

KERATAN AKHBAR-AKHBAR TEMPATAN
TARIKH: 23 MEI 2016 (ISNIN)

Bil	Tajuk	Akhbar
1.	Tarikan sains angkasa	Utusan Malaysia
2.	Forum Galaksi Asia Tenggara – Malaysia 2016	Utusan Malaysia
3.	ANGKASA anjur pertandingan esei	Utusan Malaysia
4.	Limpahan teknologi angkasa	Utusan Malaysia
5.	Sumbangan teknologi angkasa	Utusan Malaysia
6.	Teknologi angkasa beri sumbangan dunia perubatan	Utusan Malaysia
7.	PBAPP: Cloud seeding must go on in Penang	The Star
8.	Tropical Bioessence raih RM2.75 juta	Utusan Malaysia
9.	Rapid progress in Malaysia's biotech, bio-based industries	New Straits Times
10.	How do we stem cybercrime tide?	Malay Mail
11.	Losing the art of science	New Straits Times
12.	STEM-ming the lack of interest in these fields	New Straits Times
13.	Too few STEM students	New Straits Times
14.	Fear keeping students away from 'tough' fields	New Straits Times
15.	Glamorising science will boost numbers	New Straits Times
16.	Teachers must be STEM specialists	New Straits Times

Tarikan sains angkasa

Bidang astronomi bantu minat terhadap sains

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BUKAN mudah mengajak golongan muda meminati sains. Apatah lagi sains sering dikaitkan dengan subjek Matematik dan Fizik yang menambah jurang minat kepada bidang tersebut.

Tidak banyak boleh dilakukan untuk meningkatkan minat golongan muda dalam bidang sains melainkan usaha berterusan dilakukan bagi membuka mata golongan tersebut mengenai seronok dan pentingnya sains.

Usaha tersebut perlu dilakukan berterusan dan menggunakan pendekatan yang mudah, santai dan menyeronokkan.

Satu daripada pendekatan tersebut adalah mempromosikan bidang sains angkasa kerana jelas terbukti ramai golongan muda cepat tertarik dalam bidang tersebut.

Seperti kata Timbalan Ketua Setiausaha (Sains) Kementerian Sains, Teknologi dan Inovasi (MOSTI) **Prof. Madya Dr. Ramzah Dambul**, bidang sains angkasa amat luas dan pelbagai tetapi boleh dimanfaatkan untuk menarik generasi muda antaranya teknologi satelit dan penggunaan teleskop.



DR. RAMZAH DAMBUL

"Bidang sains fundamental mampu menarik minat mereka terutama penggunaan elemen yang dekat dengan dunia mereka seperti kartun," katanya.

Beliau menyatakan demikian selepas melancarkan program *Night at Planetarium* dan *Earth Hour* di Planetarium Negara baru ini.

Strategi kedua adalah menentengahkan ikon yang berjaya dalam bidang sains untuk dijadikan teladan kepada generasi muda mengikuti jejak langkah mereka.

Ini kerana kata Dr. Ramzah, sejarah membuktikan bahawa golongan muda cepat teruja dengan kejayaan tokoh-tokoh tertentu dalam bidang tertentu dan mudah mempengaruhi mereka.

Sementara itu, Pengarah Planetarium Negara, **Mhd. Fairos Asillam** juga sependapat bahawa bidang sains terutama astronomi memang popular dalam kalangan masyarakat.

"Apabila ditanya apakah Kimia dan Fizik, pelajar agak sukar tetapi mereka lebih popular dengan astronomi. Ini sekali gus dapat menarik minat mereka kepada Sains Teknologi dan Matematik

Sementara itu, mengenai program *Earth Hour*, Mhd. Fairos berkata, program tersebut telah dimulakan pada 2009 bertujuan memberi kesedaran kepada orang ramai

EARTH Hour diwujudkan dengan tujuan memberi kefahaman kepada orang ramai mengenai pencemaran cahaya.

PROGRAM Planetarium Negara mengenai pencerapan sering mendapat sambutan dalam kalangan masyarakat.



KERJA-KERJA mencerap sering kali terganggu jika cahaya sekitar terlalu terang.



SAMBUNGAN... UTUSAN MALAYSIA (MEGA SAINS) : MUKA SURAT 21 TARIKH : 23 MEI 2016 (ISNIN)

mengenai pentingnya rakyat negara ini menyedari masalah pencemaran cahaya yang kini semakin serius.

Katanya, pelancaran program *Earth Hour* yang dimulakan sejak 2009 itu juga bertujuan supaya orang ramai memahami masalah tersebut yang mengganggu kerja-kerja ahli astronomi.

"Jika tanpa kawalan kami di Planetarium menghadapi masalah mencerap menyebabkan balai cerap ditubuhkan di Langkawi sebagai alternatif," ujarnya.

Malah beliau berkata, kerja-kerja pencerapan kini terjejas sehingga ke satu peringkat bahawa hanya satu bintang dapat dikesan apabila pencerapan dilakukan menggunakan teleskop berbanding 10 sebelum ini.

Beliau menjelaskan, pada keamatan cahaya yang tinggi atau dalam cahaya

yang terang, kerja-kerja mencerap tidak lagi tepat kerana bintang atau objek yang dilihat di bawah teleskop kelihatan samar. "Sekarang kalau hendak buat kerja pencerapan bintang kena pergi pinggir



DR. NOORDIN AHMAD

Kuala Lumpur," ujar beliau sambil menambah jika keadaan berterusan, minat orang ramai dalam bidang astronomi akan berkurangan.

Sementara itu, menurut Ketua Pengarah Agensi Angkasa Negara (Angkasa), Dr. Noordin Ahmad berkata, sesuatu perlu dilakukan bagi mengawal masalah pencemaran cahaya yang melibatkan pelbagai pihak yang terlibat.

Pada peringkat awal, program kesedaran perlu dilakukan seperti yang dianjurkan oleh Planetarium Negara dan kemudian disusuli dengan pengubalan garis panduan bagi mengawal pencemaran cahaya.

"Buat masa ini kita bekerja sama beberapa pihak berkuasa tempatan (PBT) kerana hal berkaitan lampu seperti lampu jalan dan iklan di bawah selian mereka, ujarnya.

Pihaknya kini sedang dalam proses mengadakan kerjasama dengan pelbagai balai cerap dan jabatan mufti bagi membentuk satu jawatankuasa dalam usaha untuk menggubal akta pencemaran cahaya.



AKTIVITI berkaitan angkasa mempunyai daya tarikannya yang tersendiri.



BARISAN tokoh yang menjadi penceramah pada Forum Galaksi Asia Tenggara di Bangi baru-baru ini.

Forum Galaksi Asia Tenggara - Malaysia 2016

APABILA menyebut tentang galaksi, sudah pasti ia berkait dengan dunia astronomi iaitu cabang sains yang melibatkan pembelajaran jasad cakerawala yang menghasilkan fenomena di luar atmosfera bumi.

Pada pertengahan Disember tahun lalu, Pentadbiran Aeronautik dan Angkasa Lepas Kebangsaan (NASA) Amerika Syarikat telah menghantar kembali angkasawannya ke Stesen Angkasa Antarabangsa (ISS).

Kemudian pada Februari 2016, syarikat pengangkutan angkasa lepas, Space-X telah melancarkan Roket Falcon 9, tetapi malangnya ia dilaporkan meletup semasa mendarat dekat perairan San Diego.

Sementara itu, China pula sedang rancang membangunkan teleskop radio berukuran 50 m (FAST) manakala Korea Utara juga telah melancarkan satelitnya sendiri.

Kemajuan dalam bidang angkasa lepas dan perkembangan ilmu astronomi pada masa kini kian memuncak setelah banyak negara berlumba-lumba mencipta pelbagai teknologi untuk misi angkasa demi menjelajah galaksi dengan lebih jauh lagi.

Lalu, bagaimana pula perkembangan negara-negara di Asia Tenggara, khususnya Malaysia, Indonesia, Singapura, Thailand dan beberapa negara jiran lain dalam bidang astronomi.

Oleh itu, demi memberi maklumat dan pendidikan kepada umum, Pusat Sains Angkasa, Institut Perubahan Iklim (IPI) Universiti Kebangsaan Malaysia (UKM) dengan kerjasama International Lunar Observatory Association (ILOA) telah mengadakan Forum Galaksi Asia Tenggara - Malaysia 2016 di UKM baru-baru ini.

Menurut Pengarah IPI UKM, Prof. Datuk Dr. Sharifah Mastura Syed Abdullah, Galaxy Forum ialah acara

awam percuma yang diadakan sebagai penyelesaian yang fleksibel dan responsif untuk memajukan Pendidikan Galaksi Abad ke-21.

"Sebelum ini, Galaxy Forum telah diadakan di Hawaii, Silicon Valley, Kanada, China, India, Asia Tenggara, Jepun, Eropah, Afrika, Chile, Brazil, Kansas dan New York.

"Forum kali ini telah menyasarkan pendidik yang terdiri daripada guru-guru dalam bidang Sains Fizik dan setera, pensyarah muda, pelajar universiti awam (UA) dan pertubuhan bukan kerajaan (NGO) untuk sama-sama berkongsi ilmu pengetahuan dalam bidang ini," katanya.

Katanya, seramai enam orang penceramah jemputan telah berkongsi pengalaman mereka dalam bidang astronomi dan kajian angkasa lepas dalam forum galaksi tersebut.

Ketua Pusat Sains Angkasa IPI, UKM, Prof. Ir. Dr. Madina Abdullah yang merupakan salah seorang penceramah dalam forum tersebut telah berkongsi berkenaan latar belakang institut tersebut.

Antara yang dikongsikan dalam forum tersebut adalah peranan mereka dalam penyelidikan dan pengajaran pada peringkat pascasiswazah yang dilaksanakan Pusat Sains Angkasa dalam beberapa bidang.

"Sebagai sebuah pusat penyelidikan multidisiplin, kami melakukan penyelidikan dalam bidang sains angkasa yang meliputi astronomi, astrofizik, astrobiologi, kimia angkasa, geologi dan sains angkasa.

"Dari segi perkembangan teknologi angkasa, kami juga menjalankan reka bentuk dan pemasangan sistem bagi komunikasi, kawalan dan pemanduan roket serta kapal angkasa selain membangunkan aplikasi teknologi



STEVE DURST membentangkan kertas kerja dalam Forum Galaksi Asia Tenggara 2016 di Bangi baru-baru ini.

angkasa yang meliputi bidang kaji cuaca, pengurusan alam sekitar, pengurusan bencana alam dan penggunaan tanah," katanya.

Sementara itu, Ketua Penyelidikan dan Pendidikan Sains Angkasa, Agensi Angkasa Negara (Angkasa), Mhd. Fairos Asillam turut berkongsi mengenai latar belakang agensi tersebut selain perkembangan terkini bidang astronomi dan angkasa negara serta perkhidmatan yang disediakan di Planetarium Negara.

"Angkasa merupakan sebuah agensi yang diberi mandat oleh kerajaan untuk membangunkan sektor angkasa negara. Melalui Dasar Angkasa Negara, agensi telah merancang untuk membangunkan keupayaan dan kapasiti negara bagi membolehkannya mendapat manfaat dan pulangan daripada sektor angkasa ke arah mencapai Wawasan 2020.

"Antara program penting Angkasa termasuklah antaranya pembinaan infrastruktur berkaitan pengoperasian sistem angkasa.

"Infrastruktur tersebut antaranya seperti stesen bumi bagi menjalankan penjejakan, kawalan dan telemetri satelit, makmal kalibrasi optik, makmal pengujian dan pengukuran serta kemudahan asas lain yang berkaitan," jelasnya.

Dalam pada itu, wakil dari ILOA, Steve Durst, telah berkongsi misi dan perkembangan terbaharu program yang dilaksanakan oleh pertubuhannya.

Menurutnya, misi yang sedang dijalankan oleh pihaknya ialah misi ILO-X bersama-sama rakan pintarnya iaitu Moon Express.

"Selain itu kami juga akan meneruskan lagi dengan program Galaxy Forum untuk memberikan pendedahan kepada masyarakat di seluruh dunia mengenai ilmu sains angkasa," katanya.



MHD. FAIROS ASILLAM

Angkasa anjur pertandingan esei

Terbuka kepada sekolah rendah dan menengah,
tawar hadiah lumayan

AGENSI Angkasa Negara (Angkasa), Kementerian Sains, Teknologi dan Inovasi (MOSTI) melancarkan sebuah program baru iaitu Pertandingan Esei *Cassini Scientist for a Day*.

Menurut kenyataan Angkasa, pertandingan tersebut merupakan sebuah program pendidikan sains angkasa yang melibatkan penulisan esei saintifik oleh pelajar sekolah rendah dan sekolah menengah.

Cassini Scientist for a Day merupakan sebuah pertandingan esei peringkat antarabangsa yang pada asalnya dianjurkan oleh *Jet Propulsion Laboratory, California Institute of Technology* di bawah Pentadbiran Angkasa dan Aeronautik Kebangsaan (NASA) Amerika Syarikat (AS) semenjak tahun 2013.

"Pertandingan ini menyediakan satu peluang unik kepada pelajar sekolah rendah dan menengah dari seluruh dunia untuk menjadi saintis NASA bagi kajian planet Zuhul (*Saturn*), kata kenyataan tersebut.

Secara asasnya, peserta akan diberikan tiga gambar yang diambil oleh kapal angkasa *Cassini* untuk tujuan penyelidikan sains angkasa.

Peserta perlu memilih salah satu gambar yang difikirkan akan memberikan keputusan saintifik yang terbaik.

Pilihan peserta harus disokong dengan penjelasan dan penerangan saintifik dalam bentuk penulisan esei.

Topik esei setiap tahun adalah berbeza. Topik esei bagi sesi 2015-2016

adalah berhubung kait dengan planet Zuhul (*Saturn*) khususnya lingkaran cincin di sekeliling planet Zuhul, sistem bulannya yang dinamik seperti *Rhea* and *Teth*.

Selain pelajar di Amerika Syarikat, pertandingan esei *Cassini Scientist for a Day* juga telah mendapat sambutan yang menggalakkan daripada pelajar-pelajar dari seluruh dunia, antaranya Brazil, Kanada, India, Itali, Maghribi, Pakistan, Romania, Singapura, Turki dan Venezuela serta juga dari negara rantau Eropah.

Untuk kali pertama, Malaysia akan mengambil bahagian dalam pertandingan ini bagi sesi 2015 dan 2016 dan akan bermula dari peringkat kebangsaan dalam negara.

Program itu bukan satu pertandingan semata-mata tetapi guru-guru sekolah digalakkan untuk menjadikan penulisan esei itu supaya dimanfaatkan dalam mata pelajaran Sains atau Bahasa Inggeris di kelas sekolah.

Pertandingan akan melibatkan dua jenis pembelajaran iaitu pembelajaran berasaskan inkuiri (*inquiry-based learning*) dan pembelajaran berasaskan masalah (*problem-based learning*).

Oleh demikian, adalah diharapkan pertandingan berbentuk saintifik seperti ini dapat menyokong proses pembelajaran STEM (Sains, Teknologi, Kejuruteraan dan Matematik) di sekolah terutama dalam bidang sains angkasa dalam kalangan generasi muda dalam negara.

Pertandingan esei *Cassini Scientist*

for a Day akan ditutup pada hari Isnin, 3 Jun 2016.

Pelajar sekolah rendah dan menengah dari seluruh negara dialu-alukan menyertai pertandingan melalui guru sekolah masing-masing.

Maklumat lanjut berkenaan program

ini boleh dirujuk kepada laman sesawang Angkasa iaitu <http://www.angkasa.gov.my>.

Sebarang pertanyaan boleh hubungi Jong Tze Kian di talian 03-22734303 atau e-mel tkjong@angkasa.gov.my.

Pertandingan esei menawarkan hadiah mengikut kategori berikut :

KATEGORI SEKOLAH RENDAH

Kategori	Pemenang	Jumlah (RM)
Esei Terbaik	Seorang	RM500
Esei Khas	Seorang	RM300
Sagu hati	Tiga orang	RM200

KATEGORI SEKOLAH MENENGAH

Kategori	Pemenang	Jumlah (RM)
Esei Terbaik	Seorang	RM600
Esei Khas	Seorang	RM400
Sagu hati	Tiga orang	RM200

KERATAN AKHBAR
UTUSAN MALAYSIA (MEGA SAINS) : MUKA SURAT 5
TARIKH : 23 MEI 2016 (ISNIN)



SAMBUNGAN...
UTUSAN MALAYSIA (MEGA SAINS) : MUKA SURAT 6
TARIKH : 23 MEI 2016 (ISNIN)

Oleh MOHD. ZAMRI
SHAH MASTOR

SELEPAS menikmati tayangan wayang gambar bertajuk *London Has Fallen* di sebuah pangung wayang di Mid Valley, Kuala Lumpur, Aziz meninggalkan pusat beli-belah yang terkenal tersebut dengan menaiki kereta dengan berbandukan aplikasi Waze yang terdapat dalam telefon pintar miliknya.

Aplikasi Waze memberi arahan "three hundred meters ahead turn left to Jalan Maarof" dalam slanga bahasa Inggeris Amerika sebagai panduan kepada Aziz untuk melalui jalan yang kurang sesak pada waktu itu untuk ke arah utara Kuala Lumpur dan seterusnya menuju ke Damansara.

Aziz singgah sebentar di sebuah stesen minyak di Bangsar untuk mengisi petrol untuk kendaraannya menggunakan transaksi kad kredit melalui slot kad kredit di kiosk minyak tersebut dan dalam beberapa saat, transaksi pembelian disahkan oleh bank dan pengisian minyak dibenarkan.

Setibanya di rumah, Aziz membuka saluran TV berbayar untuk menyaksikan siaran langsung perlawanan bola sepak Inggeris, Chelsea melawan Manchester United dengan kesudahan seri dua sama.

Sketsa yang dinyatakan itu menunjukkan bahawa kehidupan seharian kita pada hari ini sangat dipengaruhi dan dibantu oleh teknologi angkasa. Apabila Aziz menggunakan aplikasi Waze, dia dapat melihat kedudukan keretanya di jalan raya yang sedang menuju ke Bangsar dan bagaimana aplikasi tersebut boleh memberitahunya bahawa keretanya sedang berada di jalan tertentu menuju ke Bangsar? Kedudukan kenderaan Aziz sebenarnya telah diberitahu oleh satelit Sistem Penentu Kedudukan Global (GPS) yang kemudiannya maklumat tersebut telah dimasukkan ke dalam perisian aplikasi Waze untuk memberitahu kedudukan kenderaan setiap pengguna aplikasi berkenaan.

Apabila Aziz membuat transaksi kad kredit di kiosk stesen minyak, kiosk tersebut telah mendapatkan pengesahan daripada bank yang mengendali kad kredit Aziz terlebih dahulu sebelum pengisian minyak dibenarkan.

Bank yang menguruskan kad kredit Aziz mungkin berada beribu-ribu kilometer (km) daripada kiosk minyak tersebut dan bagaimanakah pengesahan boleh diperolehi daripada bank dalam tempoh hanya beberapa saat sahaja? Sekiranya anda sedar, di hampir setiap stesen minyak di Malaysia, dapat diperhatikan terdapatnya cakera penerima satelit yang rupanya seakan-akan cakera satelit Astro tetapi saiznya beberapa kali lebih besar dan terletak di bahagian atas bumbung stesen minyak.

Cakera penerima satelit tersebut telah menghantar maklumat kad kredit Aziz ke bank yang menguruskan kad kreditnya melalui satelit komunikasi dan seterusnya menghubungkan bank untuk pengesahan oleh komputer di bank berkenaan. Tempoh di antara Aziz memasukkan kad kredit ke dalam slot sehingga pengesahan oleh



PAKAIAN angkasa lepas menggunakan fabrik khas yang kalis api.

Sumbangan teknologi angkasa

Pelbagai peralatan dan inovasi hari ini diinspirasi dari teknologi angkasa



MESIN pengeluaran wang automatik (ATM) yang dipasang pada stesen minyak menggunakan teknologi satelit (VSat).

komputer bank hanya mengambil masa beberapa saat sahaja! Sungguh mudah! Siaran TV berbayar seperti Astro juga menggunakan teknologi angkasa iaitu menggunakan satelit komunikasi sama seperti transaksi kad kredit Aziz di stesen minyak tadi. Siaran langsung Chelsea melawan Manchester United telah dipancarkan oleh satelit dari luar negara dan diterima oleh stesen penerima satelit Astro di Bukit Jalil. Kemudiannya siaran langsung tersebut dipancarkan ke satelit



ANTARA makanan yang bawa oleh angkasawan negara semasa di ISS.

Measat yang terletak 36,000 km di atas garisan Khatulistiwa dan dipancarkan kembali ke cakera penerima satelit di rumah pelanggan Astro bagi menikmati siaran langsung perlawanan bola tersebut. Contoh yang telah dinyatakan tadi adalah merupakan aplikasi secara langsung teknologi angkasa dalam kehidupan seharian kita. Sebenarnya terdapat banyak lagi limpahan daripada

aplikasi teknologi angkasa secara tidak langsung yang secara tidak disadari telah kita gunakan dalam kehidupan seharian. Kita mungkin tidak sedar pada pembungkus produk makanan yang kita beli di pasar raya terdapat logo pengiktirafan HACCP (Hazard Analysis and Critical Control Points).

Produk makanan yang telah mendapat pengiktirafan HACCP telah disediakan dengan teliti dan disahkan tidak mengandungi bahan yang tercemar dan membahayakan. HACCP sebenarnya merupakan suatu prosedur penyediaan makanan yang telah digunakan untuk menyediakan makanan angkasawan yang bakal menjalankan misi penerokaan ke angkasa lepas.

Agensi Pentadbiran Angkasa Lepas dan Aeronautik Kebangsaan Amerika Syarikat (NASA) menghadapi dua masalah dalam menyediakan makanan untuk angkasawan semasa di bawah program Apollo, Mercury dan Gemini. Ia bagi memastikan bahawa makanan yang di bawa ke angkasa lepas tidak akan bertaburan lalu menyelilap masuk dan merosakkan peralatan-peralatan sensitif

SAMBUNGAN...

UTUSAN MALAYSIA (MEGA SAINS) : MUKA SURAT 7

TARIKH : 23 MEI 2016 (ISNIN)

Teknologi angkasa beri sumbangan dunia perubatan

TEKNOLOGI pam jantung
yang inspirasikan daripada
pembinaan enjin roket.

SEKIRANYA kita pernah terlihat pendakap gigi (braces) pendakap itu sebenarnya merupakan seramik lutsinar yang telah terhasil daripada teknologi angkasa. Seramik lutsinar tersebut telah dihasilkan oleh sebuah syarikat sebagai pelindung bagi antena pengesanan misil (roket) yang mengekori sasarannya berpandukan kepada haba yang dikeluarkan oleh objek sasarannya.

Sumbangan yang lebih besar teknologi angkasa dalam bidang perubatan adalah terhadap penyakit yang berkaitan dengan jantung manusia. Antara masalah berkaitan jantung yang dihadapi oleh manusia adalah kadar degupan jantung yang tidak stabil, tidak sekata atau menjadi lemah kerana faktor yang mempengaruhi jantung.

Inovasi NASA telah membantu pesakit yang mempunyai masalah tersebut menerusi ciptaan *cardiac pacemaker* atau perentak degupan jantung itu. Sistem tersebut sebenarnya telah mengaplikasikan teknologi komunikasi kawalan satelit ketika satelit berada di dalam orbitnya.

Pacemaker merupakan suatu alat penghasil denyutan isyarat elektrik bersaiz 3 sentimeter (sm) x 3 sm x 1 sm yang boleh ditanam di bahagian dada pesakit menerusi pembedahan. Isyarat elektrik yang dihantar akan membetulkan kadar degupan jantung pesakit dan terdapat alat kawalan yang boleh melaras kadar degupan.

Proses tersebut menyerupai seorang jurutera yang sedang mengawal pergerakan dan aktiviti sebuah satelit yang sedang berada di dalam orbitnya. Kadar degupan jantung pesakit boleh dilaraskan menggunakan peralatan kawalan melalui pengaturcaraan yang bersesuaian dan pelarasan tersebut dapat dilakukan tanpa memerlukan pakar membuat sebarang pembedahan semula jantung.

Sekali lagi inovasi teknologi angkasa NASA telah berjaya membina 'jejantas' yang dapat menyambung semula kehidupan pesakit jantung sementara menunggu pembedahan penggantian jantung baharunya.

NASA juga telah mengaplikasikan pengetahuan yang diperolehi daripada kajian ke atas aliran cecair di dalam enjin roket yang melancarkan manusia ke Bulan. Proses tersebut menghasilkan pam jantung atau *cardiac pump* yang membolehkan jantung dapat berfungsi seperti biasa sementara menunggu tarikh pembedahan.

Pam mengambil alih fungsi jantung yang telah rosak dengan mengempam darah ke seluruh badan pesakit untuk beliau terus hidup sementara menunggu jantung baharu daripada penderma.

Sehingga kini lebih sejuta orang telah mendapat manfaat daripada teknologi pam jantung yang asalnya merupakan



PENDAKAP GIGI

teknologi untuk pembinaan enjin roket bagi menerbangkan manusia ke angkasa lepas.

Bagi pesakit kencing manis, saintis telah mencipta alat bagi merembeskan insulin ke dalam darah di dalam badan pesakit. Ia bertujuan untuk mencairkan kandungan gula berlebihan yang terdapat di dalam darah pesakit menggunakan alat pam insulin.

Pam tersebut yang boleh diprogramkan akan mengempam insulin ke bahagian bawah kulit perut pesakit untuk mengawal kandungan gula di dalam darahnya mengikut masa yang telah diprogramkan tanpa perlu melalui proses suntikan berulang-ulang seperti sebelum ini.

Teknologi pam insulin ini sebenarnya telah diadaptasi daripada kapal pendarat Mars Viking untuk menyuntik bahan kultur ke dalam tanah permukaan planet Marikh pada tahun 1976.

Terdapat pelbagai lagi limpahan daripada aplikasi teknologi angkasa sama ada kita sedari atau tidak. Ia sebenarnya telah diadaptasi dan sedang kita gunakan dalam menjalani kehidupan kita seharian.

Bagaimanapun, terdapat juga beberapa perkara yang seringkali telah disalah anggap sebagai hasil daripada teknologi angkasa lepas yang telah diadaptasi dalam kehidupan kita tetapi perkara sebenarnya bukanlah sedemikian.

Antaranya perkara tersebut termasuklah peralatan tanpa wayar seperti pemutar skru tanpa wayar. Pemutar skru tanpa wayar sebenarnya telah direka oleh Black & Decker pada tahun 1961 tetapi telah dipopularkan penggunaannya dalam kalangan angkasawan semasa melakukan aktiviti pembaikan di angkasa lepas.

Peralatan pengimbas badan pesakit *Magnetic Resonance Imaging (MRI)* bukanlah dihasilkan oleh teknologi angkasa lepas tetapi, kontraktor Jet Propulsion Laboratory (JPL) yang telah membangunkan perisian pemrosesan imej digital yang telah digunakan di dalam peralatan tersebut.

Serbuk minuman *Tang* pula sebenarnya telah dicipta oleh syarikat General Foods pada tahun 1957 tetapi telah dipopularkan sebagai minuman angkasawan semasa di peringkat awal misi angkasawan mengelilingi bumi. Velcro pula telah dicipta oleh syarikat dari Switzerland pada tahun 1940-an tetapi menjadi terkenal kerana telah digunakan oleh angkasawan dalam misi-misi Apollo untuk melekatkan peralatan-peralatan semasa di dalam sekitaran mikrograviti.

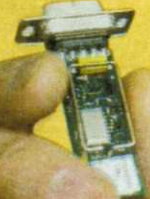
Di sebalik usaha dan perbelanjaan yang begitu besar yang telah dilakukan untuk menghantar misi penerokaan ke angkasa lepas, mungkin ada yang bertanya, "apakah kaitan di antara pelancaran roket ke angkasa lepas dengan kehidupan manusia di permukaan bumi?"

Oleh itu, masyarakat perlu memahami kepentingan teknologi angkasa kerana sumbangannya amat besar kepada kehidupan manusia.

Mereka juga sepatutnya terus menyokong usaha bagi menerokai angkasa lepas dan alam semesta yang terbentang luas.

PENULIS ialah Pegawai Sains di Agensi Angkasa Negara (Angkasa)

CONTOH alat
mengempam
insulin.



di dalam kapal angkasa dan. Selain itu ia juga bagi memastikan makanan yang dibawa tidak mengakibatkan penyakit akibat bakteria dan bahan toksin yang terdapat di dalam makanan tersebut.

Masalah pertama dapat diatasi dengan mudah tetapi masalah kedua tidak sebegitu mudah untuk diselesaikan.

Akhirnya, bagi masalah kedua mereka dapati bahawa penyelesaiannya adalah dengan mewujudkan prosedur untuk mengawal keseluruhan proses penghasilan makanan angkasawan agar tidak terdapat bakteria atau toksin yang boleh membahayakan kesihatan. Prosedur tersebut jugalah yang kini telah diaplikasikan dalam proses penghasilan makanan harian untuk keselamatan dan kesihatan manusia di bumi.

Ada yang bertanya, apakah yang boleh kita peroleh dengan melancarkan roket dan manusia ke bulan dan menghantar prob angkasa ke planet Marikh? Semasa program latihan Apollo 1 kira-kira 50 tahun yang lalu, tiga orang angkasawan telah terbunuh kerana kebakaran *command module* kapal angkasa tersebut.

Sejak peristiwa tersebut, saintis mencari jalan untuk meningkatkan aspek keselamatan angkasawan termasuklah mencipta pakaian angkasawan yang diperbuat daripada nilon pada ketika itu daripada terbakar sekiranya terkena api.

Saintis akhirnya telah mencipta fabrik yang disaluti dengan PTFE atau juga dikenali sebagai teflon yang tidak terbakar dan akan hanya cair pada suhu 650 darjah Fahrenheit atau 343 darjah Celsius.

Bagaimanapun, pakaian angkasawan pada hari ini sudah tidak lagi menggunakan teflon tetapi menggunakan gabungan Gore-Tex, Kevlar dan Nomex yang dikenali sebagai ortho-fabric.

Namun, fabrik disaluti Teflon terdahulu atau yang juga dikenali sebagai membran gentian kaca teflon kini amat terkenal dalam bidang seni bina bangunan. Antaranya termasuklah bumbung bangunan moden seperti Stadium Putra di Bukit Jalil, khemah jemaah haji di Arafah, Arab Saudi dan banyak lagi bangunan dan stadium.

Menggunakan bumbung fabrik yang biasanya berwarna putih atau cerah adalah merupakan hasil daripada teknologi keselamatan angkasawan daripada mengalami kebakaran semasa program Apollo 1 dahulu.

PBAPP: Cloud seeding must go on in Penang

GEORGE TOWN: The water situation in Penang is still not safe as the level at the dams has not reached 60% even with the recent cloud seeding operations.

Penang Water Supply Corporation Sdn Bhd (PBAPP) chief executive officer Datuk Jaseni Maidinsa said that cloud seeding should continue until the effects of El Nino taper off at the end of June.

"Both the Teluk Bahang and Air Itam dams must reach the 60% mark. Right now, it's hovering at around 50%," he said when commenting on the recent cloud seeding operation which was successfully carried out on Friday in the northern states.

He said the water levels at the Muda and Beris dams in Kedah were presently around 30%.

A statement on the portal of the Science, Technology and Innovation Ministry revealed that cloud seeding had brought rain to the Timah Tasoh dam in Perlis, the Beris and Ahning dams in Kedah and the Teluk Bahang and Air Itam dams in Penang.

"The Federal Government should not let up on the cloud seeding operations as the dry weather is expected to continue throughout June," said Jaseni.

He added that if cloud seeding was stopped now, the level in all the dams would drop and it could create a major issue early next year even if it rained after June.

KERATAN AKHBAR
UTUSAN MALAYSIA (BIZ) : MUKA SURAT 20
TARIKH: 23 MEI 2016 (ISNIN)

Tropical Bioessence raih RM2.75 juta

Oleh **DIANA AZIZ**

ekonomi@utusan.com.my

SEREMBAN 22 Mei - Tropical Bioessence Sdn.Bhd mencatat peningkatan pendapatan sebanyak 25 peratus setakat lima bulan pertama tahun ini sejak menyertai program BioNext di bawah kelolaan BiotechCorp dan SME Corp Malaysia.

Pengarah Urusannya, Mohd. Khairil Said berkata, pendapatan syarikat berstatus bionexus itu meningkat kepada RM2.75 juta, berbanding RM2.25 juta dalam tempoh sama tahun lalu.

"Peningkatan pendapatan tersebut adalah sumbangan daripada jualan produk Sutra dan pada tahun ini, kita menyasarkan pendapatan hasil jualan produk berkenaan meningkat lebih daripada RM3.5 juta.

"Sasaran tersebut turut disokong dengan penambahan beberapa outlet kedai konsep Sutra Shoppe, pelancaran produk baharu serta peningkatan sumbangan daripada pasaran eksport," katanya selepas Majlis Perasmian Sutra Shoppe yang pertama di negara ini di sini baru-baru ini.

Yang turut hadir pada majlis tersebut **Ketua Pegawai Eksekutif BiotechCorp, Datuk Dr. Mohd. Nazlee Kamal** dan **Ketua Pegawai Eksekutif SME Corp Malaysia, Datuk Hafsah Hashim**.

Sementara itu, menurut Mohd. Nazlee, Tropical Bioessence merupakan antara 10 syarikat yang dibimbing di bawah pro-



MOHD. KHAIRIL SAID (kanan) memberi penerangan mengenai produk kepada **Hafsah Hashim** (kiri), **Dr. Mohd. Nazlee Kamal** (dua dari kanan) dan **Badrul Hisham Badruddin** pada majlis perasmian Sutra Shoppe di Seremban, baru-baru ini.

gram BioNext untuk menjadi sebuah syarikat bertaraf antarabangsa.

Katanya, pada program yang bermula pada 2015, kesemua syarikat mendapat sokongan BiotechCorp dalam usaha mengembang dan memperkukuh perniagaan melalui program-program bertaraf dunia seperti Bioeconomy Accelerator Programme yang dijalankan bersama Institut Larta dari Amerika Syarikat (AS).

Program BioNext melibatkan organisasi pengkomersialan teknologi daripada Universiti Oxford dengan kerjasama SME

Corp Malaysia dan BDEC Resources Malaysia Sdn. Bhd.

"Program-program tersebut membantu merangsang pertumbuhan Perusahaan Kecil dan Sederhana berstatus BioNexus dan kita turut merancang untuk mewujudkan sebanyak 20 buah syarikat berasaskan bioglobal menjelang 2020.

"Ia selaras dengan Dasar Bioteknologi Negara yang mahu meningkatkan nilai eksport bioproduk Malaysia sekali gus menjadikan negara sebagai antara pemain bioekonomi berdaya saing di peringkat antarabangsa," katanya.

Rapid progress in Malaysia's biotech, bio-based industries

SHAREN KAUR

KUALA LUMPUR: Malaysian Biotechnology Corp (BiotechCorp) Sdn Bhd chief executive officer Datuk Dr Mohd Nazlee Kamal says the development of biotechnology and bio-based industries in Malaysia is showing rapid growth and progress.

In the past 10 years, BiotechCorp had been enhancing its strategy and perseverance in driving foreign direct investment (FDIs) into Malaysia's biotechnology sphere, said Mohd Nazlee.

From 2007 to last year, the company had attracted RM11.6 billion worth of FDIs and investments were mainly from the United States, the United Kingdom, Australia, Belgium, Singapore, Taiwan, India, Holland, Germany, Denmark, South Korea, Japan and France.

Mohd Nazlee said there was a need to strengthen Malaysia's position as the gateway to reach Asean, which was a market of 600 million people.

"One of the areas being worked on is to strengthen the clustering strategy in key economic corridors, in which industry clusters around Malaysia provide a platform for supporting bioeconomy stakeholders in AgBiotech, BioMedical and BioIndustrial.

"One of Malaysia's most attractive

characteristics is its ability to carry out bio-based clustering due to the close proximity of raw materials, feedstock and facilities, highly specialised industrial zones and world class infrastructure, which are able to reduce cost and increase efficiency," he said.

Mohd Nazlee hopes to accelerate investments and one of the drivers this year is the BioMalaysia & Asia Pacific Bioeconomy 2016 exhibition and conference.

He said the conference, which was held in collaboration with the Ministry of Science, Technology & Innovation (Mosti) hoped to raise awareness about the potential of bio-based technologies in contributing towards the economic growth of Malaysia and the Asia-Pacific region.

"This year's theme is 'Value-adding our Economy through Bio-based Technologies', and the agenda is set to encourage partnerships to spur innovation and growth in the bio-based sector. Key highlights include the Bioeconomy Innovation Awards, BioNexus Product Launch, Technology Showcase Pitching, 'Open Conference Concept, BioShopper and BioCareer'," he said.

The BioMalaysia & Asia Pacific Bioeconomy 2016 will be held from May 31 to June 2 at the Kuala Lumpur Convention Centre.

Admission is free.



BiotechCorp CEO
**Datuk Dr Mohd
Nazlee Kamal**

KERATAN AKHBAR
MALAY MAIL (LETTERS) : MUKA SURAT 17
TARIKH : 23 MEI 2016 (ISNIN)

How do we stem cybercrime tide?

CYBERCRIME is fast growing and lucrative. There is a global trend which shows the total amount of losses through cybercrimes may have actually exceeded traditional crimes.

Cybercrime is a term for any illegal activity that uses internet and a computer or other electronic devices such as mobile phones and cameras as its primary means of committing a crime. It includes identity theft, hacking and computer fraud and is a complex area of criminology.

The Centre for Strategic and International Studies (CSIS) reveals that the likely 2015 annual cost to the global economy from cybercrime is more than US\$400 billion (RM1.6 trillion). Juniper research recently predicted that by 2019 the cost loss will be US\$2.1 trillion (RM8.6 trillion), increasing to almost five times the estimated cost of breaches last year.

In Malaysia, cybercrime is also emerging as a serious economic crime threat.

CSIS estimates the cost of cybercrime in Malaysia is 0.18 per cent of GDP, or approximately RM215 million per year.

Based on statistics provided by Pemandu, Malaysia lost only RM179.3 million last year. Cybercrime has surpassed drug trafficking as the most lucrative crime. More than 70 per cent of commercial crime cases are now categorised as cybercrime cases according to police.

According to **Cybersecurity**, the number of cybercrimes in the country has increased with an average of 10,000 cases reported each year. This included various types of cybercrimes, with the highest incidences involving online scams and the rest involving hacking information systems of organisations. Other cybercrimes reported include cyber harassment, cyberbullying, denial of service, intrusion, and others which are content-related.

In another report released by Telenor Group, Digi.Com Bhd stated an Internet

scams study shows the top three scams in Malaysia are "work from home" fraud (30 per cent), Internet auction scams (22 per cent) and online dating scams (20 per cent). The study found one in five people have been victims to both Internet auction scams and online dating scams, and one in 10 had their Facebook hacked.

It is no surprise cybercriminals are attacking and focusing on Malaysia given the high usage of the Internet. We now see a breed of cybercriminals who is bolder, harsher and more open about their activities, and are looking to enter the ranks of the world cybercrime professionals.

The modus operandi of the cybercriminals has become more sophisticated and their scale of activities has increased considerably. The high-tech banking system, lax student visa regulations and weakness in enforcement have made Malaysia a global hub for cybercrimes.

One other main reason for the growth of cybercrime is the way it preys on the human tendency of seeking the easy way to make money and gain profit. Cybercrimes always have the pretext of making quick profits and hence, greedy people fall prey to it despite the extensive exposure of its dangers by the authorities and many cautionary tales from cheated victims.

DATUK AKHBAR SATAR

LOSING THE ART OF SCIENCE



NOT enough students are taking up science in secondary school and at the tertiary level. Misconceived fear of the subjects, the lack of jobs in the field and 'poor' salaries are cited as reasons for the low numbers. The dreadful consequences to the nation's aspirations cannot be overstated, warn academicians.



→ **REPORTS BY AINA NASA AND ZAFIRA ANWAR**
ON PAGES 4 & 5; **OP-ED ON PAGE 14**

STEM-ming the lack of interest in these fields

KUALA LUMPUR: Science and Mathematics Cluster of the National Council of Professors secretary Professor Datuk Dr Abdul Razak Salleh said the declining interest in STEM (science, technology, engineering and mathematics) fields in recent years is worrying, especially if the country wants to be a developed nation by 2020.

"The vision is a stone's throw away, and, in no time, we will see our nation in want of students with scientific qualifications," he said.

He said the lack of interest in science could be traced to the early days when science was seen as "too difficult" and "exclusively for the exceptionally brilliant".

"No subject is tougher than others per se, but some may require deeper understanding and more exercises than others. For a field like mathematics, for example, I look at it like I look at a game of football.

"Without training and understanding of elements like playing positions in football, you will never do well in the game," he said.

Razak added that the notion held by students and their teachers that science and mathematics were difficult was unwarranted.

"It is not as difficult as people anticipate it to be. What is important, though, is understanding of concepts. When concepts are under-



Fatin Nur Aqilah Izmir, 11, looking through a telescope at Universiti Putra Malaysia. It is important that schoolchildren are exposed to scientific concepts early. File pic

stood to one's full capacity, grasping any subject skillfully will be easier."

The logical nature of subjects like science, technology, engineering and mathematics, Razak said, provided students of the field with the ability to excel in anything, as their mental capacities were trained to think logically.

Razak, a retired lecturer who had served at Universiti Kebangsaan Malaysia since 1972, said to glorify the STEM field in the coming years, relevant parties must make the field

more attractive to the young.

"The Education Ministry, science and mathematics societies and even the National Council of Professors must advocate STEM and we must do this among schoolchildren.

"By the time they reach the university level, they will have an interest in the field and, hopefully, delve into it further with time."

Dr Ng Soo Boon of the Education Ministry told the *New Straits Times* that the reason students were un-

interested in the field.

"The trend at the moment is of concern, especially at the university level, because places are there, but there are not enough takers.

"Pure science students at the secondary level with good grades are taking up law, accountancy and business because the reality is that the jobs are in those areas," she said.

It was normal for science graduates to encounter difficulty in finding jobs, Ng said.

"Science graduates can work in research centres, but in Malaysia, we do not have many of those," she said, adding that although science was imperative for the nation, the arts stream was also necessary for the development of a balanced society.

On whether there was a lack of interest in science among youth, she said it was more a matter of the need for immediate results in society that demanded everything, even success, instantly.

"I do not think that interest is waning. It is more of students wanting more immediate results and the lack of patience in doing science."

Dr Nor Haniza Sarmin of Universiti Teknologi Malaysia said developing a love for science early instead of forcing it on students later would be a determining factor to develop their passion for the field at higher levels.

"It is very important that students

at the early stages of school be nurtured and exposed to basic scientific knowledge and everyday science.

"This will generate interest and, as they grow older, they should be exposed more to higher-level scientific concepts and prospective career paths, up until they reach the end of secondary school," she said.

Nor Haniza said science and math graduates were invaluable.

"They will go on to become experts in their field. Without them, the whole world will be victims of inaccurate dissemination of scientific knowledge. The country will be stunted in terms of technological progress and contributions to the scientific society will be non-existent."

Nor Haniza, who is also vice president of the Malaysian Mathematical Sciences Society, said science subjects offered those who pursued it the satisfaction of discovering new things in research and development.

"It all comes down to passion and the intention of the individual.

"While some might find solace in poetry or art, others find it in successfully conducting experiments, proving theorems or even just learning something new and interesting."

She said there were many branches of science that had yet to be fully studied and the idea of making the next big discovery should be attractive to students.

Too few STEM students

PROBLEM: Serious human capital shortage in science fields if numbers don't rise

AINA NASA
AND ZAFIRA ANWAR
KUALA LUMPUR
news@nst.com.my

MALAYSIA will face a serious shortage of human capital in science fields as the target for students enrolling in the stream is not being met annually at the school and tertiary levels.

Based on the Science and Technology Human Capital Report and Science Outlook 2015 by Akademi Sains Malaysia, the country needs at least 270,000 science students sitting the Sijil Pelajaran Malaysia examination annually, but there are only about 90,000 now.

A total of 500,000 students enter Form Four every year.

The Higher Education Ministry told the *New Straits Times* that 270,000 students, or roughly 60 per cent, of the annual cohort taking up science would be ideal. To compound matters, of those taking

STEM-based programmes in school, 12 per cent migrated to non-STEM programmes at the tertiary level.

STEM (science, technology, engineering and mathematics) involves pure science and mathematics disciplines.

The target ratio of 60:40 for the number of students enrolling for STEM and non-STEM programmes has not been met.

For the 2015/2016 academic year, 59.06 per cent of students who were offered spots in public universities (out of 42,000 applicants) were for science-based programmes.

"The fact that we offer spots to 59.06 per cent of them means that we are still short of our 60 per cent target. The reality, however, is that we need more," the ministry said.

Educationists said efforts must be increased to boost interest in the sciences as the situation, if allowed to continue, would lead to the country not being viewed in the same light as advanced nations.

With global economic giants like the United States, Japan, Singapore and Germany having a solid 30 per cent workforce in STEM fields, Malaysia still has a long way to go as

it has a STEM-related workforce of only less than three per cent.

This will lead to technical dependency on foreign workers, a phenomenon plaguing the country in many fields, educationists said.

Meanwhile, the ministry said, efforts to promote STEM among schoolchildren were underway.

Besides promoting STEM among students, the ministry is also reaching out to researchers and industries. There are also research and development

exhibitions, publication of books and technology competitions.

"The ministry also awards grants to encourage science-based research and discovery. These efforts were undertaken to create interest and disseminate information and knowledge on STEM.

"For instance, competitions encourage students to harness their understanding and talents for better acceptance of STEM as a key to innovation and development of new technologies."

The ministry said it was doing its best to make students excited about the prospects and potential of STEM in Malaysia.

A Malaysian scientist, for example,

was recently named in Thomson Reuters' list of the "World's Most Influential Scientific Minds".

Universities in the country were also ranked in the world's top 50 best universities in chemical engineering and electrical and electronic engineering, as well as top 100 in STEM-based subjects like environmental sciences and aeronautical and mechanical engineering.

"The things happening in universities here have a positive impact on society. Thus, the ministry's efforts include communicating with students via traditional and social media that they can be part of something meaningful via STEM."

The Education Ministry and Akademi Sains Malaysia also have programmes, the ministry said, and initiatives were in place to encourage interest in STEM among students.

"Other organisations, such as BioTechCorp and Nano Malaysia, have been set up to create jobs in STEM-related fields.

"Efforts to increase interest in STEM are ongoing and will take time, but the ministry is confident that students and parents can see the potential of STEM in the long run."

The ministry was adamant that Malaysia must support a strong foundation in basic science at the primary and secondary levels for students to become catalysts and part of the supply pool in the coming years.



Fear keeping students away from 'tough' fields

KUALA LUMPUR: The seeming lack of interest among schoolchildren in science, technology, engineering and mathematics (STEM) may be attributed to the "fear" they have of the STEM field.

The fear could be a result of pre-conceived ideas they have about the field, the pressure they face to obtain the best results and the sense of insecurity about finding a stable career path.

Former Universiti Teknologi Mara (UiTM) vice-chancellor Tan Sri Dr Sahol Hamid Abu Bakar told the *New Straits Times* that university students often took the easy route to everything, including their course of choice.

"One reason interest in STEM is on the decline is that it is easier to graduate in non-STEM courses or arts courses. With arts, you have more time and you can have more fun."

"With science, you need to struggle every day. You need to do a lot of thinking and reading, and you spend long hours in the lab. When they observe this, they question 'why should I even take science?'"

Sahol said the decline was most noticeable at the tertiary level.

"The decline comes when they want to choose a career or course to study. At the university level, not many are choosing STEM courses."

"Even performing students and those with a science background prefer choosing arts courses," he said, adding that science courses had more restrictions, which could be a reason for the low enrolment.

Sahol, who has a background in chemical engineering, said students feared that if they chose STEM-related courses, there was a chance that they may not perform well and ultimately fail.

Failing, he said, was the worst thing that could happen as parents put a lot of pressure on students to perform well and score good grades.

"Parents are looking for a good

pointer. But the thing is, if you score in exams in science courses, it is not necessarily a good indicator that you will be a good worker in the future."

"The one who performs are the street smart ones. When it comes to science, grades are not as important as how you see and manipulate things," he said.

Choosing a good career was also a priority for university students in selecting their course of study, he added, and salaries in STEM-related fields had not been revised and increased in a long time.

"The salaries in STEM fields have not been revised for the past 10 years. They have to make a drastic change in salary because it is not commensurate with progress."

The lay-offs in the oil and gas industry were not helping, he said, as graduates feared they would become victims of job cuts.

In addressing these issues, he offered recommendations that centred on making technical education more attractive as the demand was increasing year by year.

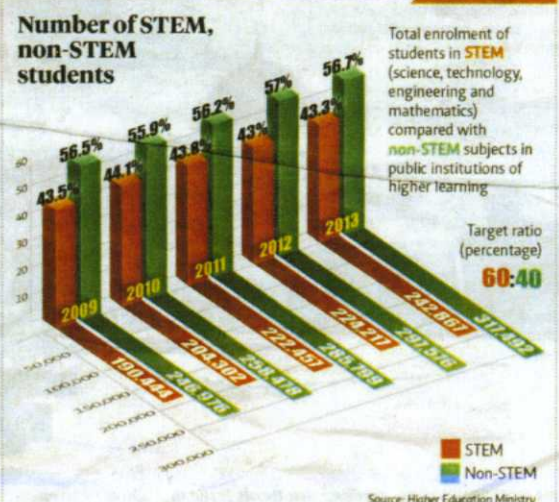
"There has to be a policy that makes it compulsory for Sijil Pelajaran Malaysia leavers who do not get places in universities to be trained in TVET (technical vocational education training)."

"This can not only increase the number of skilled workers, but can keep youth off the streets and out of factories."

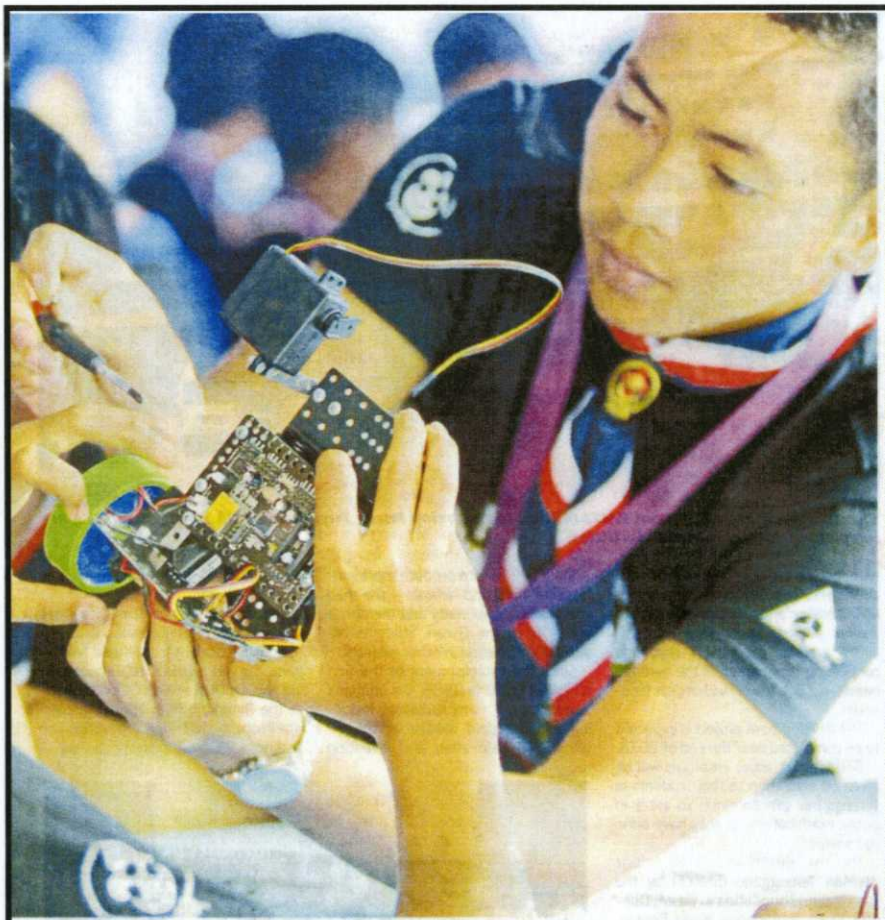
Other recommendations he suggested were to revise and increase the salary in STEM fields, passing a legislation for industries to train engineers while they were in university and emulate countries like Germany and South Korea in terms of technical and vocational progression.

Sahol is with the Jelajah Pendidikan Bumiputera programme, which briefs SPM leavers and recruits them into community colleges, UiTM, polytechnic colleges and Mara institutes.

Number of STEM, non-STEM students



KERATAN AKHBAR
NEW STRAITS TIMES (PRIME NEWS) : MUKA SURAT 5
TARIKH : 23 MEI 2016 (ISNIN)



Glamorising science will boost numbers

KUALA LUMPUR: Statistics from Universiti Malaya (UM) show that 569 science students and 513 engineering students took up the discipline in the 2015/2016 bachelor's degree intake.

UM Deputy Vice-Chancellor (Academic & International) Professor Dr Awang Bulgiba Awang Mahmud said if universities continued to produce more arts graduates than those from STEM (science, technology, engineering and mathematics) disciplines, the country's development would be stunted.

"If we don't have enough STEM graduates, we will run out of resources, making us another Dubai, where we have to rely on foreign talent. Not developing our technology base and using others' will mean that we will forever be dependent on copyright and intellectual property rights, and we need to break out from this thinking of borrowing other people's rights."

Dr Awang Bulgiba was concerned that while using foreign talent could increase per capita income, Malaysia would depend on the technology of others.

This, he added, would not lead to sustainable growth as having a small talent pool would drive foreign investors away from the country.

"If the talent leaves or stops supplying you with the technology, you'll be stranded and become nothing more than a trading nation."

"Investors are hesitant to come in with high-tech industries if they see that there is insufficient talent," he told the *New Straits Times*.

Dr Awang Bulgiba said there was slightly more than 4,000 students who took STEM subjects in Sijil Tinggi Persekolahan Malaysia.

"How do we spread this amount between 20 public universities and the many private varsities in the country? We are struggling to fill up spaces in engineering and science courses. Last year, among all public universities, there were 14,000 unfilled places, most of which are in the STEM field."

"Thankfully, UM is known for its STEM courses. Therefore, we do not face much of a problem."

"The pool of students graduating from STEM courses is getting smaller. In some universities, they have to scrape the bottom of the barrel," he said.

Dr Awang Bulgiba attributed the declining number of students in STEM subjects to the lack of interest among students to learn science-based courses.

"I believe the way we teach sci-

ence is not attractive enough for students. Science has been 'deglamorised', so to speak. We aren't presenting it as an attractive option for them to take up."

"Another reason is the lack of facilities in schools, which is a big issue. Without proper science labs, how can you teach science?"

"There isn't even a practical exam for science in SPM (Sijil Pelajaran Malaysia), unlike back in the day," he said.

Dr Awang Bulgiba said there had to be an integrated approach to the matter and suggested that the Education Ministry sit down with the Higher Education and Human Resources ministries to draw up a plan.

He said while the Higher Education Ministry could do its part to allocate 60 per cent of university spots for STEM students, it would be pointless if the spaces could not be filled.

"The Education Ministry must do its part by glamorising science and provide facilities to make learning more attractive and interactive. Matriculation and foundation programmes should also be extended to two years, so that educators aren't pressured to bulldoze through the syllabus."

Kids, too, must have their interest
in the sciences encouraged
from a young age

Teachers must be STEM specialists

AN unending problem long needing a solution is the shortfall in students pursuing science, technology, engineering and mathematics (STEM) subjects through to the tertiary level. The national target is a 60:40 ratio favouring STEM subjects, which, year in and year out, is not met. Inadequate infrastructure has been identified as one of the reasons. How can students sit the Sijil Pelajaran Malaysia examination for science subjects without having laboratory experience? Is this not a ludicrous situation? The definition of science — the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment — in itself suggests that lab experience is necessary. It appears that the education system does not have a clear agenda and has misplaced priorities. As the debate rages on, there also appears to be too many fallacies voiced, like students being afraid of the sciences.

The solution to the predicament? Every academic discipline has the same propensity to become an intellectual challenge. To suggest that the humanities might be breezed through without effort is to begin along a path that leads to more errors. Students' disinclination to the sciences can be blamed on the pedagogy, or method and practice of teaching, employed when it comes to science subjects. That the discipline is taught in primary schools as Science and Technology is telling. Science is about the basic foundation, comprising biology, chemistry and physics, that evolves into further theoretical specialisation and, then, application; technology being a part of it. That the world has been misled into thinking that it takes a genius to master the sciences is probably because of the amount of mathematics involved, especially in physics. Mathematics challenges standard linguistic use and comprehension. That one can see how a clean mind takes to the logic of mathematics is a clear indication of how language can distort logic, which, in turn, explains the effectiveness of propaganda. A child quickly grasps mathematical ideas and the permutations stated in numbers and symbols, within which interactions are expressed. As the complexity increases, an ill-equipped educator loses the exactness of logic, leading the child into a morass of the educator's ineptitude. The teaching of mathematics beyond the basics requires a teacher whose understanding of mathematical logic is strong enough to ensure a connection with the minds of students.

Next: the need to provide all schools with adequate lab facilities. Should that be too costly, then, a proportion of schools in the country must be so equipped and students with a natural proclivity for STEM subjects be gathered accordingly. There is also a need to revamp the curriculum. Start encouraging children's interest in the sciences at a young age; this should be part of the system. They must first be taught the basics of the sciences before technology is incorporated. Teachers, too, must be STEM specialists — those who can inspire or motivate interest in the sciences, and not someone who can just teach the whole spectrum of subjects offered, especially in secondary schools.

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