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## Technology learning by Theatre-playing

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### *Abstract*

*When teaching “Technology”, a number of problems should be solved, for example the problem of sustainability. Therefore at the University of Duisburg-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 theatre plays to be performed by the kids, are integrated in the projects. In the theatre plays, 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 theatre plays. Concerning these aspects, there is probably a large overlap between the technology teaching concept in Germany and the teaching concept of “Design and Technology”. A large number of theatre plays has been tested in the schools and the student activity has been evaluated, showing that important aspects of sustainable learning are achieved.*

*Keywords: sustainable teaching, theatre-playing, interdisciplinarity*

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### **Introduction**

In the state of North Rhine-Westphalia technology is taught in all schools of the general educational system. In the Primary Schools, technology is integrated in “Sciences” (Sachunterricht) lessons, which also contain physical, chemical, biological and geographical aspects.

At the University of Duisburg-Essen we are engaged in technology teacher education for the primary, junior secondary and senior higher education level since 1973 (Haupt and Sanfleber 1976).

Now a few remarks to what we in North Rhine-Westphalia at the University of Duisburg-Essen mean when we say “technology” because this is important for the “design” of the theatre plays (Theuerkauf et al. 1996).

Technology includes technical objects, procedures and methods. In addition, when teaching technology, the interaction of technical objects and methods with society and vice versa has to be dealt with, since it is well known that technical objects and methods are influenced by the demands of society and on the other hand, society influences technological objects and methods. Take for example a car: its size, number of seats, position of head and rear lights a.s.o. are consequences of the demands of society. If the demands were different, cars would look different. Understanding of these interactions is necessary for the understanding of our nowadays technical world. In specific cases it can even be helpful to understand how technical objects have developed historically in interaction with society.

This is probably different from the concept of “design and technology”, but we think there is a large area of overlapping aspects, especially in the area of interaction between technology and society and in the demand for interdisciplinarity: theatre plays are especially well suited to deal with the content of exactly these overlapping areas.

## **Construction and design of the theatre plays**

The idea to promote technology learning by playing theatre with the kids was born about 15 years ago. At that time we were looking out for methods for sustainable technology teaching. The problem was: how to integrate interdisciplinarity, and the interaction of technology and society in hands-on technology lessons.

These demands, we thought, might very well be fulfilled by playing theatre with the kids, the plays dealing among others (s.o.) with technological problems.

Talking with teachers strengthened our believe in the idea and so we started constructing theatre plays for this purpose. We say “constructing” because the teachers had given us a number of criteria the theatre plays 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 theatre plays with many topics so they can select the one he (or she) just needs for his (her) kids.
- There should be theatre plays 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 theatre play, but its use should be flexible (short, long, very long).

### Duration:

- 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 plays and in the performances.

## **Experiences**

Right from the beginning the students made an important experience, which we had hoped they would make. While practicing the play, the kids over and over asked questions on all contents contained in the play. They wanted to know more and more details about those contents a.s.o. Thus, the students had to give additional lessons to deal with these questions and try to answer them. For example, when practicing the theatre play on the first flight in a balloon, they made experiments concerning buoyancy and even constructed balloons with the kids. And, very important, as we had hoped, the kids did not ask questions only to technical, but also to physical, chemical a.s.o. problems. Also the historical background and the development of flying techniques since the first flight with a balloon were intensely discussed. So, the kids learned technology “hands-on” and in an interdisciplinary manner.

The teachers even can try to achieve specific objectives, concerning the interaction of society and technology, for example concerning ecological aspects (Langkau and Haupt 2001).

In addition, and as planned, the use of tools when preparing stage settings and requisites was practiced. This is independent of the content of the plays.

Now, besides objectives concerning learning of sciences, a teacher can try to achieve a number of other objectives by theatre playing with the kids, which are independent of the specific content of the plays too. Those, who have played theatre with kids naturally know that.

These objectives are:  
learning:

- to work in a team
- to act considerate to others
- to take up responsibilities
- to strengthen self confidence
- to overcome timidity
- to plan in advance
- to integrate isolated kids in the class.

All those objectives can be summarized to the general objective: Support of the development of the personality of the kids.

Now, just a few additional remarks which are obvious to those, who have experience with theatre playing with primary level kids.

When practicing the play, the teacher should not try to achieve perfection in gesture, mimic, music (singing) and dancing, because, according to our experience, the kids do not understand that.

This also implies to the texts the little actors have to speak. It must not be spoken literally because experience shows, that the kids, when having understood the text, they will formulate freely.

Now, back to the beginning of the project. Already after the first semester it turned out that the theatre plays were considered a big success by the kids, the students and the teachers (Haupt 1998; Haupt and Lindemann 1999). So more plays were constructed. After two years a publisher got interested in the plays. Up to now about 40 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.

The tables 1 - 4 (after references) give a list of all plays which are published up to now or are planned to be published. In the tables the theatre plays are arranged according to their main topics. Also included is information about the technical (or physical, geographical or historical) contents they are dealing with. We also give a list of the plays which are translated into English up to now (table 5) (After references).

## Concluding Remarks

15 years of experience with theatre-playing with the kids, thereby having the choice from a wide variety (see table 1-4) of especially designed theatre plays allows the conclusion: Theatre playing with the kids offers the teacher a powerful (additional) method, she or he can make use of to achieve "technological objectives", and also, at the same time, help the kids in the development of their personalities.

This method also is a very flexible tool, since the teacher has the choice to put the emphasis on those objectives she or he thinks most important in a specific situation.

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**Table 1: Theatre plays 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><b>The nicest thing in the world</b> (A story of the little hedgehog and the little hedgehogs) animals and birds Book NV</p> <p><b>Shadow-jumping</b> (A story of the little hedgehog and the little hedgehogs) light-rays and shadows</p> <p><b>I am so sad!</b> (A story of the little hedgehog and the little hedgehogs) animals and birds</p> <p><b>Let's take a walk together</b> (A story of the little hedgehog and the little hedgehogs) animals of the forest</p> <p><b>The happy moment</b> animals IBK</p>		<p><b>The creation of men with different colour / How the moon got on the sky</b> firing ceramics, basic astronomy Book Kamp</p> <p><b>The pond</b> fishes, basic optics IBK</p>	<p><b>environment</b></p> <p><b>Great imagination</b> (A story of the little hedgehog and the little hedgehogs) animals CD NV</p> <p><b>How the milky way got on the sky / How the flowers came back to the earth</b> basic astronomy, plants, production of honey Book Kamp</p>	<p><b>Birds of passage</b> (A story of the little hedgehog and the little hedgehogs)</p>	<p><b>hope</b></p> <p><b>I'd like so much to be a king!</b> (A story of the little hedgehog and the little hedgehogs) animals, pirates Book NV</p> <p><b>The dream</b> (A story of the little hedgehog and the little hedgehogs) balloon flying buoyancy</p> <p><b>The colourful bird / Journey to the Stars</b> (A story of the little hedgehog and the little hedgehogs) animals, basic geography,</p>	<p><b>The paradise / The horizon</b> (A story of the little hedgehog and the little hedgehogs) animals, affection, love / basic geography, objectives in live Book Kamp, IBK</p> <p><b>The blue flower</b> animals, flowers, thinking about oneself and one's roots IBK</p> <p><b>Sheep on your left</b> optimistic and pessimistic view of the world IBK</p>

**Table 2: Theatre plays 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	The against violence and war	realisation of dreams /	others
<p><b>Fairytale world</b> (A story of the little hedgehog and the little hedgehogess) Book Kamp, IBK</p>	<p><b>Columbus discovers America</b> history of discoveries, world as a sphere Book Kamp</p>	<p><b>The indians and the smoking ghost</b> geography, history, steam engine Book Kamp</p> <p><b>A hall full of gold as ransom</b> history of the discovery of Peru, Inka culture Book Kamp</p>	<p><b>indians and the fire-horse</b> geography, history, steam engine CDNV</p> <p><b>The big bow</b> ecology, basic greography, basic astronomy, temperature measurement IBK</p>	<p><b>The demon</b> (A story from old times)</p> <p><b>Pirates and merchants</b> (A story from hanse-times) ships buoyancy, buildings (towers), social structure in the middle ages Book Kamp</p> <p><b>A german boy in a roman town</b> roman technics, cities, buildings, amphitheatre, bath a.s.o. Book Kamp</p> <p><b>The long voyage of Ulf, the viking boy</b> life, social structure of the vikings, ships, navigation Book Kamp</p>	<p><b>The knight's wife</b> social structure at medieval times, castle (building), monastery life</p>	<p><b>Islands of horror</b> hunger, exploitation, suppression, ships, navigation IBK</p> <p><b>The adventure</b> (A story of the little hedgehog and the little hedgehogess) humanity IBK</p> <p><b>The voayge</b> humility, basic geography, map making, printing, basic optics (technology), ship building IBK</p> <p><b>When pleasure changes to slavery</b> addiction</p>

**Table 3: Theatre plays 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	The against violence and war	realisation of dreams /	others
<p>Pupils Attitudes Towards Technology Annual Conference June 2003</p>	<p><b>The first railway in Germany</b> steam engine and related physics and technics f.e. transmission</p> <p><b>The first balloon ride</b> buoyancy, flying technics</p> <p><b>The invention of book-printing</b> casting metals, pressure paper-making CD NV</p> <p><b>The building of a pyramid</b> building, technics and procedures, social structure, religion</p> <p><b>A voyage to other planetary systems</b> basic rocket technology, basic astronomy</p> <p><b>The invention of writing</b> writing materials</p>	<p><b>The labyrinth</b> death of young people, love CD NV</p> <p><b>The heart of sailors</b> (First story of a pilot)</p> <p><b>Under the nice surface of the ocean</b> (Second story of a pilot)</p> <p><b>The white sail</b> (Third story of a pilot) death</p> <p><b>The pearl merchant</b> (First story of a merchant)</p> <p><b>The porcelain merchant</b> (Second story of a merchant)</p> <p><b>The silk merchant</b> (Third story of a merchant)</p>				

Table 4: Other Theatre plays (not arranged to specific topics)

Special occasions	Biblical stories	fairytales / myths	stories from literature
<p><b>Recollection and hope can be played at the end of primary school-time</b> (4th grade) Book NV</p> <p><b>The Christmas story</b> (1st to 4th grade) Book NV, Book Kamp</p> <p><b>I am so excited!</b> can be played for the kids entering school for the first time (1st to 4th grade) CDNV</p> <p><b>The first day in school</b> (1st to 4th grade) Book Kamp</p> <p><b>I come from ...</b> different countries introduce themselves (beginning with 3rd grade)</p>	<p><b>The creation of the world / The tower of Babylon</b> (beginning with 1st grade) CD NV</p> <p><b>Noah's ark</b> (beginning with 3rd grade)</p> <p><b>Four stories of creation</b> (beginning with 5th grade)</p>	<p><b>Sindbad</b> (Thousand and one night) (beginning with 3rd grade) Book Kamp</p> <p><b>The flying carpet</b> (Thousand and one night) (beginning with 4th grade) Book Kamp</p> <p><b>Fairytales at night</b> (a fairytales) (beginning with 3th grade) Book NV</p>	<p><b>Münchhausen's journey to Konstantinopel</b> (beginning with 3rd grade) Book Kamp</p> <p><b>Eulenspiegel makes fun of the tailors / Eulenspiegel makes fun of the professors</b> (beginning with 2nd grade) Book Kamp</p> <p><b>The "Schildbürger" build a town hall / The "Schildbürger" buy a "mouse-dog"</b> (beginning with 1st grade) Book Kamp</p>
<p><b>Explanations to the abbreviations:</b></p> <p><b>Book Kamp</b> Published as a book by Kamp. It contains the text of the theatre play, hints for teachers and photos.</p> <p><b>IBK (Igelband Kamp)</b> Book published by Kamp with 14 theatre plays about the little hedgehog and the little hedgehogess.</p> <p><b>Book NV</b> Published by Necker-Verlag. It contains the text of the theatre play, hints for teachers and photos.</p> <p><b>CD NV</b> Published as CD-ROM by Necker-Verlag. It contains the text of the theatre play, hints for teachers, photos and a video of the play.</p> <p>More information available under <a href="http://www.tud.uni-essen.de/theater/">http://www.tud.uni-essen.de/theater/</a></p> <p><b>Addresses:</b>  <b>Necker-Verlag GmbH</b>            78008 Villingen-Schwenningen            Postfach 1820            Tel. 07721/8987-0  <b>Kamp Schulbuchverlag GmbH &amp; Co. KG</b>            Postfach 103222            40023 Düsseldorf            Am Wehrhahn 100            40211 Düsseldorf            Tel. 0211/17711-102</p> <p>All books published by Kamp can be ordered as CD-ROM including a video at:  <a href="http://www.kinderspielentheater.de">http://www.kinderspielentheater.de</a></p>			

## Table 5: Theatre plays in English

- How God created the World
- I am so Sad!
- Journey to the Stars
- Jumping over your Shadow
- Looking for Paradise
- The Big Bow
- The birds of passage
- **The Blue Flower**
- The Colourful Bird
- The Demon
- The Dream
- The First Flight with a Balloon
- The First Railway in Germany
- The Happy Moment
- The Hearts of the Sailors
- The Horizon
- The Invention of Letterpress Printing
- The Tower of Babel
- The Walk
- The White Sail

Under the beautiful surface of the Sea