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Children of the future

I am worried about today's children. Not because they mess around on smartphones or spend a lot of time in front of the screen. I am concerned about whether they can learn today at kindergarten and school what they need when they grow up.

We educators have a duty to integrate the reality of children's lives into our educational activities. Many do this and make an effort to talk about the digital world in learning situations at kindergarten and school.

But do we educators know what we should be doing?

Half of the professions that will exist in 15 years' time are not yet known. What are we educating for today? What is relevant and what is especially important when we prepare children for their life in an adult world that we do not even know at present?

This question concerns many scientists. New lists of future competencies are published time and again. This one seems to me to be the most logical.

The children should learn to work together, to use IT in learning processes, to experience and to control how they construct their knowledge. They should be empowered to solve problems and develop their own ideas, they should explore and recognise themselves and they should practise communicating competently.

But what does this mean for kindergarten?

Let me show you an example. The film shows a young child playing at kindergarten. What do you think the boy is doing? Many parents or teachers would interrupt him and ask him to use the tricycle properly. But the boy is investigating centrifugal force. He is very concentrated and absorbed.

Young children study the physical properties of the world. They conduct a whole series of experiments to this end. One of them is the investigation of object permanence. Children try to understand if things you cannot see are still there. So they hide things a lot. The toy industry has developed various toys for this purpose. Mostly wooden boxes with differently shaped holes into which the children can put cylinders or blocks. Even this toy from the physical world is not exactly tailored to the needs of children, who actually just want to hide something and are not interested in sorting shapes.

In this film you can see what the digitisation of this play material looks like. The children are not yet able to understand what the voice in the tablet wants from them.

This observation gives rise to a rule: Replacement is nonsense! It makes no sense to have real life replaced by digital things. We must be careful about this, because the use of digital devices can also lead to a completely unintentional replacement of social relationships or responsibility. An example of this are read-aloud apps. There is nothing wrong with these in general. But at kindergarten, the teacher is there to read to the children. A lot of social contact develops whilst children are being read to, and this is very important for learning.

So when we think about how kindergarten can prepare children for a digital society of the future, I would like to share this sentence from Heidi Schellhove of the University of Bremen with you:

"Computers were made to make our lives easier. In educational processes, however, they must not take over people's thinking. We need software that encourages critical thinking and reflection."

So what can kindergarten do? In my opinion, these three competencies belong in the educational programme of the kindergarten:

- information literacy
- technical competence
- production competence

Information literacy

Information literacy is about introducing children to the world of the internet and demystifying the internet as a great truth machine.

"Who writes the internet? Where does it live and how do I get there?" are typical questions of five-year-olds who have reached a point in their development that makes them think what they see is right. It is possible to organise projects at kindergarten that make it clear to the children that there is no truth on the internet. This study shows how important it is that we start making the operating principles of the worldwide web clear to children at an early age.

Technical competence

Let me show you a film. The teacher asks the children if they think it is possible for the children to become a musical instrument.

The children do not believe it and realise that they have to hold a wire in their hands to hear the sound. They realise that they have to touch each other's skin to create a sound. The project shows an exciting learning path on conductive and non-conductive materials.

It is important to understand the devices of the digital world. Here the kindergarten has many possibilities, which are unfortunately not used enough. For example, creating circuits with the children. This is possible using wires, battery and light bulbs, but also with copper tape and LEDs.

This project, developed by Linda Liukas, shows how a computer works, and is easy to reproduce in kindergartens. What does a computer actually consist of, which parts work inside it and what do they actually do? The children take on the roles of RAM, ROM and mass storage and play how information gets to the screen.

Programming starts with patterns. This is something children already practise in the creche. Repeating patterns become a sequence and algorithms are created at the end. Simple algorithms are the basis of many children's games. Programming requires that one can express oneself very clearly, i.e. give very clear commands. This can be practised in the exercise room or in the garden.

There are many exciting programming games for kindergartens. Ideas can also be found in Linda's books.

Production competence

A positive aspect of the digital society is the increasing possibility of producing things oneself, to realise own ideas and to experience digital devices as tools.

The children of the preschool group saw a huge 3D printer during a visit to the FAB Lab. They had the idea of building their own kindergarten house using the 3D printer. Unfortunately, their 3D printer is much smaller. They still persisted with their plans. First, three-dimensional shapes are made from peas and toothpicks. Then the rooms of the future kindergarten are printed using the *Doodle* program. Constructing the roof is difficult. The children try, but with no success. They try using the *Tinkercad* program and at the end a small house with tower and roof is created using a 3D printer. The children are very proud.

Let us take another look at future competencies!

Cooperation: Are there many projects in the kindergarten that the children carry out together? Are collaborative works presented?

Using IT in learning processes: Are the children able to use IT independently in their world explorations? Do they learn how digital devices work? Do they know how digital programs work and can they carry out the first steps of programming themselves?

Knowledge construction: How are learning processes shaped in kindergarten? Do the children learn to learn, to develop knowledge themselves and to develop learning tasks out of their own curiosity?

Problem solving and innovation: Do the teachers provide the children with opportunities to find problems and solve them independently, to develop new ideas and to realise them?

Self-evaluation: Is a culture of self-evaluation maintained? Are the children encouraged to reflect on what they do, how they learn and how they behave socially? Do the teachers also reflect?

Communicating competently: Are there learning occasions in kindergarten that help to understand the changing world of information? Is the protection of the social community a central issue? Do the children learn to behave well and to appreciate and protect the basic rules of "decency"?

Our goal is to create a social understanding of the necessity of educational events in kindergarten that make children understand the digital world and to create a basic social understanding of what today's children need to learn for tomorrow's world and how kindergarten can lay a foundation here.

This requires a clear explanation that the confrontation with digital media does not mean idly killing time in front of the computer.