehogess) animals, affection, love / basic geography, objectives in live Book Kamp, IBK</p> <p>The blue flower animals, flowers, thinking about oneself and one's roots IBK</p> <p>Sheep on your left optimistic and pessimistic view of the world IBK</p>

**Table 2: Theatreplays for the 3rd and 4th grades
arranged according to the main topics of the plays**

(Explanations to the abbreviations can be found in table 4)

friendship / partnership	inventions & discoveries	other cultures	respect for the natural environment	against violence and war	realisation of dreams / hope	others
<p>Fairytale world (A story of the little hedgehog and the little hedgehogess) Book Kamp, IBK</p>	<p>Columbus discovers America history of discoveries, world as a sphere Book Kamp</p>	<p>The indians and the smoking ghost geography, history, steam engine Book Kamp</p> <p>A hall full of gold as ransom history of the discovery of Peru, Inka culture Book Kamp</p>	<p>The indians and the fire-horse geography, history, steam engine CD NV</p> <p>The big bow ecology, basic geography, basic astronomy, temperature measurement IBK</p>	<p>The demon (A story from old times)</p> <p>Pirates and merchants (A story from hanse-times) ships buoyancy, buildings (towers), social structure in the middle age Book Kamp</p> <p>A german boy in a roman town roman technics, cities, buildings, amphitheatre, bath, a.s.o. Book Kamp</p> <p>The long voyage of Ulf, the viking boy life, social structure of the vikings, ships, navigation Book Kamp</p>	<p>The knight's wife social structure at medieval times, castle (building), monastery life</p>	<p>Islands of horror hunger, exploitation, suppression, ships, navigation IBK</p> <p>The adventure (A story of the little hedgehog and the little hedgehogess) humanity IBK</p> <p>The voayge humility, basic geography, map making, printing, basic optics (technology), ship building IBK</p> <p>When pleasure changes to slavery addiction</p>

**Table 3: Theaterplays for the 5th to 8th grades
arranged according to the main topics of the plays**

(Explanations to the abbreviations can be found in table 4)

friendship / partnership	inventions & discoveries	other cultures	respect for the natural environment	against violence and war	realisation of dreams / hope	others
	<p>The first railway in Germany steam engine and related physics and technics f.e. transmission</p> <p>The first balloon ride buoyancy, flying technics</p> <p>The invention of book-printing casting metals, pressure paper-making CD NV</p> <p>The building of a pyramid building, technics and procedures, social structure, religion</p> <p>A voyage to other planetary systems basic rocket technology, basic astronomy</p> <p>The invention of writing writing materials</p>	<p>The labyrinth death of young people, love CD NV</p> <p>The heart of sailors (First story of a pilot)</p> <p>Under the nice surface of the ocean (Second story of a pilot)</p> <p>The white sail (Third story of a pilot) death</p> <p>The pearl merchant (First story of a merchant)</p> <p>The porcelain merchant (Second story of a merchant)</p> <p>The silk merchant (Third story of a merchant)</p>				

Table 4: Other Theatreplays (not arranged to specific topics)

Special occasions	Biblical stories	fairytale / myths	stories from literature
<p>Recollection and hope can be played at the end of primary school-time (4th grade), Book NV</p> <p>The Christmas story (1st to 4th grade), Book NV, Book Kamp</p> <p>I am so excited! can be played for the kids entering school for the first time (1st to 4th grade), CD NV</p> <p>The first day in school (1st to 4th grade), Book Kamp</p> <p>I come from ... different countries introduce themselves (beginning with 3rd grade)</p>	<p>The creation of the world / The tower of Babylon (beginning with 1st grade) CD NV</p> <p>Noah's ark (beginning with 3rd grade)</p> <p>Four stories of creation (beginning with 5th grade)</p>	<p>Sindbad (Thousand and one night) (beginning with 3rd grade) Book Kamp</p> <p>The flying carpet (Thousand and one night) (beginning with 4th grade) Book Kamp</p>	<p>Münchhausen's journey to Konstantinopel (beginning with 3rd grade) Book Kamp</p> <p>Eulenspiegel makes fun of the tailors / Eulenspiegel makes fun of the professors (beginning with 2nd grade) Book Kamp</p> <p>The "Schildbürger" build a town hall / The "Schildbürger" buy a "mouse-dog" (beginning with 1st grade) Book Kamp</p>

Explanations to the abbreviations:

Book Kamp

Published as a book by Kamp. It contains the text of the theatreplay, hints for teachers and photos.

IBK (Igelband Kamp)

Book published by Kamp with 14 theatreplays about the little hedgehog and the little hedgehogess.

Book NV

Published by Neckar-Verlag. It contains the text of the theatreplay, hints for teachers and photos.

CD NV

Published as CD-Rom by Neckar-Verlag. It contains the text of the theatreplay, hints for teachers, photos and a video of the play.

More information available under <http://www.tud.uni-essen.de/theater/>

Adresses:

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78008 Villingen-Schwenningen

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Kamp Schulbuchverlag GmbH & Co. KG

Postfach 103222

40023 Düsseldorf

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40211 Düsseldorf

Tel. 0211/17711-102

All books published by Kamp can be ordered as CD-Rom including a video at:

<http://www.kinderspielentheater.de>

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