

Understanding pneumatics and statics through hands-on activities in science and technology education

at the grammar school in Dornstetten / Baden-Württemberg (DE)

Grade 9 | Subject NwT (Natural Sciences and Technology) | STEM Pneumatics & STEM Statics | Deployment period: 2020



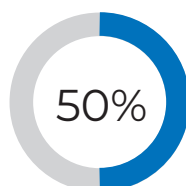
THE CHALLENGE

Science/Technology (NwT) teacher Tobias Hannich had been searching for ways to make the physics lessons for his 9th grade class more hands-on. When the COVID-19 pandemic hit, the purely online teaching format prompted a need to enhance learning with practical activities.



Studies show that learners can remember up to 50% more content when they learn in an action-oriented manner.

Source: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1027&context=library_talks



“The creativity of the students can be perfectly channeled in hands-on NwT (Natural Sciences and Technology) lessons using fischertechnik. It offers creative and open-ended opportunities for project-based and problem-oriented work with fischertechnik.

Tobias Hannich, NwT-Teacher



THE SOLUTION

Initially, Tobias Hannich tested the pneumatics learning concept STEM Pneumatics on a trial basis with great success: „The students immediately engaged with the building blocks,“ he reports. „The creativity of the students can be perfectly channeled in hands-on NwT (Natural Sciences and Technology) lessons using fischertechnik, as it offers creative and open-ended opportunities for project-based and problem-oriented work with fischertechnik.“ Subsequently, the school procured ten pneumatics kits. „The educational support materials are clearly described and comprehensive, allowing educators to quickly familiarize themselves with new topics,“ explains Tobias Hannich. „All documents are available in Word format on the fischertechnik website, making it possible to customize them for individual classroom needs. Additionally, they are aligned with the curriculum and include group and individual tasks with sample solutions.“



THE RESULT

Due to the successful work with the STEM Pneumatics kits, Tobias Hannich expanded the curriculum by introducing additional STEM Statics learning kits focusing on statics. Initially, several small-scale models were created, culminating in a class pinball machine powered by pneumatics. „The hands-on approach with fischertechnik is truly about ‚grasping‘ the concepts!“ The hands-on lessons were significantly enhanced with fischertechnik. During the construction of the eight fischertechnik models, the functionality of pneumatics became evident. Little instruction was needed as the class independently built models in various teams and worked on accompanying task sheets. The groups supported each other, enhancing their abilities to work in teams and develop problem-solving strategies. „When the finished models are tested and the everyday applications of compressed air become apparent, new worlds of technology open up and connections become clear,“ says Tobias Hannich.

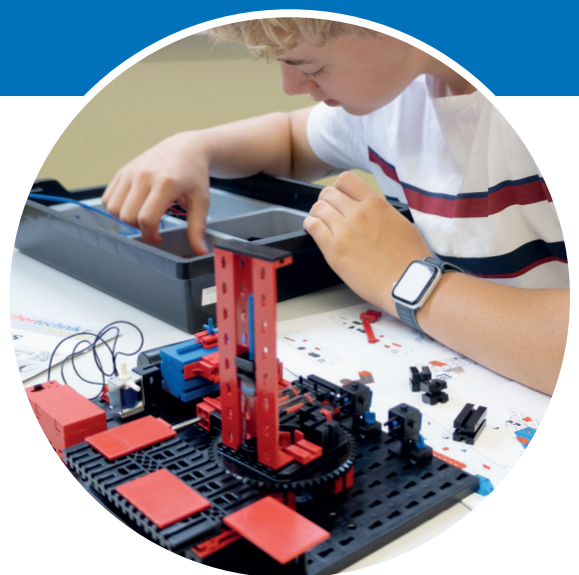
HANDS-ON LEARNING CONCEPTS FOR REGULAR CLASSROOM INSTRUCTION

fischertechnik offers innovative digital and analog learning concepts for interdisciplinary use in pre-schools, primary and secondary schools, as well as in universities and vocational education. Based on hands-on learning, STEM (Science, Technology, Engineering, Mathematics) subjects are made easily accessible and tangible, fostering important future skills such as problem-solving abilities, creative thinking, and emotional and social competencies.

All learning concepts include thematic construction sets, technical components like motors, sensors, and controllers, as well as freely accessible educational support and training materials such as building and programming instructions, lesson plans with tasks and solutions, curriculum references, and professional development opportunities.

„I could never quite grasp the topic of ‚pneumatics‘ before. However, when fischertechnik models were introduced in our classroom, I understood the principle right away. Not only did I enjoy building them a lot, but the lessons became very diverse and interesting because of it. I wish we had more lessons like that.“

Lena S., 15 Years old



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