



What's what FSKM

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UNBOXING FEELINGS:

MEASURING IPHONE
HAPPINESS THROUGH
SENTIMENT

INNOVATION COMPETITIONS:

GROWING CREATIVE
MINDS FROM PRIMARY
SCHOOL TO UNIVERSITY

LEARNING BY DOING:

ROBOTICS VERSUS
MICRO:BIT FOR STEM
EDUCATION

THE FUN SIDE OF MATH:

MAGIC TRICKS AND
PUZZLES



COLLABORATING FOR
SMARTER MOSQUES

How Chess
Sharpens Your
Mind and Math
Skills

BEYOND THE CLAIM
OF RANDOM
SAMPLING



Learning by Doing: Robotics versus Micro:bit for STEM Education

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INTRODUCTION

Science, Technology, Engineering, and Mathematics education (STEM) plays an essential role in preparing the younger generation for the demands of the future workforce (Wan Ghani, Gobil, & Noradzan, 2025). Among the available tools, robotics and microcontrollers such as the micro:bit have emerged as effective platforms to support experiential learning, also known as *learning by doing*.

LEARNING BY DOING IN STEM

Experiential learning allows students to acquire knowledge and skills through hands-on engagement rather than passive observation. Robotics projects encourage students to design, assemble, and program mechanical systems, thereby strengthening problem-solving and engineering skills. In contrast, the micro:bit provides a simpler and more cost-effective entry point to coding and digital literacy. This microcontroller enables students to execute commands and witness real-time outcomes such as lighting LEDs, triggering sensors, or producing sounds (Quyen, Van Bien, & Thuan, 2023).

Both approaches foster creativity, logical thinking, and collaboration among young learners. Robotics offers tangible and dynamic outcomes through movement and interaction, while the micro:bit introduces students to computational thinking in a highly accessible format.

CURRENT ISSUES IN SEREMBAN PRIMARY SCHOOLS

Despite the clear pedagogical benefits, several challenges impede the widespread adoption of robotics and micro:bit in Seremban primary schools:

- 1. Teachers' limited coding expertise** - While many educators are strong in core science and mathematics, their proficiency in coding and digital technologies remains limited, even when teaching technology design (*Rekabentuk Teknologi*) subjects. This constraint reduces their ability to guide students effectively in programming-based activities (Noordin, 2024).
- 2. Financial constraints** - Robotics kits can be a big investment, and for schools with limited budgets, this becomes a major challenge. Although micro:bit devices are relatively affordable compared to other robotics kits, purchasing them in bulk so that every student can participate still strains school finances. On top of that, accessories and maintenance costs add up over time. This makes it difficult for many schools to scale up robotics programs to reach all students.
- 3. Restricted opportunities for participation** - Information regarding innovation competitions and STEM-related programs is often insufficiently disseminated. Schools are largely aware of major competitions such as the National Robotics Competition (NRC), yet such platforms are costly, resource-intensive, and often unsuitable for most primary-level students.

FINDING A WAY FORWARD

Despite these obstacles, there are ways to make robotics more accessible. Training programs can help teachers gain the confidence they need to teach coding alongside robotics. Schools could also look at partnerships with government agencies, tech companies, or community organizations to help reduce costs. Affordable options, such as virtual coding platforms or DIY robots made from everyday materials, can provide students with an introduction to robotics before schools invest in advanced kits.

UiTM SEREMBAN'S CONTRIBUTION TO ROBOTICS EDUCATION

One inspiring example of how robotics is being introduced in schools comes from the Faculty of Computer and Mathematical Sciences (FSKM), UiTM Cawangan Negeri Sembilan, Kampus Seremban. The faculty has actively shared its expertise through training sessions on micro:bit and robotics, creating real opportunities for hands-on learning.

Through the USR Masjid Sheikh Haji Ahmad program, UiTM lecturers trained special needs students, giving them opportunities to explore robotics and express their ideas through innovative activities. This initiative has opened new doors for students who might not have access to such technology, allowing them to embrace creativity and innovation in a supportive environment. In addition, UiTM also collaborated with Kelab Robotik SK Mambau to conduct micro:bit workshops, which eventually enabled the school to participate in an innovation competition. These efforts show that with the right support, robotics education can reach a wider range of students and inspire them to achieve beyond the classroom (Figure 1).



Figure 1: Participants of Masjid Sheikh Ahmad and Kelab Robotik SK Mambau.

Another major milestone is the Pertandingan Inovasi Masjid Pintar Sheikh Haji Ahmad-UiTM CNS, Peringkat Daerah Seremban 2025, a flagship innovation competition that brought together schools from across the Seremban district (Figure 2). This event has encouraged students to apply robotics and coding knowledge to solve real-world problems, fostering a competitive yet collaborative spirit.



Figure 2: Participants of Masjid Sheikh Ahmad and Kelab Robotik SK Mambau.

In addition, FSKM also organizes a Junior Robotics Program during every school holiday (Figure 3), giving students extra opportunities to learn, experiment, and prepare for international robotics competitions. These continuous efforts ensure that young learners are not only exposed to robotics education but are also motivated to pursue it at a higher level.

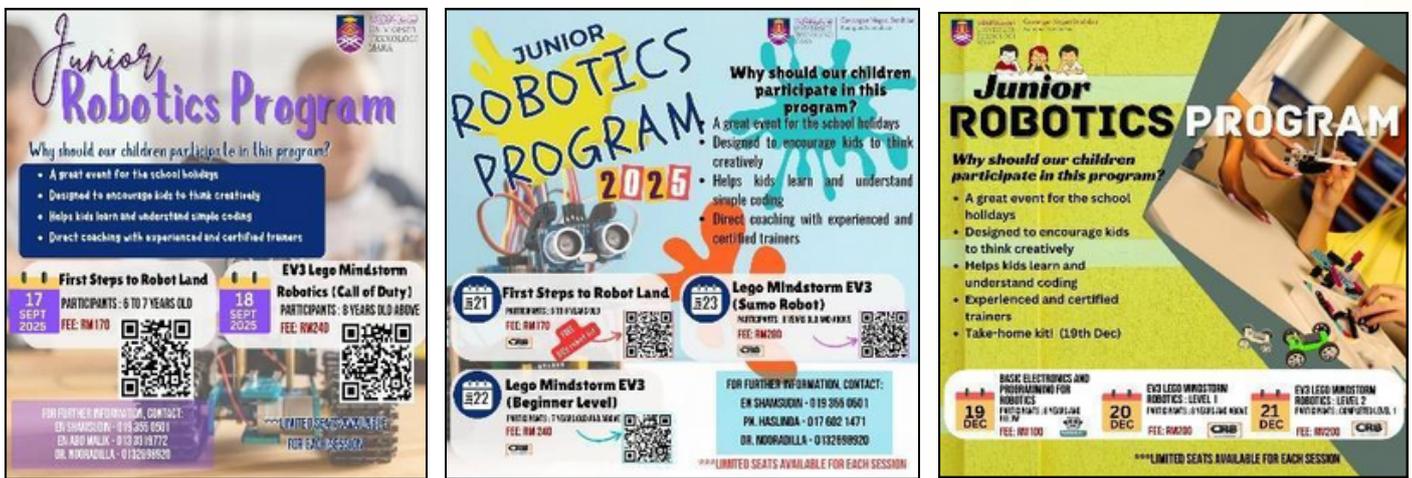


Figure 3: Posters for the Junior Robotics program organized by FSKM UiTM CNS

Together, these initiatives demonstrate how strong partnerships between universities and schools can empower the next generation of innovators in Malaysia.

CONCLUSION

Both robotics and the micro:bit offer distinct benefits in fostering STEM enthusiasm among primary school students. For the Seremban district, adopting a progressive model by introducing the micro:bit as a foundation tool and the gradual integration of robotics provides a practical and sustainable pathway. With proper teacher training, affordable resources, and accessible platforms for innovation, *learning by doing* can effectively foster STEM engagement and prepare young learners for future challenges.

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