

**KERATAN AKHBAR-AKHBAR TEMPATAN
TARIKH: 12 JUN 2016 (AHAD)**

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LEARNING CURVE

COVER STORY

Is Science too daunting for too many students?

TIME TO ACT: Building early interest in Science, Technology, Engineering and Mathematics concepts

O.C.YEON
ocyeh@nst.com.my

THE number of students enrolled in Science, Technology, Engineering and Mathematics (STEM)-related programmes in higher secondary and tertiary levels is on a decline.

The STEM curriculum serves to educate students in an interdisciplinary and applied approach. Last month, it was reported that the target for students enrolling in the stream is not being met annually at the school and tertiary levels.

Akademi Sains Malaysia's Science and Technology Human Capital Report and Science Outlook 2015 estimated that the country would need at least 270,000 science students sitting the Sijil Pelajaran Malaysia examination annually, but they numbered only about 90,000 now.

Those in the know have warned that not having a sufficient STEM-related workforce will lead to further technical dependency on foreign workers.

The Education Ministry has determined that Malaysia must support a strong foundation in basic science at the primary and secondary levels for students to make up the supply pool in the years ahead.

The Higher Education Ministry also acknowledged that if this decline were to be unchecked, the nation can soon expect to face a shortage of STEM graduates.

The Malaysia Education Blueprint 2013-2025 has outlined strategies through various initiatives to enhance science teaching and learning, including pre-service training and ongoing professional development for teachers.

Said Education Ministry director-general Datuk Seri Dr Khair Mohamad Yusof: "The focus of science teaching and learning is Inquiry-Based Science Education (IBSE), which has been a worldwide trend for quite some time now, and teachers have to ensure science practicals and experimentations as well as project-based or problem-based learning are implemented in the classrooms.

"When students solve real-life problems and can relate the science concepts to their everyday lives, only then will they actually enjoy learning science and are motivated to pursue science at the tertiary level."

A team of educationists from



Science lessons should be made more interesting for students with more practical sessions and project-based learning.

Universiti Pendidikan Sultan Idris (UPSI)'s Faculty of Education and Human Development, led by Professor Emeritus Datuk Dr Aminah Ayob and including Professor Dr Ong Eng Tek and Associate Professor Dr Md Nasir Ibrahim, has asserted that an effective STEM education will equip children with STEM competencies from an early age which will then build upon each other and can be used with real-world application.

That, in turn, will help to create critical thinkers, increase science literacy and more importantly, enable the next generation of innovators.

The main reason students shy away from STEM subjects was because many experienced difficulty and complexity in grasping the basic conceptual knowledge.

Meanwhile, research has shown a direct correlation between the use of STEM curriculum with preschoolers and an increase in collaboration skills, vocabulary, and the ability to create and discuss scientific relationships.

The solution for arresting the decline in students pursuing STEM subjects thus rests on the initiative to cultivate interest in STEM by introducing the STEM concepts at a younger age and using better strategies.

Aminah noted that many initiatives have been made by local universities as well as international corporate bodies to promote tools, learning programmes and packages on STEM education.

"However, all these initiatives are outside of school-time STEM projects which are then regarded as extracurricular activities rather than as part of the formal curriculum," she said.

"What is lacking, then, is the initiative to integrate STEM education into the school curriculum, and this is where we get stuck.

"Most of us are still not very sure how to do it. We are not even sure whether STEM should replace the regular Science and Mathematics subjects in schools or if STEM should be introduced as a new subject into our school

curriculum.

"To me, STEM should simply be integrated into the school curriculum at all levels and taught during school hours.

"You can call it a new subject, but STEM should be incorporated into the Science and Mathematics learning time, ie. within the school timetable.

"Students can learn STEM within three to four hours per week using the project-based inquiry-learning approach.

"The content of Science and Mathematics can be mixed together and, using technology, students can then design, create or invent something.

"Using this simple STEM pedagogy, students get to solve real-world problems. In this way, higher order thinking is nurtured along with 21st century skills.

"We have researched into this and found the pedagogy to be effective, both towards enhancing the understanding of science and mathematics concepts and also in technological application.

"We believe that this pedagogy is adaptable to all levels of education. We have tried it in our PERMATA programme, and we believe it is the most suitable method for STEM learning in primary and secondary schools."

Nasir said that STEM education in Malaysia is still at germinal stage.

"Prior to the Malaysian Education Blueprint, teachers already embedded the required 21st-century skills and also incorporated the integration of other disciplines; however, the impact was not quite prevalent," he said.

"The success of STEM education implementation depends on the quality of teachers in terms of knowledge, skills, and attitude. Hence, a comprehensive competency-based professional development programme will be rolled out for in-service teachers and school leaders by deploying a pool of highly-skilled master trainers to upgrade their managerial, pedagogical and soft skills.

"Partnership has also become integral to facilitate STEM integration. In terms of STEM learning environment,



Students learn better with real experiences



Aminah Ayob

it will be expanded beyond schools through partnership with other educational centres, such as Petrosains and the National Science Centre.

"These efforts will support Malaysia's aim to be at least at par with the international average of PISA and TIMSS assessments. The collaboration between The GM Asia Learning and Tunku Abdul Rahman University College quite recently is to make the renowned Robomatter teaching modules available to schools in Malaysia. Teachers and students will be trained under iCarnegie Global Learning's STEM Robotics and STEM Computer Science programme.

"The introduction of STEM education in our country is to enable all young people to think deeply and to think well so that they have the chance to become the innovators, educators, researchers, and leaders who can solve the most pressing challenges facing our nation and our world, both today and in the future.

"However, our youths have insufficient access to quality STEM learning opportunities. In addition, too few students see these disciplines as springboards for their careers although STEM disciplines are increasingly viewed as essential for work.



"When students solve real-life problems and can relate the science concepts to their everyday lives, only then will they actually enjoy learning science and are motivated to pursue science."

Datuk Seri Dr Khair Mohamad Yusof, Education Ministry director-general

SAMBUNGAN...
NEW SUNDAY TIMES (LEARNING CURVE) : MUKA SURAT 7
TARIKH : 12 JUN 2016 (AHAD)

LEARNING CURVE

COVER STORY



like creating a robot.

centre was in line with the Government's effort to boost the percentage of Malaysian children and youth taking up STEM education and careers.

The centre, located in Cyberjaya, Selangor, is equipped with technical tools and training kits provided by their technology/ industry partners. The aim is to excite students with various immersive hands-on activities.

Amid all these aspirations of boosting STEM education and careers, one concerned parent would like to advance her more holistic take on what really matters.

Dr Shen-li Lee, founder of online child development resource figur8.net and author of the book *Brainchild: Secrets to Unlocking Your Child's Potential*, said: "I used to think Leonardo da Vinci was unique because he could excel in such widely different fields of study. We have always been taught to narrow our specialty so we can be more focused.

"The idea that you can be good at many things seems at odds with what we'd been taught. But more and more, I've been thinking that he was great because he had exposure to all those different fields that fed ideas back into other areas.

"Looking at the same thing over and over makes us blind after a while. It's only after we go away and do something completely different that we are able to come back with the ability to see what we couldn't see before.

"Some time back, I read an article about how we can be more creative by talking to people who disagree with us. We get new ideas by mixing widely-different old ideas.

"Along these lines, I feel that STEM should be taught incorporating the liberal arts. Doing something completely different offers us a whole new point of view which leads me to believe that STEM majors will have more creative contributions to make if they also involve liberal arts training.

"In fact, a number of educators have started to recognise this as they now talk about STEAM instead of STEM, where the A stands for Arts."



Ong Eng Tek



Nasir Ibrahim

STEM became popular in the US and elsewhere.

"STEM education in Japan is an integrated subject taught at all levels of education. This should also be practised in Malaysia.

"We have hundreds of higher education institutions all over the country, and all it needs is for schools to approach these institutions for their help and guidance, and thereupon establish a partnership for learning.

"We have to be more open in allowing others to contribute towards the education of our students. We cannot be too rigid in our teaching and adhere to the curriculum too strictly.

"We need to realise that there are many ways to learning, especially where STEM-related subjects are concerned.

"We need to work with others to improve the teaching of Science and Mathematics, and advancing STEM education in our schools."

Ong applauds the science fairs that are held around the country to showcase students' scientific investigations and inventions.

"This is important in helping to enthuse students' interest in science," he said.

Ong also suggested that the present generation's adeptness with technology should be leveraged into STEM teaching and learning.

"The youth of today are so plugged into technology, why not take advantage of this when promoting the teaching and learning of Science and Mathematics?" he said.

Nasir added that Malaysia Digital Economy Corporation (MDEC) under its ICT as A Career of Choice Campaign has specifically established a STEM Exploration Centre that focuses on technology.

He said that the setting up of this

"In order to boost the STEM education success, a partnership of governments, industry, philanthropist, schools, non-governmental organisations and leading academic institutions, locally and internationally, needs to be realised.

"The extensive partnerships provide the capacity to achieve what may not otherwise be achieved by a single authority. Working together in partnerships can deliver better STEM outcomes. Partnerships provide the partners with unique resources and benefits. Partnerships should include networking by connecting top scientists, such as Nobel laureates, and the Blavatnik Awards for Young Scientists honorees, with STEM students, link STEM leaders worldwide to local STEM programmes for global scientific advancement, and serve as a global resource for STEM education and teaching.

"We need to begin STEM education early with our children, possibly at younger age and certainly in elementary school. The STEM education initiatives should focus on customised STEM programmes that boost desired impacts for key populations, facilitate local and global mentoring.

"In a more advanced manner, the relevant authority should also leverage

a virtual learning platform to enable a non-classroom learning approach. In the past five years, education in Malaysia has benefited from an e-revolution. Most schools and universities now have a functioning Virtual Learning Environment (VLE), at the heart of their teaching and e-learning programmes.

"The Education Ministry has invested millions to develop the Frog VLE that allows teachers to share educational materials with their pupils via the web. STEM education ought to integrate a VLE into their lessons and allow it to become second nature to learners and educators outside of the classroom."

Aminah shared her experience of teaching in a Japanese university last year where she found that most Japanese schools, be they primary or secondary, would have a mentor university attached or annexed to them.

"In Japan, tertiary institutions are obligated to become a mentor to the schools nearby," she said.

"The 'partner' university would provide advice and guidance to the teachers, students and parents on how to interpret the curriculum and translate it into practice, particularly in the field of science and technology.

"The Japanese have been teaching STEM to their students long before



Shen-li Lee

KERATAN AKHBAR
BERITA HARIAN (GEMPA) : MUKA SURAT 31
TARIKH : 12 JUN 2016 (AHAD)

139 gempa gegar Ranau sejak Jun tahun lalu

Kota Kinabalu: Sebanyak 139 gempa bumi termasuk yang terbaharu bermagnitud 2.3 semalam, direkodkan di Ranau sejak gempa bumi bermagnitud 5.9 yang menggegarkan daerah itu pada 5 Jun tahun lalu.

Semalam, gegaran dilaporkan dirasakan di sekitar daerah Ranau berikutan gempa bumi lemah itu yang dikesan di koordinat 6.0 darjah utara, 116.6 darjah timur, kira-kira 11 kilometer di barat pekan Ranau pada jam 5.18 pagi.

Tiada kerosakan

Bagaimanapun, tiada laporan kerosakan atau kemalangan dilaporkan akibat gempa bumi berkenaan.

Kejadian semalam adalah gempa bumi susulan ke-138 direkodkan di Ranau selepas setahun insiden gempa bumi yang menyaksikan 18 pendaki termasuk empat malim gunung terkorban di Gunung Kinabalu pada 5 Jun tahun lalu.

Pemangku Pengarah Jabatan Meteorologi Sabah, Lim Ze Hui, berkata sebanyak 130 gempa bumi susulan direkodkan sepanjang tahun lalu, manakala lapan lagi direkodkan sejak Januari tahun ini hingga semalam di Ranau.

Pakar Geologi Universiti Malaysia Sabah (UMS), Prof Dr Felix Tongkul, menyifatkan kejadian gempa bumi susulan sebagai proses biasa pergerakan dalam bumi selepas gempa utama dan ia boleh berterusan sehingga bertahun-tahun.

"Gempa susulan adalah sebahagian proses semulajadi penstabilan semula struktur dalam bumi yang terganggu akibat pergerakan sebelumnya dan ia akan reda selepas struktur bumi di kawasan terbabit kembali normal," katanya.



sebanyak
130
gempa
bumi

susulan direkodkan
sepanjang tahun lalu,
manakala lapan lagi
direkodkan sejak Januari
tahun ini hingga semalam
di Ranau"

Lim Ze Hui,
Pemangku Pengarah Jabatan
Meteorologi Sabah

