How Makerspace in School Helps Develop NAT2020 Core Competencies

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Abstract *As educators from Mozgásjavító School, a K12 Special Education School in Budapest, Hungary, we are integrating maker pedagogy in alignment with the National Core Curriculum 2020 (NAT2020) into the everyday teaching routine of a public school. Our focus centers on the establishment and operation of the Robotics Lab, a dedicated makerspace facilitating both curricular and extracurricular activities, thereby achieving academic success and fostering 21st-century skills.*

The well-crafted guidelines of NAT2020 encapsulate advanced educational principles, such as 21st Century Learning Design, future workforce skills, entrepreneurial competencies, promotion of critical thinking, and effective utilization of digital tools, which conflict with the inflexible and outdated teaching preferences of the other parts of the document. Despite these challenges, particularly in the realm of inquiry-based science education, the extended time frame required for an educational project development, and resource and expertise requirements, our projects serve as evidence of the effectiveness of project pedagogy to fulfill NAT2020 requirements.

Addressing these challenges, our makerspace leverages teamwork facilitated by trained staff in digital education, collaborating with subjects and special education teachers. The Robotics Lab emerges as a pivotal hub for product development, integrating STEM education and Social and Emotional Learning (SEL).

Engaging students in collaborative projects, such as programming video games based on compulsory readings and creating 3D printed objects like flint tools, showcases the acquisition of essential learning, communication skills and creativity. Personal projects, like crafting an NFC stamp-based card for lost belongings, exemplify the application of design thinking and innovative planning. In a STEAM lesson using combinatorics, students successfully built a paper piano, underscoring the effectiveness of our approach, which not only enhances digital competencies, problem-solving and mathematical and critical thinking skills but also aligns with the guidelines outlined in the NAT2020.

This way, our makerspace becomes a platform for skill development, confidence-building for social interactions, and vocational exploration, fostering an inclusive environment. Also, en-

gaging students in collaborative efforts enhances essential workplace skills while maintaining a focus on the expected academic progress.
Recognizing these achievements, the school's leadership plays a pivotal role in creating an environment conducive to providing avenues for students, including those with different disabilities, to explore the Robotics Lab through maker pedagogy.
In conclusion, Mozgásjavító School showcases the feasibility of aligning with NAT2020 while breaking through framework barriers. We believe this experience encourages educators to embrace maker pedagogy as a universal approach, creating inclusive environments that nurture creativity and skills for all students.

Description of pictures

Figure 1: Regular curricular lesson in the Robotics Lab.

Figure 2: According to the story, John the Valiant, the famous Hungarian hero, woos his beloved Iluska, while the guarded flock scatters. Created by a 5th-grade student using Arcade MakeCode programming.

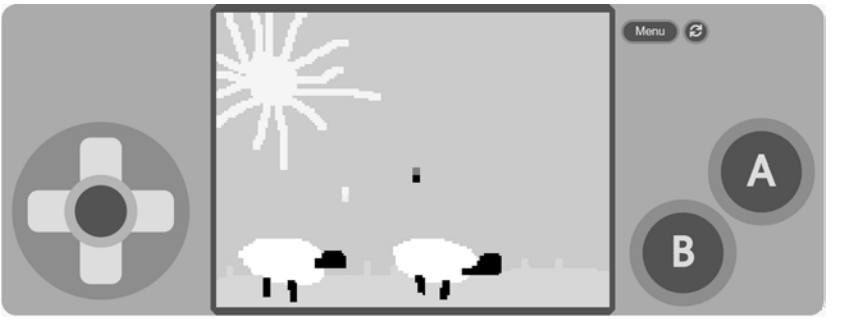

Figure 3: Ricsi, an 8th-grade student, is preparing a cookie stamp for the lower-grade students' activity, designed with the school logo in Tinkercad and independently prepared for 3D printing. Based on his own idea, the tool has several handle versions to ensure that children with different abilities can confidently grip the tool.

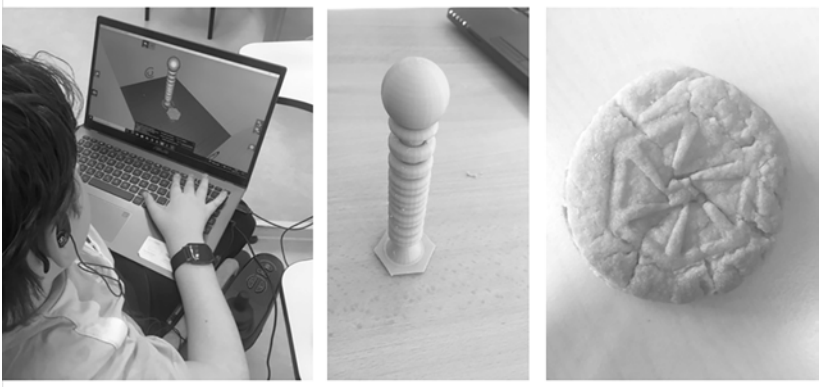

Figure 4: Bálint, a high school student, assists during the theme week in printing the first 3D designs of the younger students. He prepares the g-code files in a way that allows the younger ones to see and ask questions about the process.