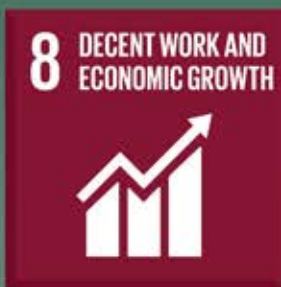


SCi planet

EYE ON SCIENCE

SUSTAINABLE DEVELOPMENT GOALS



WE REAP WHAT WE SOW

By: Maissa Azab



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In our final issue of 2019, we wrap up our year-long coverage of the UN Sustainable Development Goals (SDGs). In our previous issues, we tackled the Goals focusing on the sustainability of basic survival needs, and the safety and quality of life on Earth for humans and all lifeforms. The Goals we tackle now bring us full circle, because we cannot actually have a quality lifestyle for ourselves and our planet without quality education. Likewise, to achieve sustainable development, we need to secure decent work and economic growth, which also entails sustainable industry, innovation, and infrastructure.

All 17 SDGs are equally crucial; they all intertwine, and success of one goal contributes to success of all others. Indeed, the Goals relating to work and economy are just as critical as any other goal. However, it is my personal belief that everything we need to achieve in life for ourselves, as well as our families, communities, countries, and indeed planet, begins with proper education; that is, quality content and delivery. I believe this is the only means to raising generations empowered by the knowledge and skills to counteract the downfall from decades of irresponsible, greedy human behavior.

The UN description of the “quality education” goal is “to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. There are several targets within the Goal, including, among others, issues such as free education, equal access, eliminating discrimination, universal literacy and numeracy. A good quality education is one that provides all learners with capabilities they require to become economically productive, develop sustainable livelihoods, contribute to peaceful and democratic societies, and enhance individual well-being.

With this note, I invite you to dig into our new issue, hoping that you enjoy it and are inspired by it to look for methods you personally can contribute to the accomplishment of the Global Goals. As always, we assure you to continue our coverage via *SCiplanet* Online; if you have not already subscribed to our e-newsletter, we encourage you to do so, to keep abreast with relevant news.



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SUSTAINING STEM EDUCATION

By: Maissa Azab

similarly, when they run off on nature walks to explore a fallen nest or flower, they are observing the biological world. Teachers can approach this curiosity to direct the students in a more focused manner.

According to the aforementioned PCAST report, students must be prepared to have a strong foundation in STEM no matter what careers they pursue; this preparation should involve building shared skills and knowledge. On the other hand, students must be inspired and motivated to learn STEM subjects, to gain interest in joining STEM fields; this will be feasible through meaningful experiences that approach students' particular interests and abilities.

STEM educators, as facilitators, need not just be knowledgeable in the subject, but they should also possess the skills with which to impact learners. Instead of an either/or mentality, many experienced teachers know that using the best of a variety of approaches benefits many learners; instructional tools must be carefully and intentionally adapted to accommodate individual learners.

Yet another obstacle to effective STEM education is the poor condition of laboratory facilities and instructional media; moreover, overcrowding in classroom can make facilitation of students' activities less effective. If changes are implemented as needed in our schools, this will enhance teachers' ability to facilitate learning activities to students, improve academic achievement, and increase in test scores.

Moreover, technology can help with the huge workload and limited time and energy teachers have to plan intricate STEM lessons. Teachers who make their pupils apply technology for class projects in all, or most, lessons work 4.6 hours fewer per week than those who only occasionally use educational films and educational quizzes. Educational films are also a quick and interesting way to capture students' attention.

Unless serious measures and strategic reforms are made, inadequate facilities and lack of trained and committed teachers will continue to weaken STEM education implementation at all learning levels: primary, secondary schools, and tertiary institutions. If we are serious about sustainable development and securing a better future, decision makers need to focus on improving teaching and learning conditions in general, in STEM education in particular.

References

edutopia.org
researchgate.net
seenmagazine.us
twigeducation.com
webcpm.com



Science, Technology, Engineering, and Mathematics (STEM) education is a "meta-discipline" based on the integration of disciplinary knowledge, eliminating traditional barriers between the four disciplines into a new "whole". Within STEM education, rigorous academic concepts are coupled with real-world lessons as students apply the four disciplines in contexts that build connections between school, community, work, and the global enterprise, enabling the development of STEM literacy. The implementation of STEM education in schools across the globe is to prepare the future workforce with strong scientific and mathematical backgrounds to enhance skills development across STEM disciplines.

For STEM education to achieve its goals and objectives, addressing its barriers should start by fixing problems at school levels. First and foremost, we need to acknowledge that teachers are a huge influence on a student's choice of subject matter or their decision to pursue a STEM career. Indeed, students' decisions to study STEM in college can be directly influenced by classroom instruction and teacher advising. Consequently, poor preparation and shortage in supply of qualified STEM teachers is a major barrier to STEM education.

According to a report of the US President's Council of Advisors on Science and Technology (PCAST), more than 40% of teachers decide within the first five years of teaching that they no longer want to teach due to lack of professional support. On the other hand, a study indicated that 74% of students successfully graduating from STEM programs identify poor instruction as a major obstacle. More importantly, this study found that an increase of one mathematics course for a teacher with modest mathematical training was associated with a 1.2% increase in student achievement.

Another barrier to STEM education is poor preparation and inspiration of students.

Most children struggle to understand the importance of science because they cannot realize the connection between what they learn in the classroom and the happenings of the real world. Students also have a perception of science subjects being either too difficult or too boring.

According to a STEM study, most college students studying for degrees in a STEM field make the decision to do so in high school or before; however, only 20% state they feel their education before college prepared them for those fields. The loss of potential STEM talent begins well before high school; among the minority of students who are proficient in STEM, 60% decide during high school they are not interested, and only about 40% actually enter STEM majors in colleges.

Student boredom is a huge challenge faced by most teachers; research suggests that most students lose interest in science between 12–13 years of age. Early educators should, thus, strive to integrate STEM lessons into a daily curriculum to help young children develop a stronger understanding of these skills early on, noting that most already engage with science without understanding. For example, when children stack playing blocks together, they are essentially learning laws of physics;

A HEALTHY SCHOOL ENVIRONMENT FOR BETTER EDUCATION



By: Doaa Hosny

Schools are of major importance to individuals and societies. They are not only places for acquiring knowledge, but also environments where children and adolescents spend most of their day. As such, the school has a major effect on their physiological, physical, and intellectual health. Therefore, continuous development of the education quality is one of the most important goals of sustainable development; health is one significant aspect of this development. For this reason, school health programs have been set on action in many developed countries, and have achieved great outcomes. Nowadays, there is a trend to apply these programs in developing countries. How do these school health programs contribute to raising physically- and psychologically-fit children?

Proper Nutrition

Since early childhood, children should get used to consume healthy food, so that it becomes part of their lives. Studies have found that the type of foods consumed is a major player when it comes to fostering immunity and protection against chronic and serious diseases such as, heart diseases, obesity, liver diseases, and cancers. Healthy food also contributes to keeping the brain, memory, and concentration active, which directly affect the education quality and performance. To achieve this purpose, nutritional programs that include offering one or more healthy meals were applied. Such programs also guarantee that children have the important breakfast meal, which they might not have at home due to lack of time or appetite. Moreover, fast food meals and unhealthy foods were forbidden at the school canteen; some classes were dedicated to educate children about food, and teach them how to prepare meals by themselves.

Physical Activities

Physical activities and morning exercises have always been part of the school day, but as marginal subjects that did not receive sufficient attention. However, nowadays, as awareness has increased about the importance of sports, physical education has become an essential subject. Some schools even include private sports academies that provide more advanced training by professional athletes. Additionally, periodic competitions are held to promote the spirit of competition and achieve high athletic levels.

Physical Health

A healthy environment can be achieved through abiding by the health conditions of architectural design of schools, such as good ventilation and lighting. It is also achieved through providing clean water resources, as well as hygiene and cleaning tools, and training children to use them regularly. It can also be achieved through organizing vaccination programs that include providing students with as many vaccines as possible in schools, to guarantee that all children are vaccinated. It is also important to educate parents through organizing health seminars that raise awareness against common children diseases, their symptoms, and how to deal with them. Parents are also advised not to bring their children to school when sick to avoid contagion.

Crayons that include lead, dust, and water contaminated with lead are among the most common causes of lead poisoning, and the accumulation of lead in children's cells, causing serious diseases. Accordingly, health programs have put lead poisoning among its main goals; colors and school stationery containing lead are substituted by safe ones. Moreover,

environment protection programs conduct examinations on water and soil to define lead concentrations and make sure they are safe for children. These examinations are conducted at schools in particular, and outside schools in general.

Psychological Health

Psychological health is as important as physical health. To achieve quality education, educational personnel should be carefully selected, and trained to use advanced educational programs that tackle dealing with different aspects of a child's psychology. All this contributes to raising a psychologically-healthy and effective person. Psychological health also involves caring about children who suffer from psychological problems in cooperation with the involved physician and the family.

Some aspects of the health program can be achieved at low costs. Yet, some others require cooperation between the State, the international society, and individuals; mainly businessmen who sponsor developmental projects related to the quality of education, in addition to grants dedicated to enhancing education. Training education personnel on the selected health programs is essential to guarantee proper execution. Also, parents have to be educated and involved in the programs so that they deliver their full potential. Indeed, the saying "a healthy mind in a healthy body" has proven to be true in all ages. We only need to take all measures to turn words to action. Then, we would have healthy individuals and a healthy society.

References

dshs.texas.gov
epa.gov/schools
healthyschoolscampaign.org



LITERACY FOR ALL

By: Naglaa Hassan

Date 8 September marks the International Literacy Day; since that day in 1966, the eradication of illiteracy cause has become a symbol of inherent human rights and dignity. The Office of the United Nations High Commissioner for Human Rights ensures that human rights are indivisible; the denial of one right consequently affects other rights. Literacy is not only an intrinsic right and a mean for success throughout life; it is a prelude to people's ability to practice effectively. It enhances capabilities, develops talents, and broadens perceptions; hence, providing individuals with the motivation to participate in the various activities around them. Usually, the right to literacy implicitly falls under the right to education; fortunately though, literacy is already recognized as a separate right for both children and adults in many international agreements.

Some international agreements and declarations affirmed the right to literacy for all ages; including the Universal Declaration of Human Rights in 1948; the Convention against Discrimination in Education in 1960; the International Convention on Economic, Social, and Cultural Rights in 1966; and the Convention on the Elimination of All Forms of Discrimination against Women in 1979; and the UNESCO Roundtable report in 2003, among others. It was not only agreed in these forums that literacy is a fundamental right for all to receive a share in education; but also as a tool and mechanism by which other human rights could be pursued, and one of the axes to be followed to reduce human poverty as a more general and universal goal.

When studying South Africa, 140 million sub-Saharan adults lack basic education, which means that less than 60% of the population in these areas can read and write. This is one of the lowest adult literacy rates around the world; studies show that, to achieve rapid economic growth, the illiteracy rate must be less than 40%. Literacy is the most important way to make informed decisions through which people can participate in the renaissance of their societies. We find these high rates of illiteracy in Benin, Burkina Faso, Chad, Mali, Niger, Senegal, and Sierra Leone.

Over the years, different and interesting methods have been devised to entice learners to read and write; perhaps the most famous method is phonetics, which entails learning to read by linking the patterns of letters with the sounds within the word. There is also the "See and Say" method, which is based on comic books to nurture the student's curiosity to discover the text associated to an image. Maybe the most creative method is the audio-visual method; it revolves around the ability of the student to decode words when receiving a picture with a sound, which is an audio image located above the text.

Community research and studies show that children who can read and write before Grade 3 are most likely to complete their secondary education. Those who are already done with their secondary school have a lower rate of deviation and appearance before the judiciary, their social inclusion and access to decent jobs increase, and they are likely to have children who enjoy education and also complete their secondary education. Thus, the ability to read and write does not only protect existing individuals, but also paves the way for good and productive future generations.

Indeed, illiteracy may deprive us of some of the brightest, smartest, most creative and innovative minds. To achieve a nation's renaissance and advancement, all individuals must be given equal opportunities to demonstrate their talents and innovations in all fairness and transparency. Throughout history, there have been many celebrities, thinkers, and also inventors who have experienced learning difficulties during their childhood. However, with patience, will, and the existence of people in their lives who believed and supported them, they were able to prove themselves and bring their ideas to light. Not only to engage in society as normal individuals, but also to lead people from the dungeons of ignorance to the light of knowledge and innovation.

Among these celebrities was Albert Einstein; the physicist who came up with the theory of relativity. Einstein did not form whole sentences until the age of seven; despite his mathematics skills, he suffered with languages and writing. Moreover, there was Thomas Edison, the inventor of the light bulb; the story of his mother teaching him herself after he was thrown out of school because of his academic underachievement and permanent fugue state is quite a famous story. In the field of entrepreneurship, there was William Hewlett, the founder of Hewlett-Packard (HP), who had difficulties with reading. There was also the international writer Agatha Christie, who dictated her ideas to someone to write them down for her. In the realm of fantasy, the creative Walt Disney, who had vast imagination in the field of animation, suffered from learning difficulties during his childhood. In sports, the world champion Muhammad Ali Clay, who dazzled the world with his continuous successes, did not have access to basic, easy, and typical education, among many others.

I wonder how many innovators, scientists, or inventors exist now in our homelands suffer and struggle with learning difficulties, or have been completely deprived from their right, awaiting the redemption of their stolen rights, and the support and nurturing to overcome those obstacles and follow the path of former intellectuals.

References

dm-ed.com
dyslexiaonline.com
helenarkell.org.uk

read.org.za
unitedway.org

References

britannica.com
 borgenproject.org
 skillsafrica.org
 un.org
 ustti.org

Equality, is a noble purpose for mankind. We all look forward to a better world; this means we should reach for the unfortunate and help them live a decent life, without any kind of discrimination. Technology has witnessed huge leaps in the past decade; it has helped make our lives easier and more comfortable. This is the case for developed countries; but, for the developing or least developed ones, there is a gap. In such countries, technology is not a priority, as basics like food, clean water, and health care naturally come first.

Technology and internet Access for All.

By: Doaa Shendi

Internet access is no longer a luxury; it is a major method to connect, communicate, educate, and share information around the globe. Yet, there are four billion people in the world with no Internet access; 90% of those live in least developing countries of Africa, Asia, and Latin America. Internet access for these countries will not only enhance education and learning, but will also affect the social communication skills for users and allow vulnerable persons, such as females, to become aware of methods to obtain better health and lives.

When it comes to Internet implantation, many obstacles come in mind. As for the service itself, providers find that costs outweigh the benefits, so investment in such fields is a bit risky and needs direct involvement from governments and organizations. For a country as Mozambique, where 90% of the population is under poverty line, the Government spends 5% of its Gross National Product on communication development, which is one of the highest percentages in the world. The mobile sub-sector witnessed excellent growth rates, through competition between communication companies. Internet usage has been hampered by inadequate fixed-line infrastructure and the high cost of international band width, but this sector accelerates fast due to introduction of new broadband services as ADSL, cable modems and the landing of international submarine fiber optic cable. Currently, the low cost of services lead to lower consumer costs for more accessibility to technology and Internet.

Another obstacle is the cost of the device itself, as it is difficult for a man with USD 40 monthly salary to afford the cost of both the service and device. That is the reason such countries should start investing in educational infrastructure through availability of Internet labs and kiosks, in schools and universities, to help students with their tasks and give them a window into the world.

Mobile phones are a major method of communication nowadays; even in the least developing countries, mobile phones are widely spread and affect people's lives in many ways. In the healthcare field, learning and communication lead to awareness towards diseases as dangerous as HIV. In Africa, text messages are being used to spread awareness or even as reminder to take medications in case of disease outbreaks.

On the economic level, phones provided a method for Internet banking where people can save, invest and transfer money even with no banks around. In India, the Self-Employed Women's Association used text messages to help female farmers with commodity prices, and hence, they were able to widely spread selling of products and their incomes increased. Also in India, an organization named Hand in Hand Partnership (HIHP) provided mobile phones for females to launch their own tech-based businesses. Those social organizations should focus on delivering technology to individuals who need it more, as students, small business owners, working females, farmers, seniors, retired individuals and similar vulnerable individuals.

If used well, technology will provide a sustainable and long-term improvement for economy, through helping the poor not only be consumers, but producers too. Vulnerable people and the poor should have equal opportunities to access modern technology services and the possession of devices that will help them make their lives easier. Telecommunication companies should grant training courses for both students and workers to enhance their knowledge of technology and Internet usage, on the condition that those trainees return to their home countries after certain periods to help apply what they were taught during these courses. One of these training facilities is the United States Telecommunication Training Institute (USTTI) which is a non-profit organization that provides training courses in the field of telecommunication for trainees from around the globe, specifically developing countries.

The purpose is not only to train them adapt to technology, but to encourage innovation on all levels. Keeping in mind that one of the obstacles against Internet access for all is the language barrier, as English is the main language of Internet and technology; other languages, specially African and Asian languages, must be applied to various search engines and applications to reach people who speak them.

All that said, however, we must also be aware that technology has a dark side; it needs control and measures should be taken to hinder the use of Internet in crime, especially in least developing countries.

1 MILLION ARAB

By: Naglaa Hassan

PROGRAMMERS



If spoken languages are a means of human communication, programming or coding is a means of communication between humans and computers. It facilitates finding solutions for problems we may face with computers, and pave the way for innovation and creativity in this field. Computer literacy is not just about how to run or use some computer applications; it is imperative to spread the culture of learning programming among youth and children, to catch up with the fast changing technology worldwide.

Simply put, coding is the means of asking your computer to perform a certain task accurately, using a set of commands that it follows step by step. However, this is not regarded as an intelligence by the computer; we can rather call it a "blind obedience". There are several coding languages, such as JavaScript and Perl. Programming controls our entire digital world; computer programs, smartphones, TV screens, and even some home appliances, all rely on coding, which makes programmers the leaders and builders of this digital age.

Over the next ten years, the world will need approximately 1.5 million programmers, and there will be only 400,000 persons eligible for these opportunities. This number is not limited to professions directly related to coding, but other areas—such as accounting, medicine, engineering different branches, agriculture, and journalism—will need programmers or at least those with preliminary knowledge of the science.

Introducing children to programming at a young age teaches them how to think rather than what they should think; they acquire the skill of thinking distinctively, differently, and logically. The child learns how to approach a major problem by

breaking it down into smaller challenges and obstacles, then trying to solve them respectively to overcome it. This method is known as "Decomposition"; a feature of "Computational Thinking". When the child studies programming, s/he develops her/his creativity, learns through experience and repetition, and has an opportunity to design something owned entirely by her/him to increase creativity. All of this, in turn, increases the child's self-confidence and abilities, while having a good time and not getting bored.

Arab Initiatives

Believing in the importance of programming, several initiatives have emerged in Arab nations. They encourage and motivate youth to learn the most popular language in the world, programming, because it is a gateway to science, and governs a broad range of work fields, now and in the future. One of the most popular initiatives is the UAE's "One Million Arab Coders" Initiative, launched by the Ruler of Dubai Sheikh Mohammed bin Rashid Al Maktoum.

</10^6> مبادرة مليون مبرمج عربي 1 MILLION ARAB CODERS INITIATIVE

The first phase started in 2017, as an educational platform offering free trainings for those interested in digital skills. The initiative's idea is to empower Arab youth with future technology tools and the basic skills required by the labor market. The aim is to produce a generation of Arab digital experts, who can compete around the world. The training programs are offered by global platforms, such as Microsoft and Udacity, each offering four courses of the most popular and in-demand fields of the global labor market. The initiative encourages youth using a number of means and rewards, such as accredited certificates, huge financial awards for

outstanding and creative ones, grants for international accredited educational training programs, and job opportunities on the initiative's job platform.

In Egypt too, a strong initiative was launched in 2018, entitled the "Next Coders" program, for secondary-school first-year students; under the auspices of the Egyptian Ministry of Communications and Information Technology (MCIT) and the supervision of the Technology Innovation and Entrepreneurship Center (TIEC). The Initiative's programs and courses are offered through Udacity global platform; it aims to enable students to obtain the basics and first steps, which qualifies them to complete their path and profession in programming.



Several Arab countries are racing to help youth compete and be on equal terms with others interested in digital and software sciences that are expected to lead the world in the future.



References

arabcoders.ae	spaceworks.com
arabhardware.net	teachyourkidscode.com
arabianbusiness.com	udacity.com



By: Hend Fathy

The United Nations (UN) has set "Decent Work and Economic Growth" among its 17 Sustainable Development Goals. Undoubtedly, the word "decent" does not correspond with forced labor, slavery, or human trafficking. According to the 2017 Global Estimate of Modern Slavery—developed by the International Labour Organization (ILO) and the International Organization for Migration (IOM)—25 million people around the world were victims of human trafficking for the purpose of forced labour in any given day of their lives. Although trafficking is a complex international crime that is very difficult to detect, science still has the upper hand and can offer humanity with potential means towards achieving its goals.

The Crisis

To clarify things for everyone, let us start with a comprehensive definition of human trafficking. According to the United Nations Office on Drugs and Crime (UNODC), trafficking in persons is the "recruitment, transportation, transfer, harbouring, or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation".

Human trafficking is a highly profitable organized crime that occurs all over the world, with profits second only to illicit drugs. Different countries around the world can serve as a source of victims,

Data Science & HUMAN TRAFFICKING

a transit point, or a destination and location of abuse. Trafficking victims are forced into slavery as prostitution workers, beggars, soldiers, factory workers, laborers in construction, mining, fishing, among others. Trafficking can be viewed as a supply chain where victims, representing "supply", move through a network to meet the need for cheap labor force, representing "demand".

However, these chains are dynamic, as traffickers tend to change their distribution and transportation routes to avoid detection, posing huge challenges to the law enforcement forces that try to stop them. The good news is that traffickers usually leave a data trail behind; whether bank transactions, photos on the Internet, online advertisements, phone calls, etc. Here is where science can interfere and use these pieces of information to break the supply chain at some point. Now, let us delve into more details about the different approaches used to combat trafficking in persons.

The Science

The science field involved in fighting this crime—Data Science—is relatively recent with a huge scale of promising applications in different fields; including marketing, scientific research, sports, agriculture, etc. In simple words, data science utilizes large amounts of complex data—big data—to draw meaningful information that assist in identifying regular patterns and making decisions. It is a multidisciplinary field that employs

mathematics, statistics, computer science, artificial intelligence, machine learning, among others.

One approach of addressing human trafficking is helping banks trace traffickers' money. For example, leading technology company IBM has recently developed a cloud-hosted data hub where banking institutions can provide enhanced information regarding suspicious money laundering activities intermingled with those from legitimate businesses. Using Augmented Intelligence (AI) and machine learning, the tool becomes more able to analyze the data and detect trafficking incidents. This consequently allows analysts to identify relevant information about them more easily. The effective sharing of such data would also allow governments and concerned institutions to take the needed action to shut down human trafficking.



A similar initiative has taken place in a collaboration between the Universiteit van Amsterdam (UvA), the Netherlands Ministry of Social Affairs and Employment, and ABN AMRO Bank to track the digital fingerprints of traffickers hidden in banking data, without violating the privacy of customers. The system developed at the UvA depends on 25 data indicators that help identify potential trafficking activity. For example, it tracks multiple account holders registered to the same address who make prompt withdrawals of minimum wages from the same ATM; those could mark potential victims. Bank data is analyzed every quarter to track these indicators, and the data is filtered regularly to secure privacy and prevent needless investigations. According to the UvA, the new project has thus far identified 72 suspicious bank account holders, and 50 potential victims.

Another approach of utilizing data science against trafficking is through preventing online communication between suspected traffickers and potential victims. In recent decades, vulnerable persons have been groomed through the Internet via fraudulent recruitment methods, such as promises of employment or marriage. Analyzing patterns of interaction on social networks could also help determine which contacts have a critical influence over others; this may enable early identification of traffickers and victims. In case the communication could not be blocked, data science still can help if any of the spotted potential victims went missing. It can provide investigators with the IP addresses and any available contact information of both the victim and predator, as well as other information regarding the communication between them.

Data science can model vulnerabilities of potential victims and help the concerned parties define the populations that could be approached by traffickers. In other words, it provides insight about which depressed areas or populations authorities need to target with anti-trafficking awareness campaigns and social service support. These vulnerability factors usually include poverty, unemployment, migration, and escape from political conflict or war.

A case in point is an initiative from India where poor village girls are usually targeted by traffickers with promises of better education, jobs, or marriage opportunities. Actually, the parents are not aware that their children are being



sold into slavery; an Indian foundation known as "My Choices Foundation" has, thus, launched a program designed to raise awareness among villagers about how traffickers work. However, with over 600,000 villages in India, the program had to depend on a Big Data solution in order to identify the villages that are most at risk. The program developed by an Australian analytics firm analyzes India's census data, government education data, and other sources for information about poverty level, proximity to police and transportation stations, etc., to draw the needed conclusions.

Another approach is to employ text analytics against trafficking. For instance, American analytics company SAS has supervised a project that utilized machine learning to assess patterns of human trafficking buried in the texts of hundreds of relevant official reports. The aim was to make these reports more accessible to the concerned organizations. Tom Sabo, of SAS, explains "We used text analytics to comb through all the Trafficking in Persons reports since 2013 and identify patterns that were not apparent previously".

The findings included identifying the source and destination countries for trafficking worldwide across these years. Analyzers even drew color-coded lines between them to indicate whether a given pair of countries are cooperating to address the issue or not. Text analysis also involved spotting recurring word clusters to identify the purposes of trafficking in a given country. For example, a cluster of "forced", "child", "beg", and "street" indicates exploitation of children as street beggars. The project provides researches and organizations with more easily accessible clues and figures from the reports, but they can still also resort to the supporting full texts to fully understand the context for the statistical findings.

The Challenge

Data science seems to offer a wide array of smart solutions, does it not? Yet, it still faces major challenges that hinder the urgently-needed fast action. One challenge lies in the fact that traffickers are so powerful in some countries that they threaten or bribe officials to ignore their vicious activities. As such, it is made easy for them to fabricate or alter the identification documents of their victims and make them invisible both to authorities and data analysts.

Second, but most importantly, data science needs "data" to function, and since the problem is global, the data needs to be global too. Unfortunately, it is still very hard to share data across different governmental agencies, NGOs, and data analytics institutions within the same country, let alone around the world. In addition to the sensitive nature of the information, there are no efficient and secure tools to facilitate sharing such huge amounts of data on a global level yet.

Trafficking is undoubtedly a horrible and horrifying crime; just like similar pressing global concerns, it requires serious actions and cooperation. It is high time humanity puts its trivial political conflicts and economic interests aside and work together towards a safer world where human beings are not treated as a commodity.

References

blumcenter.berkeley.edu
freedomunited.org
hundp.org
ibm.com
mapr.com
migrationdataportal.org
sas.com
scientificamerican.com
theconversation.com
thenextweb.com
unodc.org

By: Basma Fawzy

CHEMNOBYL

A MANMADE DISASTER

Planet Earth is often plagued by natural disasters, from volcanoes and earthquakes, to hurricanes and tsunamis, natural disasters can be truly horrendous. Yet, more often than not, manmade disasters wreak even more havoc. This article is about Chernobyl, one of the worst manmade disasters of all time.

Before going into details about Chernobyl, let us know more about nuclear power plants. As we know, a power plant is built to generate power (electricity); in a nuclear plant, electricity is generated through nuclear fission, with uranium fuel at the core of a nuclear reactor. During nuclear fission, atoms are split then heat is produced; the heat is used to create steam, which is used in spinning the turbines, eventually generating electricity. For additional information concerning nuclear power plants, check out "Is Nuclear Energy the Answer to Global Warming?"

Though Chernobyl was the first nuclear power plant in Ukraine, it was not the first in the Soviet Union; the plant had four RBMK-1000 reactors, which were built during 1970s and 1980s. The date 26 April 1986, was a tragic day for those operating the Chernobyl Nuclear Power Plant and for anyone in its proximity when the fourth reactor exploded, emitting dangerous radiations into the atmosphere.

The accident partially occurred due to a faulty design of the reactor; however, human error cannot be disregarded. During maintenance, safety procedures were not properly followed when operators wanted to check if the reactor could be cooled down during power outage. As a result, a surge of power inside the reactor led to the fateful explosion, which unfortunately led to the exposure of the nuclear core.

Death claimed many lives as a direct result of the explosion; yet, the implications of the exposure of a nuclear core, which

amounts to 30% of Chernobyl's uranium, were not limited to death. Huge numbers of people and other creatures suffered from Acute Radiation Syndrome resulting from exposure to high amounts of radiation over a short period of time. Moreover, children who consumed dairy products from cows that fed on contaminated grass developed thyroid cancer.

After the explosion of the Reactor, and in order to contain the damage, thousands of people were evacuated; until now, no one is allowed inside the area where the Reactor exploded and around it, which is known as the "Exclusion Zone". It is estimated that the affected area can be habitable only after 20,000 years. On the other hand, affected areas around the Exclusion Zone have witnessed serious efforts for rehabilitation. As several countries were affected by that disaster—namely Belarus, Russia, and Ukraine—the scale of the disaster merited international cooperation.

One of the organizations that took the initiative to support the affected communities was the International Atomic Energy Agency (IAEA). The initiative known as the Chernobyl Forum was launched in cooperation with five UN organizations, the World Bank and the governments of the affected countries. The purpose was to scientifically evaluate the accident and provide solutions and recommendations involving special health care programs and controlling environmental damage.

Furthermore, on its website, the United Nations (UN) has included the economic rehabilitation of Chernobyl disaster affected areas as one of the goals in action under the Goal 8 of Sustainable Development: Decent Work and Economic Growth. Indeed, the UN has taken the lead in rehabilitating the area, creating "A Chernobyl Trust Fund" in 1991. The UN has also named the ten years 2006–2016 the "Decade of Recovery and Sustainable Development of the Affected Regions." Thanks to these

efforts, nowadays, more than three decades following the disaster, the economic revival in the area is visible, with some spots becoming leading destinations for investors.

Addressing environmental and economic issues has not been enough though; people's fears and concerns also had to be addressed, and the knowledge of how to deal with the situation had to be delivered to them. To that end, UN Agencies dedicated USD 2.5 million to raise awareness and deliver vital information to affected communities. The initiative attempts to transform scientific information into practical advice that the communities could use to lead a safe life. It is a long journey, but with proper international collaboration efforts, these areas can return back to normal.

Despite the potential dangers, nuclear power plants are considered an environmentally-friendly energy solution because they do not emit greenhouse gases. If the Chernobyl disaster was of any significance, it was to inform people how deadly nuclear energy can be if not well-managed, and how careful we should be when handling nuclear power plants.



References

conserve-energy-future.com
chnpp.gov.ua
eia.gov
express.co.uk
greenfacts.org
history.com
iaea.org
livescience.com
nationalgeographic.com
news.un.org
world-nuclear.org

By: Fatma Asiel



Jobs Suitable for People of Determination

Everyone in this world has rights and commitments. The rights are numerous; the most important of which is that every person effortlessly finds his/her basic needs of good quality food, clothing, education, and health services. On the other hand, work is regarded as both a right and an obligation. Everyone must do his/her work with utmost perfection, and has the right to be provided with an appropriate job opportunity that suits his/her abilities and skills, for an adequate income.

However, people of determination (people with special needs) all over the world often face problems finding jobs suitable for their health conditions. Many of them have achieved progress in sports specifically, and participate in sports competitions; yet, this cannot be regarded as key work opportunity for all—though it might seem suitable for some. A lot of people of determination suffer to find suitable jobs, for several reasons:

- Inability to perform certain tasks accurately and promptly.
- Some employers have concerns about their inefficiency to perform the required tasks.
- Problems related to some workplaces and work nature.
- Insufficient experience that qualify them for suitable job opportunities.

Labor laws of some governments mandate a certain percentage of employment for people of determination in enterprises; however, they often indicate a limited number, or the work itself does not suit a person with an incapacity. Yet, there are several suitable professions, depending on the health problem; for example:

1- Teaching

Teaching is a sacred profession; although communicating knowledge to a student is a noble goal, it is also a daunting one. However, some people of determination have teaching abilities that can help them make a career of it. Physical effort is not always required in teaching; the older the students are, the easier teaching becomes physically.

2- Web Development and Programming

There have been several technology-related careers that did not exist 50 years ago; including those related to computers, such as graphic design, web development, application programming, etc. The completion of such professions depends primarily on thinking and mental effort rather than physical; thus, they are very suitable for people of determination, who suffer from physical problems but enjoy a glowing intelligence.

3- Writing and Translation

Writing and translation are of the most famous occupations currently not requiring to physically be at a certain workplace. Most translators and writers are currently freelancers, so these professions suit people with disabilities who are unable to move easily.

4- Reception and Reservations

People of determination with jovial manners, and who are also well-spoken and helpful, can work in ticketing and reservation jobs, or as receptionists at hotels, hospitals, or companies.

5- Sales and Marketing

A salesperson does not have to go in person to the customer's place, to convince him/her to purchase a product or service. Some salespersons work through the Internet in marketing using social media, or even from the headquarters of their companies without a need for moving frequently.

How are people of determination eligible for the correct job?

They need to have appropriate educational opportunities for their abilities, skills, and health conditions. Education is the most essential means to have that opportunity, and it is great to provide special scholarships for people of determination. They should also be provided with appropriate medical equipment, and various health services, such as medicine, physiotherapy, etc.; in order to improve their health, facilitate and accelerate their daily activities, and accomplish their tasks accordingly.

One of the most important reasons that affects the rehabilitation of people of determination when finding a suitable job, is to provide them with the psychological and moral support. Many of them suffer from discrimination, or lack the sense of being an ordinary person. These people are an integral part of the society that cannot be ignored anyway; if they are destined to lack something, they are distinguished by something else. The community and its members must support them in finding suitable job opportunities that are morally and financially feasible.

References

content.wisestep.com

usnews.com

world-psi.org



By: Esraa Ali

ENTREPRENEURSHIP

Bridging the Business-Science Gap

"If you want money, forget science"; this is a statement often used claiming a wide gap between business and science. In the movie *Alrahina [The Hostage]* (2006)—story by Nabil Farouk—this idea was embodied by portraying a young man, Mostafa, who travels to the Ukraine in pursuit of a work opportunity. He accidentally meets an Egyptian scientist and Nobel Prize laureate, Dr. Makram Sahab, whom Mostafa asks about the fortune he can make from scientific discovery; the scientist replies that he can earn a lot of money, but only science matters.



Nikola Tesla (1856–1943), for example, is a brilliant scientist and inventor, whom we have to thank for developing Alternating-Current (AC), which has led to numerous advances in communication and technology. Tesla's life was a series of conflicts with other scientists, or rather successful businessmen of his time, such as Thomas Edison and Guglielmo Marconi, which partly explains why they have strong legacies after them. On the other hand, Tesla paid most of his money on his projects, then died in debt.

The Bridge

In my opinion, the business–science gap dissolved with the appearance of the concept of "entrepreneurship". Though being a relatively old term—it first appeared in the French dictionary *Dictionnaire Universel de Commerce* published in 1723—the impact of entrepreneurs on society at large is more significant since end-twentieth century.

The term entrepreneurship is often confused with the concept of small-business; yet, though an entrepreneur could be a small-business owner, the latter cannot be an entrepreneur. Small-business owners are people with technical expertise in an existing business, but entrepreneurs are innovators and visionaries, who create a new business or make great changes to an existing one.

Entrepreneurs exist in all industries, and carry on different motives. They seek a solution by looking into a single problem and thinking of doing something in a totally different way, constantly seeking improvements. In other words, we can say that entrepreneurship is rather a mindset; it is about imagining new ways for solving problems and creating value for it.

Within this context, we can agree on a certain point that entrepreneurship can go hand-in-hand with sustainability. True sustainability tackles different challenges simultaneously; being it environmental, social, economic, educational, etc. Entrepreneurship values these areas as well for survival and thriving.

This does not mean that the road to entrepreneurship is paved; it is a treacherous one filled with unexpected obstacles. These hardships could include sleepless nights, a lot of plans that do not work, shortage of funding, or failures, just



Indeed, history is full of stories about talented philosophers, scientists, and artists, who died broke, or almost so; every one having made huge and lasting contributions to our society. They have all sought the improvement of humanity, never seeming to have any interest in financial gain.

to mention a few. However, thousands of entrepreneurs start this journey yearly with one main goal, which is solving one issue in the society, and truly with success it really is worth.

The Guts

Today, everyone dreams of becoming an entrepreneur. Every now and then I meet people who claim themselves to be entrepreneurs or influencers—another topic I would like to talk about in a future article—because it is a “trend” that is equivalent to a lot of fame and money. However, others, who are actually aware of the concept, are willing to take on the many risks of implementing their ideas; even if they have to choose between becoming an employee or an entrepreneur for achieving their dream.

Throughout history, entrepreneurs have made decisions that have seemed irrational to the rest; however, many eventually change the world. Whenever you ask an entrepreneur about the secret of her/his success, s/he would reply “gut instinct”. They think differently and see what most people do not see; yet, this does not mean that they are always correct. They need to use more science and use a more analytical approach about their pursuits.

As you hear the word “entrepreneur”, you will think of famous names born in the 20th century, who were/are skilled in information technology and computer sciences, such as Steve Jobs, Bill Gates, or Mark Zuckerberg. Yet, you might be surprised to discover that some of history’s most well-known scientists exhibited significant entrepreneurial skills too.

Thomas Edison is one of these scientists, who were able to make the entrepreneurs list. Edison is a textbook example of a scientist who was able to convert his inventions into successful commercial products and applications. He worked with a vision to make electricity available to all. His motivation and persistence following numerous failures, makes him a true entrepreneur.

Edison developed numerous inventions and patents in sound recording, motion pictures, mass communication, and electric power generation. His glory came with the development of the tin foil phonograph—read “Recording and Emitting Sound” on *SCIplanet*—that lead the way for more successful inventions, not to mention the light bulb. A key point about



Edison as an entrepreneur is working with other people, including his staff and other scientists and technologists, and forming his own company. Finally, he became a celebrity and was hailed a “genius”.

The Coin

Now, we agree that science and business can be the two sides of one coin, but how to be a science entrepreneur? Today is the perfect time for scientists to start their entrepreneurial ideas and develop them. Lately, there is a lot of money and a wealth of funding options and competitions around for scientists to develop a promising idea or project. Yet, there are few successful science entrepreneurs because there is not a single factor for success.

To be a science entrepreneur, you need first to have one great scientific idea, and remember that not all scientific ideas are entrepreneurial ones. The key success for your idea is to meet a certain consumer need, and be ahead of whatever consumers already have. If you do not have a certain idea in mind, it could be much easier, because you will start with finding a solution for a problem, rather than finding a purpose for a certain technology.

The second step is to start building your team; remember that nobody knows it all! There is no problem in getting assistance and guidance from outside and recruiting people who can compensate for your own weaknesses. All you need is to have the nerve to ask for help, to build a great team.

Third, you will need to look for the right space with reasonable duration, equipment, and funds to finalize your project.

The first stages when you start getting into action will seem similar to those carrying out scientific research.

You will need to be patient; you search for something that works by creating a hypothesis, testing and developing it, then forming a conclusion, which is simply science! You need to be patient if you fail, because you will learn and benefit from that too.

After you achieve results, you will need to expand them and invite others to get their feedbacks on what you have found. That feedback phase is similar to the “peer-review” of scientific research progress. You will need to use that criticism in improving and refining your output to suit the business world.

Life changes, and science is always changing too. We have to face the fact that science entrepreneurs are there and are reflected in facts and numbers. You can read my article on “Young Entrepreneurial Geniuses” published in *SCIplanet*, Summer 2016 issue, covering the story of five entrepreneurs who achieved fame and fortune at young ages. Similarly, it is up to you to be a scientist solely or a science entrepreneur; yet, you have to win the fight to sustain the beauty and power of scientific research.

References

businessnewsdaily.com
chemistryworld.com
en.wikipedia.org/Entrepreneurship
entrepreneur.com
gaebler.com
imdb.com
incomediary.com
ineffableisland.com
ltbn.com
nationalgeographic.com
opentextbc.ca
straitstimes.com





By: Jailane Salem

IS A CASHLESS FUTURE? A GOOD THING?

Trade transactions between humans have taken place since the beginning of time; we started off with bartering and eventually moved to the use of money, something that has stuck with us. Now, as our lives have become more and more digitized, so have our financial systems; we are moving towards a cashless future where we can pay for things by simply scanning a QR code or waving our cards. From tangible monetary transactions, to intangible digital monetary transactions, this change has consequences; some positive and others negative.

Currently, we now live in the world of "FinTech", which is the abbreviation for Financial Technology; this emerging industry is based around the delivery of digital financial services. For example, many target banking services, where we no longer have to physically go to the bank to carry out transactions; we can simply do so through Apps on our mobile phones or via websites. However, as we move more into the realm of virtual space and away from hard cash, what does this mean?

Sweden is leading the path when it comes to a country going cashless.

According to an article published by *National Public Radio (NPR)* news "In 2018, only 13% of Swedes reported using cash for a recent purchase, according to a nationwide survey, down from around 40% in 2010".

If you visit Sweden, you will meet signs that say "No cash, only card" in many businesses. Cash is increasingly becoming scarce and due to strong broadband coverage and a welcoming attitude of a Tech-Savvy population, the trend is heading at full speed. Even at many banks, you will be hard pressed



to find actual cash. Many people find it convenient to move around without cash as it lessens the risk of being robbed and also makes monetary transactions faster.

While many around the world worry about the risk of surveillance in the digital era, Claire Ingram Bogusz, a researcher at the Stockholm School of Economics says that "Ordinary Swedes are not concerned at all. The convenience of having your bank account, your money at your fingertips and increasingly on your smart watch vastly outweighs any concerns that they have about security or about being tracked".

A friend of mine visited Sweden recently, and when I asked about her experience there, she had the following to say "basically, cash is not expected anywhere I have been to in Stockholm. This made our life so much easier since we did not need to convert currency. It was an amazing experience unlike travelling to a country where credit card machines are not easily available, or the ones that are available do not work with your cards. You avoid embarrassing situations of not having enough cash, and you can easily pay with your phones and digital watches".

My friend's experience is echoed in what Christopher Loob, General Manager of Urban Deli, a restaurant and ecological food company in Stockholm, had to say about the issue, "It is good for both, the guests and for us. It saved us a lot of time in that we do not have to count cash anymore. There has hardly been any reaction. Almost everybody has the alternative payment method—a credit card".

As mentioned, people in Sweden regard going cashless as a way to avoid theft which goes hand in hand with what some of those pioneering the expansion of the technology in the financial sector believe, and that is relying on digital payments will make it easier to enforce the law and limit criminal activities. This is because online activities can be tracked and monitored, which makes it easier for government surveillance to take place. This will facilitate combating tax evasion, bribery, counterfeiting, illegal financing, and many other criminal activities.

Another advantage of the ability to track electronic payments is that the data



can be used by central banks and the financial sector to make informed decisions regarding economic policies based on collected data. Money changes hands quickly, and with cash there is no way of knowing the whole cycle, but when we pay for things online everything is visible. While this digital footprint can be regarded as one of the advantages, it can also be a disadvantage given the rising concern with online privacy as well as safety.

We have already witnessed how data can be sold by companies and used to manipulate the public. There has also been several cyber-attacks on companies where sensitive customer data was leaked, leaving many vulnerable to cyber-crime. There is also the issue that the infrastructures needed to move towards a cashless future are not available to all.

While in some countries, such as Sweden, the idea of going cashless is becoming a daily reality, the abandonment of the use of cash runs the risk of leaving behind vulnerable sections of society. This can include the elderly and the underprivileged who may not have the access or know-how to use today's digital financial tools. After all, it is estimated that around two billion people globally do not have a bank account, which is why some people are still very much attached to the idea of using cash. Cash is accessible to all whereas digital financial services are not.

While going cashless and depending on the use of smartphones and cards is becoming more popular, many ponder the effect this will have on the environment. Upon first thought, the idea of leaving paper behind seems like an environmentally friendly solution; after all, anything that means we cut fewer trees must be good for the environment, or is it?

In a paper written by Sabrina Rochemont entitled: *A cashless society: Benefits, risks and issues*, "Among all the devices, trends suggest that by 2020, the most damaging devices to the environment are smartphones. While smartphones consume little energy to operate, 85% of their emissions impact comes from

production. A smartphone's chip and motherboard require the most amount of energy to produce, as they are made up of precious metals that are mined at a high cost. Smartphones also have a short life, which drives further production of new models and an extraordinary amount of waste". The production of smartphones is not the only issue; the data we use to perform our online transactions has to be stored somewhere.

While we can use our smartphones to make cashless payments, these go through large networks of server farms which need a lot of energy to keep them running. With the increasing demand for electronic financial services, we ramp up electricity consumption, which in turn majorly relies on fossil fuels, the use of which is well known to be detrimental to the health of our planet. As mentioned by Bridget Dayton in the article *Ecology: The Carbon Footprint of the New Means of Payment*, she says that, "Experts calculated that the footprint of data centers and communication networks will reach 764 megatons in 2020. In other words, their footprint will equal that of over 163 million cars driven for a year".

It is therefore important to weigh up the pros and cons of a cashless society and the reliance on FinTech. If we are inevitably heading towards that future, studies need to be conducted to ensure that correct foundations are laid ahead of time to minimize harm to people and environment.

References

actuaries.org.uk
bcg.com
cashless-economy.com
forbes.com
greenjournal.co.uk
npr.org





By: Muhammad Mabrouk

In 2008, the global economy witnessed one of the worst economic crises in history, which led to the bankruptcy of many financial institutions and banks around the world. As a result of the bankruptcy of these institutions, the capital of which amounts to hundreds of billions of dollars, the crisis escalated dramatically. It did not affect banks only; its consequences spread to individuals and companies, and even countries. During this critical crisis, while the global economy faced its most difficult challenge, and many banks around the world faced bankruptcy, a dim light appeared at the end of the tunnel promising to alleviate the dire consequences of the crisis, when a person with the pseudonym Satoshi Nakamoto created a new type of intangible currency called Bitcoin, and where all the transactions occur on the computer.

Bitcoin is a blockchain digital currency that is extracted at certain rates, and is not subject to government or bank control. All the transactions processed using this currency are recorded and sent to computers all over the world and kept in a chain that includes all the transactions since this currency was first used. Bitcoin is considered the most important digital currency as we do not need a lot of time to transfer money from one account to another; this transaction takes only a few minutes. Moreover, these transactions are free of charge, unlike banks, which charge a percentage of any money transfer transaction. In order to understand the importance of this currency, we have to observe the money transfer market for citizens who live abroad, which

The Impact of DIGITAL CURRENCIES on the Global Economy

account to nearly 600 billion dollars in 2018. These money transfer transactions are the backbone of many countries' economies. As a result of processing these transactions through banks, which in return take percentages from each transaction, tens of billions enter the treasury of these banks just from the profit they get out of these transactions. That is why Bitcoin is revolutionary as it is free of charge.

Furthermore, all Bitcoin transactions are documented on millions of computers around the world, making it impossible to hack them and reach any information regarding these transactions. Even though Bitcoin transactions are registered and documented, no one can identify the owners of these transactions, or in other words no one can know the identity of the sender and recipient of the money transferred; this maintains the privacy and adds another strength point to this revolutionary currency and its ability to change global economy.

To imagine the rapid development of the value of this currency around the world, you just have to know that its value at the time it appeared in 2009 was one US dollar only, while its value now at the time of writing this article has reached nearly 10,000 dollars; this motivated many people to invest in this currency, which is likely to become an alternative to regular currencies one day! The real breakthrough in the technology of digital currency is the use of the so-called Ethereum to make what is known as smart contracts through blockchain technology; meaning that the computers that document all the transactions can assure that all the conditions involved in the contracts of the transactions are fulfilled. They can even stop any transaction in case any of the conditions in the contract are not met.

Thus, the role of digital currencies has greatly expanded from dispensing

with banks regarding money transfer transactions to dispensing with the governmental and judicial systems that supervise the conditions of the contracts and ensure their fulfillment. Due to the advantages of the Bitcoin currency, its market size is increasing day by day, paving the way to a technical revolution, not much less than the Internet revolution. The blockchain technology on which the Bitcoin currency is based can threaten the existence of many jobs in the future; it even threatens the existence of the world's largest economic institutions.

The idea of digital currencies is no longer strange or uncommon; some countries such as Japan acknowledged its use and is already dealing with it as a normal currency. The UN itself has already sent aids using Bitcoin currency! In short, we cannot be certain about the ability of digital currencies such as Bitcoin to overthrow ordinary currencies in the future; however, it is certain that the presence of this currency and its use in the money transfer transactions market has become an undeniable economic reality.

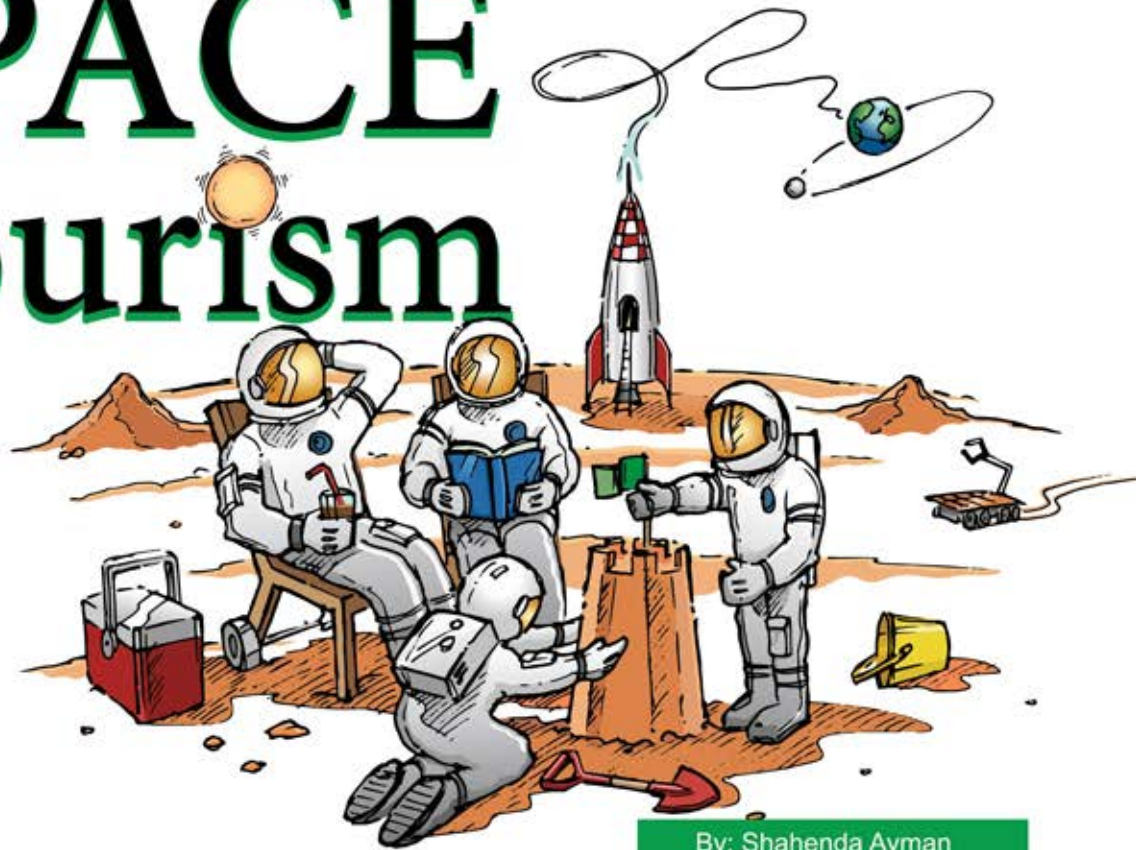


References

academia.edu
bbc.co.uk
coindesk.com
historyofbitcoin.org
researchgate.net

SPACE Tourism

TO
DO
OR
NOT
TO
DO



By: Shahenda Ayman

Exploring outer space has always been a human fantasy; humans have dreamed of orbiting the Earth and exploring the secrets of outer space since Ancient Times. Indeed, governments spend a lot of money on research and missions to outer space to unravel the secrets of our magnificent universe. Next year, traveling to space will not be for trained astronauts only; you can book your ticket now and discover space yourself.

For nearly a decade, many companies have promised citizens trips to the Moon and new homes on Mars, but these promises have never been fulfilled; yet, that is. Starting next year, according to NASA officials, private companies will be able to send citizens on lifetime trips as part of an initiative to help generate a sustainable economy in low-Earth orbit.

In the late 1990s, Space Adventures Ltd. was established and began working with private citizens interested in flying to space; XCOR Aerospace and Bigelow Aerospace were founded in 1999 for the same purpose. In the 2010s, Virgin Galactic, a commercial space travel company, succeeded in sending flights to space before facing a devastating loss in October 2014 when its VSS Enterprise broke up during a manned test flight.

On 13 December 2018, Virgin Galactic successfully tested its SpaceShipTwo, which was recognized by the Federal Aviation Administration (FAA) and NASA

Flight Opportunities Program as officially capable of reaching outer space by US standards. The two pilots, Mark Stucky and Frederick Sturckow, took the spaceplane to an altitude of 82.7 kilometers. The two pilots were awarded Astronaut Wings from the US Department of Transportation after the test from Mojave Air and Space Port California.

During a press conference this year, NASA announced its strategy to open up the International Space Station (ISS) for commercial business as part of its drive to accelerate a thriving commercial economy in Low Earth Orbit (LEO). NASA hopes that the income from space tourism will help fund its broader science and space exploration goals, including the push to the Moon and Mars.

Next year, Virgin Galactic will offer flights into the lower edge of space from New Mexico; more than 700 people bought tickets, the cost of which ranges between USD 200,000 and USD 250,000.

Six passengers will be on each flight experiencing several weightlessness minutes in addition to views of Planet Earth before the space plane lands back on Earth. The entire adventure will last for about 90 minutes.

SpaceX and Boeing—two private US companies—will also be sending astronauts to orbit. Both companies are contracted by NASA to take astronauts to the International Space Station (ISS), and they are planning to fly their own astronauts as well. This step is a crucial step to make space more accessible and to open new doors for tourist flights. SpaceX has already begun talking about paid trips to the Moon as early as 2023.

Although most of the space tourism industry activities is placed in the United States, other countries are looking to tap into the market. Virgin Galactic has forged agreements with international partners in Italy and the United Arab Emirates (UAE) to explore opportunities to fly from their spaceports and provide local access to the microgravity environment for their science, education, and technology sectors.

As good as this may sound, environmentalists think that the whole space tourism issue is unnecessary;



they believe it will wreak havoc in the Earth's atmosphere for the pleasure of a few. Experts assume that launching rockets can cause a long-term damage in the ozone layer; the chemicals burned by rockets work together in the upper atmosphere, eventually depleting up to 1% of the ozone that helps keep us safe from the Sun's harmful radiation.

Rocket launches damage the atmosphere; when a rocket moves through the upper atmosphere, it burns kerosene-based fuel and deposits chemicals including chlorine into the air around it. Chlorine destroys the ozone molecules that protect the planet from harmful sunrays, contributing to global warming.

This is not the only damage caused to the ozone layer by rocket launches. Burning rocket fuel also creates black carbon, or soot, and aluminum oxide. The soot particles form a "black umbrella", which absorbs sunlight and heats up the air around it; while the aluminum oxide particles reflect heat away as aluminum foil. Together, these two effects make the surface of the planet cooler.

Cooling the Earth's surface at the expense of heating the upper atmosphere is not a good thing as it might sound. A warmer upper atmosphere means that the chemical reactions depleting the ozone layer happen even faster, exacerbating the problem caused by the chlorine. Basically, as the upper atmosphere gets warmer, the ozone protecting our planet is destroyed faster.

Current estimates show that rocket launches cause up to 0.1% in ozone loss, according to a report by Dr. Martin Ross, Senior Project Engineer

for commercial launch projects at The Aerospace Corporation, and his colleague Dr. James Veda. If launches go up by a factor of ten in the next few decades as governments and companies launch more satellites and tourists head up into the cosmos, we could wipe out 1% of the ozone layer. This threat to the ozone layer is specific to rockets, and could undo the precious progress we have made on repairing ozone depletion in the past 30 years.

Moreover, space tourists might encounter some health issues resulting from microgravity, interstellar radiation, and acceleration. Probably, short trips will not increase those risks, but we will not be sure of that until the first space planes launch. Microgravity seriously impacts metabolism, heat regulation, heart rhythm, muscle tone, bone density, eyesight, and the respiratory system.

As the rocket speeds away from Earth, passengers will be hit by forces of acceleration up to three times the force gravity they are accustomed to on the ground; this can place a strain on the heart as it struggles to pump blood to the head. If the passengers are not positioned correctly, the blood could drain from their brains into their feet and they might pass out. Thus, it will be important to check all

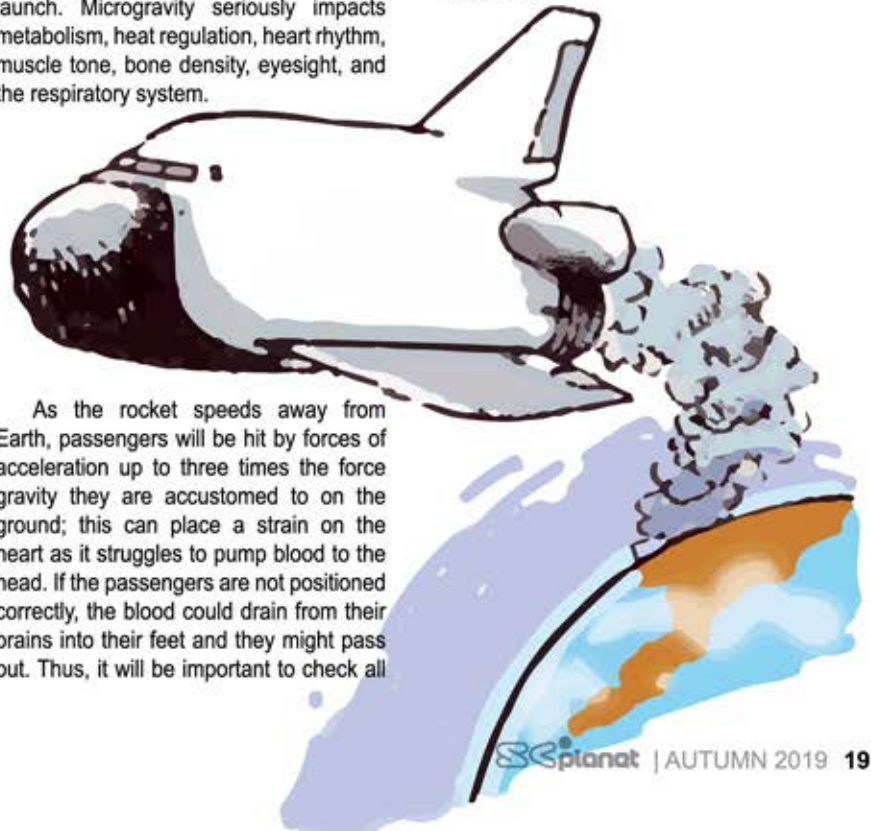
of the space tourists to confirm their hearts are healthy enough for the trip.

Vomiting and nausea will probably start once the passengers start feeling weightless. Any participant going into space should be prepared for some motion sickness and being a little confused about where up is and where down is. Astronauts who have been to space a few times have an easier time adjusting; however, space tourists will not know how their bodies will react. Passengers who will go to space will have a health check and will need to prepare for the flight and train a lot just to relieve the anxiety of experiencing something totally new when they will be in a different new environment.

Between the high cost, the health threats, and the environmental concerns, which are still to be proven, if you have ever been a fan of space and dreamed of traveling to it, you will soon have a tough decision to make; to follow your dreams or wait and see.

References

america.cgtn.com
cnet.com
digitaltrends.com
howstuffworks.com
interactive.satellitetoday.com
latimes.com
livescience.com
observer.com
wired.co.uk



Endangered Elements

H ¹ Hydrogen	He ² Helium																					
Li ³ Lithium	Be ⁴ Beryllium	B ⁵ Boron	C ⁶ Carbon	N ⁷ Nitrogen	O ⁸ Oxygen	F ⁹ Fluorine	Ne ¹⁰ Neon															
Na ¹¹ Sodium	Mg ¹² Magnesium	Al ¹³ Aluminum	Si ¹⁴ Silicon	P ¹⁵ Phosphorus	S ¹⁶ Sulfur	Cl ¹⁷ Chlorine	Ar ¹⁸ Argon															
K ¹⁹ Potassium	Ca ²⁰ Calcium	Sc ²¹ Scandium	Ti ²² Titanium	V ²³ Vanadium	Cr ²⁴ Chromium	Mn ²⁵ Manganese	Fe ²⁶ Iron	Co ²⁷ Cobalt	Ni ²⁸ Nickel	Cu ²⁹ Copper	Zn ³⁰ Zinc	Ga ³¹ Gallium	Ge ³² Germanium	As ³³ Arsenic	Se ³⁴ Selenium	Br ³⁵ Bromine	Kr ³⁶ Krypton					
Rb ³⁷ Rubidium	Sr ³⁸ Strontium	Y ³⁹ Yttrium	Zr ⁴⁰ Zirconium	Nb ⁴¹ Niobium	Mo ⁴² Molybdenum	Tc ⁴³ Technetium	Ru ⁴⁴ Ruthenium	Rh ⁴⁵ Rhodium	Pd ⁴⁶ Palladium	Ag ⁴⁷ Silver	Cd ⁴⁸ Cadmium	In ⁴⁹ Indium	Sn ⁵⁰ Tin	Sb ⁵¹ Antimony	Te ⁵² Tellurium	I ⁵³ Iodine	Xe ⁵⁴ Xenon					
Cs ⁵⁵ Cesium	Ba ⁵⁶ Barium	Lanthanides		Hf ⁷² Hafnium	Ta ⁷³ Tantalum	W ⁷⁴ Tungsten	Re ⁷⁵ Rhenium	Os ⁷⁶ Osmium	Ir ⁷⁷ Iridium	Pt ⁷⁸ Platinum	Au ⁷⁹ Gold	Hg ⁸⁰ Mercury	Tl ⁸¹ Thallium	Pb ⁸² Lead	Bi ⁸³ Bismuth	Po ⁸⁴ Polonium	At ⁸⁵ Astatine	Rn ⁸⁶ Radon				
Fr ⁸⁷ Francium	Ra ⁸⁸ Radium	Actinides		Rf ¹⁰⁴ Rutherfordium	Db ¹⁰⁵ Dubnium	Sg ¹⁰⁶ Seaborgium	Bh ¹⁰⁷ Bohrium	Hs ¹⁰⁸ Hassium	Mt ¹⁰⁹ Meitnerium	Ds ¹¹⁰ Darmstadtium	Rg ¹¹¹ Roentgenium	Cn ¹¹² Copernicium	Uu ¹¹³ Ununtrium	Fl ¹¹⁴ Flerovium	Uup ¹¹⁵ Ununpentium	Lv ¹¹⁶ Livermorium	Uus ¹¹⁷ Ununseptium	Uuo ¹¹⁸ Ununoctium				
La ⁵⁷ Lanthanum		Ce ⁵⁸ Cerium	Pr ⁵⁹ Praseodymium	Nd ⁶⁰ Neodymium	Pm ⁶¹ Promethium	Sm ⁶² Samarium	Eu ⁶³ Europium	Gd ⁶⁴ Gadolinium	Tb ⁶⁵ Terbium	Dy ⁶⁶ Dysprosium	Ho ⁶⁷ Holmium	Er ⁶⁸ Erbium	Tm ⁶⁹ Thulium	Yb ⁷⁰ Ytterbium	Lu ⁷¹ Lutetium							
Ac ⁸⁹ Actinium		Th ⁹⁰ Thorium	Pa ⁹¹ Protactinium	U ⁹² Uranium	Np ⁹³ Neptunium	Pu ⁹⁴ Plutonium	Am ⁹⁵ Americium	Cm ⁹⁶ Curium	Bk ⁹⁷ Berkelium	Cf ⁹⁸ Californium	Es ⁹⁹ Einsteinium	Fm ¹⁰⁰ Fermium	Md ¹⁰¹ Mendelevium	No ¹⁰² Nobelium	Lr ¹⁰³ Lawrencium							



Celebrating the International Year of the Periodic Table 2019, *SCIplanet* discussed the history of the periodic table and tackled the elements discovered by female scientists, in addition to the elements used to cure diseases. Now, as it is the last issue in 2019, it is important to draw attention to a critical issue that was raised as part of the celebrations, when the European Chemical Society published a new version of the periodic table warning that some elements are under the threat of becoming scarce.

It is known that the periodic table consists of 118 elements; 90 of which exist naturally, while the rest are super heavy substances created in laboratories. The supplies of these chemical elements on Earth are finite; yet, they are essential to fulfill the infinite human needs. Due to the progress of technology, we rely extensively on these elements

in many fields of our life; as a result, 44 elements out of the 118 elements are at risk of being of limited supply within the next 100 years. These elements will not completely disappear; however, the supply will be very limited to cover the economic needs. We will reach a point when we will have to seek alternatives, which can be very costly.

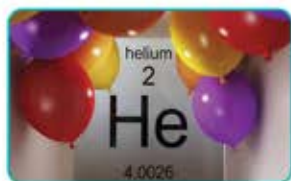
The new periodic table is color-coded to indicate the threat level that face the endangered elements; some of these elements are in more danger than the others, so they are highlighted in red. Elements highlighted in orange to red indicate that they are facing a rising threat from increased use, while elements highlighted in yellow indicate that they will face a future risk.



Most of the endangered elements of the periodic table are used in the manufacturing of electronics. In every house around the world, you will find touchscreen mobile phones or tablets; the vital

component of touchscreen technology is **Indium (In)**, in the form of Indium tin oxide. This compound is used in a transparent film that conducts electricity; the real challenge is that this element does not occur in enough concentrations in ores to be extracted.

Most of these smartphones or tablets usually end up in landfills due to the continuous production of new devices. Scientists proposed that Indium can be recovered from these unwanted devices; however, the amount of indium used in each device is very small, almost hundreds milligrams or less. This means that the process will need too much work and money. Thus, scientists started to look for alternatives to Indium; graphene is a good candidate, but it still cannot be used in all types of smartphones.



Though it is the second most abundant element in the universe, **Helium (He)** has found its way to the list of endangered elements. This element is usually used in MRI machines, where it cools the magnets to very low temperatures; it is also used extensively in the Helium-filled balloons! Another challenge facing this element is that it is a very light gas, so it easily escapes the Earth's atmosphere; this means that the amount of Helium on Earth is constantly being depleted. According to the current rates of use and natural depletion, it is estimated that the stock of Helium is just enough to meet the technology demands for 25 years or less.



Hafnium (Hf) is considered the most endangered element of the periodic table. It is rarely found naturally; it is commonly found in combination with Zirconium and currently it is only produced as a byproduct of refining Zirconium. One of the characteristics of this element is that it is excellent at absorbing neutrons and has a very high melting point. It is also corrosion-resistant because of the formation of an oxide film on exposed surfaces, such as water, air, all alkalis, and acids do not affect it.

This endangered element has many commercial applications, including some electronic equipment, ceramics, and light bulbs. Being corrosion-resistant, it is used in the making of super-alloys used in jet engines, and as control rods

in some nuclear reactors and nuclear submarines. With the expansion of nuclear industry, the demand for the element is increasing.



The metallic element **Gallium (Ga)** does not exist freely in nature; it is a byproduct of zinc and bauxite ores. About 95% of all the produced Gallium is used to make the compound Gallium arsenide, which is extensively used in the manufacturing of microwaves, LEDs, electronic circuits, semi-conductors, barometers, pharmaceuticals, and nuclear medicine tests. Gallium alloys are also used in thermometers instead of mercury, as it is non-toxic, environment-friendly, and can withstand higher temperatures than mercury. In the United States of America, these applications account for the consumption of 30 tons of Gallium yearly. As more countries around the world develop, the world's consumption is estimated to reach 680-750 tons of Gallium yearly. If the consumption of this element remains at the same rate, this may lead to its shortage.



The white metal **Silver (Ag)** is well known for its use in the industry of coins, silverware, and jewelry; however, today it is not just limited to these purposes. In comparison to other metals, Silver is the best thermal and electrical conductor; it is both malleable and ductile. Silver can also be flattened into fine sheets and flexible wires, in addition

to being resistant to corrosion and oxidation. Due to these unique properties, Silver has become a crucial element in many industrial purposes.

Silver is involved in almost all electronic devices that use switches; it is used in the on/off buttons in televisions, telephones, microwaves, computers, etc. Batteries made with Silver alloys are 35% better than Lithium ones; 30% of the Silver produced was used in the industry of photography before the emergence of digital cameras. Due to its antimicrobial properties, many cosmetic companies depend on silver chloride in the making of personal deodorants, as it helps in the delay of body odor and helps keep the skin healthy. Silver has also become a growing demand for use in photovoltaic cells in solar panels. According to the current pace of using silver, it is predicted that it would be very difficult to find and produce silver within 10 years.

Even though they carry the name "**rare**" earth elements, they are not really rare; the real problem facing Rare Earth Elements is not their lack of abundance, but rather isolating them. They tend to occur together, so separating them from each other is difficult

because they all have very similar chemical properties. They are also found in particular regions in the Earth's crust; for example, China has the most of the world's supply.



However, one of the 17 Rare Earth Elements is actually listed among the endangered elements, which is Neodymium. This rare endangered element is used to make small but powerful magnets, which are found in mobile and computer headphones, hard drives, and generators in wind mills. The other rare elements are also used in many industries, especially for green energy production, and the demand for them is increasing at a very high pace. The monopoly of China over most of these elements' supply may lead to a huge increase in their prices, which can affect many industries.



The International Year of the Periodic Table 2019 has been a great opportunity to raise awareness of how important chemistry is in providing solutions to global challenges in many fields, such as agriculture, education, energy, and health. It has also served a warning to industries, governments, scientists, and local communities to reconsider the ways of consuming natural elements in order to maintain their abundance on Earth. The good news is that many institutions have already begun some initiatives to speed the sustainable use of these elements.

References

ensia.com
geology.com
livescience.com

soci.org
techtimes.com



SENSES TICKLING and MINDS

By: Rania Farouk
Marketing Specialist, BA Planetarium Science Center

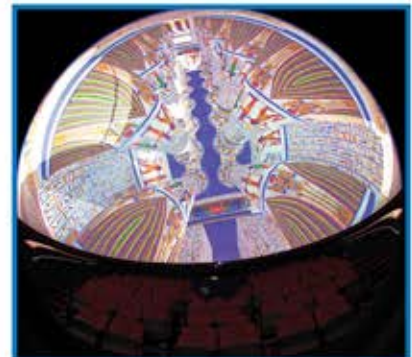
Every now and then, our souls and minds need some rest from the daily mental and physical effort and stress. You may need to live a moment in a fictional world that tickles your senses and take you to other dimensions. In the Planetarium Science Center, we offer different means to entertain your senses and mind. Let me take you on a tour in our Center.

The Planetarium theater is designed in a way that takes the visitors on a breathtaking trip in fascinating worlds for 30–45 minutes. The shows display high professional visual and sound effects to grasp the viewers' eyes and capture their minds in every second of each show. With the new Planetarium operating system, which relies on laser beams, images have become higher in resolution, brightness, and clarity; this provides the visitors with a more dazzling and accurate vision. Most shows are suitable for all age groups, from 6 years old and above; some shows are made specifically for younger age groups, starting from 4 years old, but adults can attend and enjoy them as well.

Other than the deep Planetarium experience, our visitors can enjoy a light entertaining show. In the 12D simulator, visitors enjoy a 3–6 minutes show with 12 different effects, including rain, wind, tickling, earthquakes, among other effects; a few minutes of pure fun, with childish screams and laughs.

The Planetarium Science Center also plays 3D movies in the Listen and Discover Hall, where our audiences can view scientific shows suitable for different age groups, in 3D, which adds depth and realistic vision to shows.

We, the team of the Planetarium Science Center, will be waiting for you to have this great experience and share it with friends.



PLANETARIUM SCIENCE CENTER

"Science for All"

History of Science Museum

Opening Hours

Sunday–Thursday: 9:30–16:00

Guided Tours Schedule

Sunday–Thursday:

10:30, 11:30, 12:30, 13:30, 14:30, 15:30

Fees: EGP 2.- for non-audience of the Planetarium

ALEXploratorium

Discovery Zone

Opening Hours

Sunday, Monday, Wednesday, Thursday:

9:30–16:00

Tuesday: 9:30–12:30

Saturday: 12:00–16:00

Guided Tours Schedule

Sunday, Monday, Wednesday, Thursday:

10:00, 11:00, 12:00, 13:00, 14:00, 15:00

Tuesday: 10:00, 11:00

Friday: 14:00, 15:00

Saturday: 12:00, 13:00, 14:00, 15:00

Fees: EGP 10.- (EGP 5.- for students)

Listen and Discover

Fees:

DVD shows: EGP 4.- (EGP 2.- for students)

3D shows: EGP 20.- (EGP 10.- for students)

12D shows: EGP 20.-

Available Planetarium Shows

The Great Barrier Reef; 42 min.

The Secrets of Gravity; 45 min.

Two Small Pieces of Glass; 22 min.

The Future by Airbus; 27 min.

Enlightened Mind; 19 min.

The Mission; 24 min.

Kaluoka'hina;

The Enchanted Reef; 33 min.

Stars of the Pharaohs; 35 min.

Seven Wonders; 30 min.

Oasis in Space; 25 min.

For schedule and fees,
please visit the Planetarium
Science Center's website:
www.bibalex.org/psc



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BAPSC

The Bibliotheca Alexandrina Planetarium Science Center (PSC) invites its visitors to spend a day of fun learning, where they can enjoy amazing scientific shows that cover a diverse variety of scientific fields and are suitable for a wide range of groups at the Planetarium Theater.

Visitors can also enjoy tours of the History of Science Museum, which highlights scientific discoveries throughout three eras: Pharaonic Egypt, Hellenistic Alexandria, and the Golden Age of Islam.

Moreover, visitors can enjoy a collection of interactive exhibits that targets children and adults, workshops, DVD and 3D shows at the ALEXploratorium as well as shows at the 12D Theater.



Space-Fit



Don't worry;
they are just training
for their tourist
space trip.

To know more about the trip, read the article on page 18.
Illustrated by: Mohamed Khamis



Mohamed Khamis