

# Education as a glowing experiment

## Bifrost: a new pedagogy in practice

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In Herning, a provincial town in Danish Jutland, a remarkable school is situated, named “Bifrost”. The word Bifrost is derived from Scandinavian mythology and means “rainbow”, a bridge between the earth and the supernatural world of the gods. The Bifrost School wants to pay homage to its name: its pedagogical approach aims to bridge fantasy and knowledge, reason and feelings. “There, on that rainbow, the interface between the known and the unknown, we hope to encounter both daily reality and utopia, enabling us to face the world with both courage and joie de vivre”, as the motto of the school goes. The educational experiment, which has been ongoing for 16 years, is attracting much attention lately, predominantly from the Nordic countries. Each year, many pedagogues from Norway, Finland and especially Sweden, come to visit this minor, yet extraordinary school.

Bifrost is a so-called *friskole*, a public, state-funded school that has been established by both parents and teachers for pupils between six and sixteen years of age. Though the school radiates a mood of art and culture, one should not regard it as an “art school”. Its aim is not to train children to become artists. The core tenet of the school is that expressions of art and culture are an important source of inspiration in the learning process. On Bifrost, one can find children of all social backgrounds, though the amount of children from parents with an academic background is slightly more than at regular schools.

The history dates back to 1971, when a group of teachers in Herning started experimenting with thematic, cross-curricular and non-graded education. After having experimented with innovative ideas and practice for some years, several teachers concluded

that it was very difficult to implement drastic changes within the prevailing structures. The innovations



Drawing and dissecting plants

developed in the junior classes were only sporadically given a follow-up in the higher classes. A fundamental pedagogical view on *how* children learn, *what* is important for them to learn in today's world, and *why* children learn, was lacking. This gave the

teachers the impetus in 1987 to start a whole new school, together with a group of committed parents. An experimental pedagogical approach, derived from these fundamental questions, would be their point of departure.

Initially, Bifrost started off with three teachers and thirty pupils, divided over the three lowest groups. Each subsequent school year, a new pre-school class was added. Now, after sixteen years, the school has reached its maximum size of 180 pupils, divided over ten classes, from grade 0 (pre-school) up to grade 9. This means that Bifrost encompasses the whole so-called *grundskole* period, the compulsory school period. The school board has decided that each grade should comprise not more than eighteen pupils, so that a personal, intimate relationship between children, teachers and parents can be maintained.

### **Inspiration themes**

At Bifrost, they try to break away from the traditional one-sided focus on cognitive learning processes and passive education. Learning is regarded as a versatile process, not merely focused on acquiring knowledge, but equally on engaging the senses, fantasy and feelings. From its early stage onward, a pedagogical approach was adapted that is based on the innate inquisitiveness and interest of children to learn. “From the early age up, children are curious by nature and are anxious to experiment. It is our task as teachers to cherish and to stimulate those original impulses,” says Bodil Abildtrup Johansen, founder and director of the Bifrost School. “Children should have a true saying in and impact on their own learning process, so that their natural inclination to

inquisitiveness and exploration continue to be stimulated throughout the process.”

All education at Bifrost is related to cultural–historic themes, the so-called *inspiration themes*. Each year, teachers select in average two to three inspiration themes, with which the whole school will work continuously during a stretched period of time. Examples of such themes have been Van Gogh, Mozart, the Danish composer Carl Nielsen, M.C.Escher, the Olympic Games, Leonardo da Vinci, and the children’s book “The Mystery of the Playing Cards” of the Norwegian author Jostein Gaarder.

Johansen: “An important criterion for us as teachers when selecting a theme is, whether it contributes to raising interest for other historical periods and cultures that previously were relatively unknown to the children. We as teachers are trying to provoke interest for new items among children; therefore we prefer to select non-conventional themes. By provoking children, we open up new learning arenas. Introducing new perspectives, breaking conventions, confronting and investigating: these are all important preconditions for learning.”

### **Leonardo and his era**

During a five-month period in 1997 the whole school is engaged in the inspiration theme “Leonardo da Vinci”. In order to make children affiliated with this versatile 15<sup>th</sup> century scientist, researcher and artist, the teachers organize a large happening, whereby the whole school building has been transformed and designed in style with “Leonardo and his era”. The idea is to give an impression of his

life, époque, work, publications, inventions, art, his technical capabilities, and his explorations in nature. In one room there are different light sources – candles, lamps and spots – that illumine different objects: here the children can experiment with shadows, shape and colour.



Experiment with light reflection

Another room focuses on *perception*. Here children can do experiments related to questions like: do we actually see what we think we are seeing? Another room is decorated with mirrors, where children do experiments in mirror writing. In one corner there are music instruments from the Renaissance period and someone plays Renaissance music. Leonardo was interested in optics and eyes. The children can use different lenses, or dissect real eyes. Such a happening tends to trigger quite strong reactions and emotions, and that is exactly what it aims at.

“At Bifrost all education is derived from direct experiences, experiences which are provoked by confrontation with a new theme. We introduce any new inspiration theme to the children in such a way that it not only stimulates them intellectually, but also emotionally and sensually. We want children to

relate their imagination and emotions to such a new theme”, explains Johansen.

After the presentation of a common inspiration theme, extensive evaluations are held in smaller groups. The teacher stimulates all children to express as many thoughts, associations and experiences as possible that are provoked by the inspiration theme. This evaluation process is highly valued and can take up to a whole day or more. All ideas and suggestions are written down. They form the basis for the sub-themes, with which the children will work the coming two to four months.

### More than “project based education”

Although all education is related to the central thematic projects engaging the whole school, Johansen does regard the Bifrost approach as more than merely “non-graded project based education”. “We aim to integrate different dimensions of learning. In that sense we are very much inspired by the American psychologist Howard Gardner. He claims that in Western education we overvalue cognitive learning, while we in fact have multiple learning capacities. He distinguishes for example emotional, social, sensual, and physical capacities. Here at school we aim to enhance all these different learning capacities. And we think it is important not to prioritise cognitive capability over emotional or sensual. That is why we value aesthetic expressions very high here at school, which is illustrated by the diversity of artistic creations one can find throughout the school building. We think it is of utmost importance that children learn to express themselves in many different ways, through painting, music,

sculpting, theatre, writing or poetry. These are all different ways of communication. It takes time to learn how to understand and use them.”

An interesting example in this regard is that mathematics is not merely regarded as an exercise in solving math problems, but also as a communication exercise. Children learn to apply mathematical concepts in a drawing or in a written text. For instance, they should try to find the mirror image line in an object or a portrait. Or they should try to make their own mirror image game, including the rules of play that pertain to it.

“In our Western culture the rational learning processes are over-emphasized, which results in a one-sided development. Knowledge should also be connected to emotion and aesthetic experiences. Through our ratio we can investigate and understand parts of the whole. But imagination and fantasy are of crucial importance if we are to understand the whole”, explains Johansen. “We take up the challenge to turn education into an exciting endeavour, a glowing experiment.”

### **Environment**

The Bifrost School is located in a former textile factory, which was drastically rebuilt under supervision of an architect. The interior design and the shaping of the rooms are conform the pedagogical purposes. The flexibility of the learning process is reflected by the interior design of the building. Each classroom has its own shape and size: there are rooms with bended walls, others have extra large floor space, and larger group rooms alternate smaller rooms.

Another remarkable feature is that many rooms lack a fixed entrance door. This is done on purpose, as it enables both pupils and teachers to frequently go in and out. In that way, they can take notice of other activities elsewhere and possibly be inspired. There are no fixed tables, chairs or teacher desks. In the middle of the building, there is a large open space, where the library is situated. Additionally, there is a large common room for gymnastics and performances, a music studio, an established natural science lab for the senior level pupils, and a large open kitchen. In each classroom there is an open cupboard with plastic storing baskets, where each pupil stores his or her own belongings and study material.



Dissecting the corpse of a pig

The function of a classroom can change during the course of a school day. At one instant, it may serve as a more traditional classroom, used for courses in Danish or mathematics. For that purpose tables and chairs, and, if needed, a blackboard, are moved into the room. At other instances during the day, the same room can be used as painting atelier, reading or writing atelier or lab. Then the room is emptied out of furniture, and instead the painting easels or the

laboratory instruments are put forward. Throughout the building, on walls and in corridors, one sees creations made by the children. At some occasions the entire interior of the school is reshaped in correspondence with the inspiration theme, as to contribute to the atmosphere. One large interior wall is marked out for murals, in the making of which the whole school can engage.

### **Organisation**

The junior level encompasses grades 0, 1 and 2 (ages 6,7 and 8), the intermediate stage grades 3, 4 and 5, and the senior level is divided in grade I (group 6 and 7) and grade II (group 8 and 9). There are five teachers working in the junior level and five in the intermediate. Each teacher has his or her own qualifications, be it in Danish, mathematics, English or music. There is also a separate art teacher.

Throughout the week, the whole school uses the common basic time schedule. Each course lasts ninety minutes, and there is a one-hour lunch break. This time schedule is kept very simple and flexible, so it easily allows for changes and adaptations. It should provide leeway for visiting a museum or for taking a group of children out on a nature field trip.

Each morning starts with a common gathering, followed by group teachings in the basic subjects Danish or mathematics, in the senior level accompanied by English and physics. The content of these subjects is to a large extent related to the central inspiration theme, but the primary underlying goal is to have children in the junior and intermediate level train their basic skills in reading, writing and mathematics. In the senior level, the underlying goal

is to improve the skills in Danish, English, mathematics and physics.

After a morning break of half an hour, a ninety minutes period of “workshop activities” follows for the junior and intermediate level. The children then can choose to work individually or in a group in one of the three workshops: the reading and writing workshop, the painting atelier, or the science laboratory. The purpose of these workshop activities is to practice practical skills and, just as important, to learn how to plan one’s own activities. The senior level uses this part of the day to do project work.

After the lunch break the children work in multi-age groups on subject-integrated courses, again inspired by the inspiration theme, with the aim to make further investigations and studies.

### **No assessments through grades**

Not only the children are challenged to find ways to study an inspiration theme. Also teachers have to submerge into each new theme, both individually and as a team. They collect all learning materials themselves and have become proficient in creating special adopted assignments in relation to the prevailing theme. This demands intensive preparation and inquisitiveness, and presupposes an extraordinary spirit of cooperativeness. The teachers consider this to be a very stimulating and inspiring process. As the content and way of working at Bifrost are to a very large extent determined by the input and interests of the children, working with standard learning books and methods is not appropriate. Each theme brings along its own perspective or specific assignments. Where one theme seems appropriate for



a more aesthetic approach, the other might be more suitable for a natural-scientific or historical approach. Additional study material can be found in the school or in the public library, or on the Internet.

Another remarkable feature of Bifrost is that no assessments are made through grades or tests.

“Creativity, flexibility and responsibility have become ever more important assets in current society, but it is exactly those qualities which are difficult to express in grades”, says Johansen. Grades contribute to anxiety and add to the erroneous “learning for reward” attitude. Learning should be considered as a

*personal* challenge, and not something one does to get approval from others. From early age on, children at Bifrost are trained to evaluate their own achievements, as well as those of others. These evaluations encompass much more than what could be expressed in grades, as they reflect both the process and the result. In close cooperation with the teachers, children review their acquired knowledge, mutual cooperation, interest, creativity, time scheduling, etc. In Denmark, grades or a final exam list are not an obligatory requirement at the *grundskole*-level.



Leonardo da Vinci Mural

Unlike most other Scandinavian schools, where homework is common practice at most intermediate and senior level education, the children at Bifrost do not get homework. Children are taught to take responsibility to work with assignments at school. To obtain skills takes much time and effort, and sufficient time is provided to train them during school time. After school, the children should be free to plan their own activities and do what they like.

### **In practice**

The Bifrost approach can best be illustrated by a concrete example. When the inspiration theme “Leonardo da Vinci” is being introduced to the children, some become fascinated by the “eye”: how does an eye work, how can we see, what is colour-blindness? But also: what do we mean with the expression “the inner eye”? The eye becomes one of the sub-themes with which children of the low and intermediate grades will be working. The children can choose to experiment in one of the workshops with assignments that are developed by the teachers. They themselves choose in which workshop they want to work and whether they want to work on an assignment individually or in a group.

This process of choosing is to be thoroughly planned. Firstly, they fill out a so-called “working sheet”, indicating what they intend to do, how they plan to work, how long they expect to be working with an assignment, with whom they want to work, and what materials or tools they plan to use. The children who can read and write can fill out this form by themselves and thus make a detailed planning. Others get more assistance from the teacher.

“The filling out of this “work sheet” is a slow and intense process, which requires assistance of the teacher”, explains teacher Kirsten. “What is important here is that the children learn to plan their activities. The younger ones start off with shorter, less complicated assignments, but gradually they learn to handle more encompassing assignments, spending more time doing experiments and investigations. To overview such a process is complicated, that is why we think it is important to take enough time.”

Here are some examples of assignments in the junior and intermediate level related to the sub-theme “the eye”:

#### *Painting atelier:*

- painting fantasy animals
- drawing copies of portraits
- making a fantasy drawing inspired by a story told
- making a drawing by observation

#### *Reading and writing workshop:*

- exercise in mirror writing
- reading/writing facts about eyes
- reading about the inner eye – imagination

#### *Science laboratory:*

- colour-blindness
- eye tests
- dissecting an eye

- experiment with lenses, magnifying glass, glasses
- experiment with eye pupil
- observation of one's own eye in the mirror

After finishing the assignments, the children evaluate the result and way of working. For this they once again make use of the “work sheet”. The teachers not only assist in suggesting what can be written down, but also in how it should be written down, the spelling. Reasons for a child to be satisfied with one's own work can diverge considerably. It is important to reflect on this and learn to express one's own thoughts in this respect.

Gradually, the children get more and more fascinated with Leonardo: his life and his interest in nature and technology. During the course in Danish they read about him, or tell each other what they have read. Or the teacher reads out loud for the group, and asks the children to retell the story. The goal is to train their memory, and their use of vocabulary. Illustrations are made to accompany these texts. The afternoon courses allow for further exploration of a subject, related to the inspiration theme. These explorations can be practical, like collecting insects or flowers outside, examining them and drawing them, planting seeds, etc. The investigations could also be more theoretical, like reading about the anatomy of the eye or the body, or studying night-blindness. Another possibility is that they study further one of the topics which Leonardo himself investigated, like the invention of book-printing, the anatomy of the human body, the use of warm, cold and complementary colours in painting. The children

usually bring forth numerous associations to an inspiration theme, so there is no shortage of material worth studying.

In the senior level, the pupils work more on a project basis. On basis of the inspiration theme “Leonardo da Vinci”, two sub-themes are selected: “The Renaissance” and “A New Mankind in the Renaissance”. During an extended period, the pupils study subjects like architecture in the Renaissance, individual and societal views in the Renaissance, and the development of science and music during this époque. They elaborate their findings in a so-called “muse product”. This can be a painting, a poem, a sculpture or a lecture. Some pupils choose to work individually, others in groups. Once they are finished, they give a presentation of their muse product for the whole senior level group. Here they elaborate on the choice, content of their muse product and way it is made. The presentation is usually finished by a common discussion. Each presentation is thoroughly evaluated by both pupils and teachers, the children are stimulated to criticize and they learn to be criticized.

## **Mural**

At the very beginning, in the initial stages of the “Leonardo da Vinci” theme, the idea was launched to finish the project with a mural, a creation in which the whole school would participate. At that early stage, nobody had the slightest idea how the mural should look like, let alone the practicalities of the making. This was to evolve gradually during the project period. The teachers at Bifrost prefer not to structure a project totally from beginning to end;



they rather leave room for the unexpected. An essential part of the creative process is to learn to be open for the interaction of ideas, visions and practical experiences, to allow for new thoughts and experiences to arise. This process should get a chance to develop slowly and spontaneously.

However, to have a whole school with 180 pupils participate in one single mural – and to prevent it from ending up in chaos – did eventually require some thorough practical preparation. One teacher came up with the idea to place two big lenses in the middle of the picture as basis for the mural, each one shedding light on a universe. Leonardo da Vinci was indeed fascinated by optics. In fact he studied two universes: the “inner universe” of the human being, and the outer-worldly universe. Both lenses would be shaped as two intersecting eclipses. At the crossing point a human being would be depicted. This ground structure was painted on a wall of 3 by 4 meters. Now each school level would get the task to fill in a part of the mural, relating to the respective sub-themes they were working with. The lowest level chose to depict Da Vinci’s technical inventions, while the intermediate level wanted to represent his interest in nature. The senior level painted the cosmos in one eclipse, and on top of that historical images of the Renaissance period. The intermediate level designed the other eclipse, with a focus on human anatomy.

The whole process of painting the mural took several months. Each time one group had elaborated on a sub-theme, it resulted in new images, which would become part of the mural. Children of the intermediate level had studied the sub-theme

“anatomy”, and examined organs, dissected an eye and a heart of a pig, and measured limbs. This resulted in a wide range of motifs for the mural. Others had made sketches of exotic plants, which were copied in the mural. Yet others had studied the topic of architecture in the Renaissance. They choose to depict a replica of the Dome of Florence. Some pupils of the junior level had made studies of the Mona Lisa, and used her portrait as basis, placing it behind one of the lenses. They also painted motifs of the youth period of Leonardo, about which they had been reading. A group of pupils that had been studying the role of the church in the Renaissance, painted a witch on a burning stack and the Death swaying with his scythe. The Renaissance invention of the use of marble was visualized by a chequered floor, illustrating at the same time Da Vinci’s discovery of the concept of perspective. The pupils of the junior level wanted to give this section a playful twist by painting insects and seeds on this floor, which they had been studying in the context of “Leonardo and nature”. And finally Da Vinci himself was placed in the middle of the mural. In his hands he holds an eye, giving expression to his fascination with this complex organ. □

**Ceciel Verheij**, e-mail: [polarstarcentre@yahoo.com](mailto:polarstarcentre@yahoo.com)