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EMPOWERING STEM CULTURE AMONG THE YOUNGER GENERATIONS THROUGH JUNIOR DATA SCIENCE PROGRAM

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Junior Data Science Program

Science, Technology, Engineering and Mathematics (STEM) has become an essential field of study at the tertiary level towards producing experts among Malaysians (Idris, Govindasamy, & Nachiappan, 2023). At a very young age, many programs related to STEM have been developed and run by many agencies either government or private sectors in order to prepare and fulfil the requirements. Robotic Program is one of the active programs towards STEM encouragement among the school's children (Yahaya & Lajium, 2017)

College of Computing, Informatics, and Mathematics (KPPIM), UiTM Negeri Sembilan Branch, Seremban Campus has organised the Junior Data Science Program on May 2023. This program is the second series since it was introduced in 2022 and is an ongoing program to generate income for the KPPIM. Junior Data Science Program focuses on empowering STEM education and skills for kids starting 6 years and above and been conducting during schools' holidays. Furthermore, this program was divided into 2 parts. The first is Robotics for Beginners on May 30, and the second is Robotics on May 31, 2023.

Category 1 : Robotics for Beginner

There are 51 participants who joined in this category with ages between 5 to 8 years old and been divided into two modules. The first module is R4K, which involves kids ages 5 and 6 years old and is held at Perpustakaan Abdul Razak (PTAR), as shown in Figure 1. In this module, the participants have been introduced to the basic LEGO robot. The participants experienced themselves to assemble their robot with the guidance of experienced instructors. They thought about how to build the robot's body and connect it with the robot's brains for robot to move. Besides that, the participants also are encouraged to work together with their friends to complete the task.

Figure 1: The groups of participants for R4S module with their own robot material for development.

The participants were able to construct their robots and put them through a final test by competing against one another in a simple robot wrestling match within the allotted time frame of 2 hours (Figure 2). These activities have given the excitement to the participants and develop the better social skills among the participants. Before the competition is over, each participants must reassemble the robot from its component parts and place them back in the box.

Figure 2: The participants showing their own robots (left). Robot wrestling battle (right).

The second module in Category 1 is the R4S module, in which children aged 7 and 8 participated. This module introduces participants to two activities: 1) developing robots with simple programming and 2) generating robot animation. This module was held at the FSKM building's Big Data Lab and Lab 2. For the first activity, each participant was given one set of aeroplane robot models to construct and program the robot brains, as depicted in Figure 3. For this activity, the participant must have basic computer skills, such as using a mouse to pick a purpose and being comfortable with a keyboard to type some code for the robot's brain.

Figure 3 : Robot development with simple programming activity at Big Data Lab

In the second activity, the participant was taught to create robot animation by using Microsoft PowerPoint as shown in Figure 4. This activity is handled by the Final Year student of KPPIM. Each participant has had a good time throughout the entire process, from searching for an image to uploading it to the workspace to sketching and colouring it, to adding text and animation.

Figure 4 : The participants creating robot animation by using Microsoft PowerPoint.

Category 2 : Robotics

Participants in the second category, Robotics, should be skilled and have experience with the EV3 Lego Mindstorm module. Participants will work with an instructor to construct and program their robots over the course of two sessions. Thirteen kids, ages 8 to 12, participated in this session at the KAT room in PTAR at UiTM Seremban 3.

In the morning session, participants were introduced to EV3 Lego Mindstorm robots by assembling them in pairs, as depicted in Figure 6. They must follow some instructions through a program installed on their laptops and make adjustments as appropriate. They must program and instruct the robot to move and set the time for the robot to move.

Figure 6 : The activities in the morning session with EV 3 Mindstrom Lego robots.

Participants must test their robots in the afternoon session by following the black line track in Figure 7 (left). A simple combat is held to put each built robot to the test. The robot that completes the one-round track in the shortest amount of time wins. It has improved the participants' critical thinking skills as well as their problem-solving abilities.

The participants were having fun and receiving tokens and certificates from the organiser, as seen in Figure 7 (right).

Figure 7 : The participants enjoying the evening session

Program Benefits

Throughout the program, the kids were able to gain useful skills such as programming, data science and robotics, which can lead to a variety of opportunities in STEM careers. Furthermore, it has created a strong problem-solving activity in which the kids have learned to gather and evaluate data in order to solve real-world problems that may be utilised in numerous aspects of life (Yahaya & Lajium, 2020). On the other side, the Junior Data Science program provides technological exposure, assisting the kids in becoming acquainted with the technology-driven environment. The fundamental goal here is to equip the next generation of Malaysians to navigate and contribute to a tech-driven economy (Ibrahim, Ali, Phang, & Abdullah, 2014).

Young people's critical thinking and creativity are encouraged by this program as well. Furthermore, the success of the robotics project encourages participants to work with individuals from various backgrounds. Kids who feel accomplished after completing a project or assignment are likelier to do well in STEM classes.

Enrolling children in such a program is a long-term investment in their success. In addition to equipping students for future success, it encourages them to discover the boundless opportunities in data science and robotics.

References

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