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Stephen Hawking: An Introduction *by Waqas A Qazi*

Pulitzer Prize-winning writer Michael Skube has written:

"In the past 25 years, Hawking has done more than perhaps any other physicist since Einstein to expand our understanding of the nature and origins of the universe. Indeed ,he has advanced Einstein's General Theory of Relativity to the edge of what cosmologists regard the Holy Grail----a theory that would explain not merely the laws of the universe but time itself. "

Very right, I would say. Stephen Hawking is bound to a wheelchair, but his mind explores the universe. He is almost totally paralyzed, speechless, able to move only his facial muscles and two fingers on his left hand. He cannot dress or feed himself, and needs round-the-clock nursing care. He can communicate only through a voice synthesizer, which he operates by laboriously tapping out words on the computer attached to his motorized wheelchair. Yet, he is a man so brilliantly gifted that, despite being unable to use pen and paper, he is able to solve problems by visualizing the necessary diagrams and manipulating the complex equations in his head. He has proven himself to be an important force in the development of the science of Cosmology, and is believed by many to be the greatest genius alive today. He has been labeled "*Einstein's Heir*" and "*Master of the Universe.*"

Stephen William Hawking was born on 8 January 1942 (300 years after the death of Galileo) in Oxford, England. When he was eight, his family moved to St Albans, a town about 20 miles north of London. At eleven Stephen went to St Albans School. He wanted to specialize in Mathematics in his last couple of years at school, where his Mathematics teacher had inspired him to study the subject. However Hawking's father was strongly against the idea and Hawking was persuaded to take up Chemistry as his main school subject. Part of his father's reasoning was that he wanted Hawking to go to University College, Oxford, the College he himself had attended, and that College had no Mathematics fellow. In March 1959,at age 17,Hawking took the scholarship examinations with the aim of studying natural sciences at Oxford. He was awarded one and at University College he specialized in physics in his natural sciences degree .He still wanted to do Mathematics but Mathematics was not available at University College, so he had to do Physics instead. After three years, in 1962, and it may be added, not very much work, he was awarded a first class honors degree in Natural Science. He only just made a First Class degree.

From Oxford, Hawking went on to Cambridge to take up research in general relativity and cosmology, a difficult area for someone with only a little mathematical background, there being no-one working in that area in Oxford at the time. His supervisor was Denis Sciama, although he had hoped to get Fred Hoyle, who had a worldwide reputation as one of the best scientists currently working in the field of cosmology. This was for the better, because Hoyle traveled abroad a lot and could not properly play the role of mentoring. Hawking. However, he soon discovered that Sciama himself was a very fine scientist and a helpful supervisor. During his three years at Cambridge, Hawking applied Roger Penrose's singularity theory to the entire universe. This work was written up as his, it must be said, well-argued and original thesis and he was awarded a Ph.D. from Cambridge in 1965.

After gaining his Ph.D. he became a Research Fellow, and later on a Professorial Fellow at

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Gonville and Caius College, Cambridge. In 1973 he left the Institute of Astronomy and joined the Department of Applied Mathematics and Theoretical Physics (DAMTP) at Cambridge. He became Professor of Gravitational Physics at Cambridge in 1977. Since 1979, Hawking has held the post of Lucasian Professor of Mathematics.

Hawking had noticed that he was becoming rather clumsy during his last year at Oxford and, when he returned home for Christmas 1962 at the end of his first term at Cambridge, his mother persuaded him to see a doctor. In early 1963 he spent two weeks having tests in hospital and was diagnosed with ALS (Amyotrophic Lateral Sclerosis) or Lou Gehrig's disease, a neuromuscular disease that progressively weakens muscle control. His condition was deteriorating quickly and as a 21-year-old graduate student in cosmology at Cambridge University; doctors predicted an early death for him. Hawking talks of those times:
"*Not knowing what was going to happen to me, or how rapidly the disease would progress, I was at a loose end. The doctors told me to go back to Cambridge and carry on with the research I had just started in general relativity and cosmology. But I was not making much progress, because I didn't have much mathematical background. And, anyway, I might not live long enough to finish my PhD. I felt somewhat of a tragic character.... although there was a cloud hanging over my future, I found to my surprise that I was enjoying life in the present more than I had before. I began to make progress with my research....*".
One of the reasons that his research progressed was that he met a girl; Jane Wildish wanted to marry and realized he had to complete his doctorate to get a job. The fellowship at Caius took care of his immediate employment problem. His engagement to Jane Wilde and the progress he started to make with his research took his mind off his condition. Perhaps he was lucky to have chosen to work in theoretical physics, because that was one of the few areas in which his condition would not be a serious handicap. His scientific reputation increased, at the same time that his disability got worse.

During 1965 through 1970,Hawking did research on singularities in the general theory of relativity, devising new mathematical techniques to study this area of cosmology. Much of his work in this area was done in collaboration with Roger Penrose who, at that time, was at Birkbeck College, London. With Penrose he showed that when the General Theory of Relativity is utilized, this implies that both time and space would have a defined starting and ending point; a beginning in the Big Bang and an end in black holes. These results indicated it was necessary to unify General Relativity with Quantum Theory. Thus Hawking combined the fields of Quantum Theory and General Relativity through his research.

In 1970,his interest shifted to black holes. Applying his previous work on black holes, Hawking made a remarkable discovery. Using quantum theory and general relativity he was able to show that black holes were not entirely “black” but in fact emitted certain types of radiation. Instead, they should glow slightly with "*Hawking radiation*", consisting of photons, neutrinos, and to a lesser extent all sorts of massive particles. Over time, the black holes could evaporate and ultimately disappear from existence. This has never been observed, since the only black holes we have ample evidence for are those with lots of hot gas falling into them, whose radiation would completely swamp out this tiny quantum effect.

In 1971 Hawking suggested the formation, following the Big Bang, of extremely small particles, of the size of a proton, but weighing as much as 10^9 tons. These objects, called “*mini black*

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holes", have large gravitational attraction governed by general relativity, while the laws of quantum mechanics would apply to objects that small. Today, Hawking believes the universe did not begin with a single Big Bang. In 1974 Hawking proposed the idea of "*exploding black holes*". In accordance with the predictions of quantum theory, black holes emit subatomic particles until they exhaust their energy and finally explode.

Another remarkable achievement of Hawking using the techniques he developed during the 60's was his "*no boundary*" proposal made in 1983 with Jim Hartle, according to which time and space are finite in extent but have no boundary or edge and there are no singularities. Hawking explains that this would mean:

"*... that both time and space are finite in extent, but they don't have any boundary or edge. ... there would be no singularities, and the laws of science would hold everywhere, including at the beginning of the universe.*"

This would imply that the way the universe began was completely determined by the laws of science.

Hawking barely escaped death when, in July 1985,on a working trip to Geneva, he caught pneumonia. ALS patients are especially prone to it, and often it proves fatal. Hawking was unable to breath, and was put on a life support machine. Any chances of survival required a tracheotomy operation, slicing in to his windpipe and implanting a breathing device in the neck. But if the operation went ahead, Hawking would never be able to speak or make a sound again. The decision rested on Jane. Although Hawking's speech had been deteriorating since the 70's,still it was speech. The cost for his life was the total loss of vocal communication. Jane contemplated pulling the plug on the life support machine, but ultimately, to save him, she gave permission for a tracheotomy.

For quite some time after the operation, the only way he could communicate was to spell out words letter by letter, raising his eyebrows when someone pointed to the right letter on a spelling card. A computer expert in California, Walt Woltosz, heard of his plight. He sent Hawking a computer program he had written, called Equalizer. This allowed him to select words from a series of menus on the screen, by pressing a switch in his hand, or by head or eye movement. When a sentence had been built up ,it could be sent to a voice synthesizer which then spoke for him. Hawking found it pretty slow at first:

"*It was a bit slow, but then I think slowly, so it suited me quite well.*"

The Equalizer program was designed to run on desktop computers. David Mason ,of Cambridge Adaptive Communication, increased its feasibility by attaching a small portable computer and a speech synthesizer to Hawking's wheel chair. This system allowed him to communicate much better than he could even before the tracheotomy. He can now manage up to 15 words a minute. The electronic voice synthesizer added greatly to his distinctive public persona. The only trouble is that it gives him an American accent. He often greets people with:

"Hello, please excuse my American accent."

In 1988,Hawking's first cosmology book aimed at the popular market, *A Brief History of Time,*

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was published. It broke sales records in a way that it would have been hard to predict, enjoying the longest-ever time on the bestsellers list. By May 1995 it had been in *The Sunday Times* best-sellers list for 237 weeks. Hawking intended the book to be enjoyed by non-scientists who were interested in understanding complex scientific concepts. The book has been translated into over thirty languages and has sold over ten million copies worldwide.

His other publications include *The Large Scale Structure of Spacetime* with G. F. R. Ellis(1973),*Superspace and Supergravity* (1981),*The Very Early Universe*(1983),*General Relativity: An Einstein Centenary Survey* with W. Israel, *300 Years of Gravity* with W. Israel, *Black Holes and Baby Universes and Other Essays(1993),The Physics of Star Trek* with L. M. Krauss(1996),*The Universe in a Nutshell(2001),,The Theory of Everything,On The Shoulders of Giants(2002),The Future of Spacetime* with Kip Thorne(2002), *The Nature of Space and Time* with Roger Penrose,*Before the Beginning* with M. Rees.

Hawking's contributions to cosmology and physics have earned him many exceptional honours. He has been awarded 12 honorary doctorates including ones from Harvard,Yale, Princeton,Oxford and Notre Dame. He was elected a Fellow of The Royal Society in 1974, being one of its youngest fellows. Professor Hawking was awarded the CBE(Commander of the British Empire) in 1982,and was made a Companion of Honour in 1989. In addition,he has been elected to the U.S. National Academy of Sciences. Ironically, Hawking has not received a Nobel Prize since the prize requires a major achievement to be proven,and Hawking's ideas are so advanced that they have not been proven yet.

Hawking is certainly one of the most amazing scientific success stories of all time. For a man to overcome such an obstacle like the crippling disease ALS and still be able to accomplish as much as he has is amazing. Clearly his physical limitations have done nothing to confine him intellectually. He simply has never allowed his illness to hinder his scientific development. In fact, many would argue that his liberation from the routine acts of life have allowed him to focus his efforts more keenly on his science. With a career that began over thirty years ago he has managed to do more than perhaps any other scientist to broaden our basic understanding of the universe. His contributions in advancing our knowledge of the origin and nature of the cosmos have been groundbreaking, if not downright revolutionary. Hawking has and continues to inspire not only the scientific community with his theories, but the common man as well.

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Made of Atomic Size Stars in a Clumpy Firework Universe *by Eugene Savov*

The discoveries of normal galaxies, strings of galaxies and heavy elements in the far distant universe [1-7] suggest that these space objects have to be older than what the big bang universe can allow for their creation. In this way the big bang universe enters its current age crisis [8], which will require some new assumptions to mend the edifice of this complex theory. The basic principle of parsimony, known as Occam's razor, says not to do with more, e.g. with more assumptions, what can be done with less [9]. The advance of science shows that nature prefers simplicity and the simple explanations are hard to find because nature complicates in our perceptions [10]. The big bang theory offered a simpler explanation for the cosmic microwave background radiation as a thermal radiation left after the big bang and thus sent the rival steady-state theory of the universe into oblivion. The theory of interaction offers a simpler explanation for the puzzling clumpy structure of the universe and the structure of the cosmic microwave background [10].

The accessible universe is like a cloud of galaxies that moves around its source like an atmospheric cloud that drifts around the center of its planet [10]. Our Galaxy is like a huge atom whose nucleus is orbited by stars. Similarly the electrons move around the nucleus of their atom. The solar system also resembles an atom with the Sun taking the role of nucleus and planets rotating around it. The universe is like a hyper huge atom whose nucleus; the center of Eugene Savov's "firework universe" cast away the nuclei of the smaller atomic like structures [10]. The created huge nuclei did the same and so on. In this way a universe made of multiscale nuclei was created. So the "firework universe" had a sudden lumpy beginning, which is consistent with the big bang burying discoveries of normal galaxies at the outskirts of the observable universe. Savov's universe also accounts for the mysterious dark matter, which is found to be created from huge 3D-spiral swirls of basic matter that drive around the smaller ones. The universe is made of 3D-spiral swirls of basic matter that create smaller ones in their structure rather than from seen as elementary particles, born from mysterious matter-antimatter asymmetry in even more uncertain big bang universe beginning [10]. We see only the inner parts of the 3D-spiral swirls of basic matter because they move faster and so become denser and visible to us [10].

The just born "firework universe" looked as made of bright blue stars – the smaller ones moving around the larger ones [10]. The cooling of this universe created the cosmic microwave background radiation and its structure. The smaller stars cooled and created the planets and their planetary like moons. The extinction of the expansion of the 3D-spiral swirls, seen as stars and planets leads to mighty 3D-spiral contraction of the "basic matter" that creates supernova events [10]. The atoms are like very small stars. Eugene Savov's theory of interaction shows that we are not made of stardust as the big bang theory claims. We are made of atomic size stars [10].

There is universal similarity in nature arising from its discovered 3D-spiral underlying structure. The universe is made of contracting and expanding, vibrating 3D-spiral swirls of basic matter that depending on their size create what we see as galaxies, stars, planets, planetary like

moons, atoms, electrons, elementary particles, light, space and time. The 3D-spiral contractions and expansions of the largest swirl, the source of the universe, make it always finite in one revealed complete picture of creation. Every body and similarly the universe as a whole come from and later end on their discovered finite source. For example a form of life comes from and latter ends on the Earth's surface. The all-building interaction is governed by scale independent laws that arise from the discovered 3D-spiral fractal like fabric of reality [10].

Nature has a 3D-spiral code, which is in each of its bits like the DNA double spiral is in each cell of life [10]. The properties of the discovered all-building 3D-spiral structure of nature are described in the theory of interaction [10]. This structure shows that clumpiness is a basic trait of existence, which can be observed since the first moments of the universe beginning. The fundamental nature of lumpiness is well in agreement with the puzzling discoveries of galaxies and heavy elements at the fringes of the observable universe [10]. The Hubble Ultra Deep Field and other similar findings [4, 11] and "the swirling flow of gas hovering just a few miles from the surface" of what is considered to be a neutron star [12] are just some new confirmations of the "firework universe". The 3D-spiral nucleus of the star remains after annihilation of its atomic shell during supernova explosion. This nucleus has to be very massive and dense, made of predominantly inward 3D-spiral swirl of basic matter [10]. Thus it will display properties that are usually explained as a neutron star.

We are living in the outer atomic shell of the huge nucleus, which is in the center of the Earth. This nucleus gave birth to the atoms that build us. The theory of interaction shows how the current understanding of nature can be simply derived from a new basic framework, considered at the scales of observation [10]. Thus the theory of interaction expands the understanding of nature up to the discovered frames of existence. The discovered universe unfolding is a key to the understanding of life, mind, the cause of cancer and the other health problems. The real understanding of nature will essentially improve the quality of life.

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Knowledge and Intelligence *by Kashif Zia*

Introduction:

The age we live in can be thought as "The age of knowledge". It has always been the *knowledge*; the civilizations have been revolving around; the knowledge and a bunch of people using that knowledge *intelligently*. This paper is intended to describe the concepts of knowledge, and intelligence and relation between them.

What is Knowledge?

Philosophically knowledge can be defined as:

A person 'P' has some knowledge 'K' if:
The knowledge 'K' is true
'P' believes 'K' to be true
'P' has justification for believing 'K' is true[2]

But there is no straightforward definition of knowledge.

Historical Perspective:

People throughout the history of human civilization have been striving to find the answer to this question.

Starting from **Georgias** who believed that:

Nothing Exists.
If anything does exist it cannot be known.
If anything exists and can be known it cannot be communicated[1]

*Starting from Georgias's nothingness, **Plato** believed in thoughts rather abstract thought. To him concrete observation was inferior in front of abstract knowledge. So human civilization came to a point where they start believing in knowledge and thought but they thought it to be abstract and and away from observation or science. Plato quoted:*

Reality lies in abstract thought.
Abstract knowledge is superior to imperfect concrete observation. [1]

*The main stream of thought about knowledge came from **Aristotle** who believed that:*

Knowledge is acquired through empirical evidence obtained through experience and observation.
Induction of principles from observation.
Representation of logic by the syllogism. [1]

In his Meta physics he discusses "epistemology" or Science of knowing or his LOGIC. Aristotle referenced to his logic as the "instrument", because he felt that the study of thought itself, was the basis of all knowledge. In his logic, he investigated whether certain proposition can be said to be "true" because they are related to other things that are known to be true.

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In the period of Renaissance, **Descartes** is a central figure in the development of the modern concepts of thought and the mind.

> *In his famous "Meditations", he attempted to find a basis of reality purely through cognitive introspection. Systematically rejecting the input of his senses as untrustworthy, Descartes was forced to doubt even the existence of physical world and was left with only the reality of thought. After he established his own existence purely as thinking entity, Descartes inferred the existence of God as an essential creator.*[a]

We can make two interesting observations here: first, the separation between the mind and the physical world has become so complete that the process of thinking could be discussed in isolation from any specific sensory organ (input) or worldly subject matter; second, the connection between mind and physical world was so complex that it required the intervention of benign God to allow reliable knowledge and physical world.

Above discussions depicts the following facts courtesy to Descartes:

Mental processes can exist without a physical system.
Mental processes are achieved by physical systems.
Mental processes can ultimately be characterized through formal mathematics.
Mental activity can be inspired by a physical activity or a logical activity

So we have come from nothingness to a science of thought, which was named epistemology by Aristotle. Aristotle thought of knowledge as empirical evidence obtained through experience and observation, and gave the idea of "logic" based on knowledge, which uses inference rules to solve real world problems.

What is Intelligence?

In classical terms intelligence can be thought as logical inference. An object is said to be intelligent if it acquire structural logical behavior to solve a problem.

A scholar of 21st century like Dr. Laurel Fais, defines the intelligence as:

> *Intelligence is not a "thing;" it is defined by the interactions between human beings. Those interactions consist, at least, of our presentation of our intelligence, reaction by others to that presentation, and our perception of that reaction, which informs our sense of our own intelligence. Thus, how we perceive our own and others' intelligence can depend crucially on presentation.*[6]

Whether intelligence is a structural logical approach or a perception about a presentation, it is not believed to be a physical entity. But people now believe it to be characterized through formal mathematics.

Conclusion:

Intelligence is based on knowledge. There is no static state for any scientific knowledge. It changes as the civilization become aged day by day. So formulation of knowledge based on scientific rules seems to be varying all the time, but it will not going to hurt us as science is itself a

variable entity. As the time passes by the definition of knowledge keep changing, depicting the shallowness and variance of scientific knowledge human civilization has got. And also hinting the existence of entirety, the container of complete knowledge. *Will human civilization ever be intelligent enough to grasp and capture the complete knowledge nature offers?* Hopefully some day it will. Before that the concepts of knowledge and intelligence keep varying all the time.

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Letters to The Editor

Young Pakistani GIK Student at the United Nations of Lindau, Germaby

Dear Dr. Jameel Nabi:

Physics Today, August 2004, on page 31, has photographs of participants (500 graduate students along with 16 Nobel Laureates) for a week at Lindau, Germany in June. There is a photograph of a young Pakistani student, Kamran-ul-Hasan working on Thin Film Solar Cells. It's good to know that inspite of all the negative publicity there are some good things reported about Pakistan.

Please let us know if we can be of any help to this young man.

During 1990's, APSENA had arranged the transfer of a sputtering system to Punjab University, donated by a Pakistani American, who owned a Flat-Panel Display Company in California.

Unfortunately, by the time the equipment arrived, the young scientist interested in pursuing this research had already left to find better opportunities in Europe. The equipment was collecting dust and as we heard last year that it was given to another person involved in setting up a new university related to Solar Energy research. During Zia-ul-Haq's time Centers of Excellence, National Institute of Electronics, and National Institute of Silicon Technology were set up but were not properly funded or nurtured. We hope that GIK will take the lead in Solar Cell Technology, in which new (cheaper and easy to manufacture) technologies are emerging in time.

Bashir A. Syed, Vice President, R&D, EnerTech Enterprises, Inc., (A Renewable Energy Company), Houston, TX

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Newspapers and Fake Degrees

(Originally Printed in the Daily Times)

Sir: It was reported at the beginning of the week that the district administration of Sialkot had smashed an organised criminal gang charged with preparing fake degrees. A large number of these degrees – from school-level right up to PhD-level – were seized during the raid.

It was also reported that officials from private universities as well as from reputed institutions such as Punjab University and Allama Iqbal Open University had been involved in the scam.

As competition for jobs increases, desperate applicants will try increasingly daring methods to sell themselves on the open job market. This will continue unless the government understands how these scams operate and weeds them out. Newspapers clearly can play an important role in informing the public about the pitfalls of gaining shady degrees. But instead, some papers are unwittingly, or otherwise, publishing advertisements from local and international fake degrees sellers. The Internet is already awash with such solicitations.

The very paper that announced the seizing of fake degrees in Sialkot, ran, on the same day, an advertisement for Washington International University. Even the ad itself is suspicious, and one needn't even visit its website (www.washint.edu) to know that something is amiss. First of all, the advertisement declares that you can earn your Degree (any) in one year based on your previous education and work experience. Secondly, the institute is located in King of Prussia, PA, which is America's second largest shopping mall. People go there to shop, not to study. Thus it becomes apparent that Washington International University is nothing more than a one-room outfit, endeavouring to make a mint from gullible students, or more likely, from those who wish to cheat the system by using their fake degrees to get ahead in life.

"Revolutionary learning method: Core curriculum is bypassed to concentrate on new developments and trends in your field of study. There are no exams to pass. Book reports and research papers will be required as evidence of mastery of the subject matter," says the section on "accelerated degree programme". All accelerated degree programmes are designed to be completed within one year, and that includes PhDs.

The education establishment ought to put an end to this fraud. And for their part, reputable newspapers should engage in a little research and only publish advertisements for genuine institutions.

Q ISA DAUDPOTA
Islamabad

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Introduction to The Science and Technology Review Journal of Pakistan (STREJP), *by Abdulrahman Rafiq*

The Science and Technology Review Journal of Pakistan, herein referred to as STREJP is a publication published by the Pakistan Science and Engineering Forum (PakSEF.)

The purpose of STREJP is to act as a professional Science and Technology review journal catering to the Pakistani science, engineering, technology and medical professional. This journal is to act as a central repository for research and development articles published in Pakistan. The journal will be published on a bi-annual basis, and will contain peer-reviewed articles and letters submitted by both Pakistani and Pakistani-Expatriate Science, Engineering and Medical professionals.

To submit articles to the journal authors are requested to follow journal submission guidelines of internationally reputable Science and Technology journals. However, we would recommend that authors follow either the American Physical Society (APS, www.aps.org) or the Institute of Electrical and Electronic Engineers (IEEE, www.ieee.com) journal submission guidelines.

This Serial will be published both in electronic (online) and print format. The United States Library of Congress has assigned the following International Standard Serial Number (ISSN) to this publication: ISSN: 1550-6797 (online edition), SSN: 1550-6789 (print edition.)

Currently we are in the process of forming an editorial committee which will consist S&T professionals from boh academia and industry, who are actively engaged in research and development in their respective fields. If you or someone you know would be interested in joining, you can contact me via email.

We have already published the first issue of STREJP, it can be viewed online at www.paksef.org/publications.htm . The second issue is scheduled to be published in December of 2004.

The author is a Physics lecturer at the California State University, San Bernardino and is the founder of the Pakistan Science and Engineering Forum, www.paksef.org. He can be contacted via email arafiq@ucsbalum.net.

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News Briefs

The following News Briefs can be found on PakSEF's Daily Science News Update site at http://paksef.blogspot.com/

Pakistan's Pleads to Share Space Science and Technology:
UNITED NATIONS, October 12: Pakistan has pleaded for increased efforts so that the benefits of space science and technology could be shared by all countries. Addressing the Special Political and Decolonization Committee of the UN General Assembly on its agenda item concerning International Cooperation in the Peaceful Uses of Outer Space here today, Pakistan delegate, Senator Mouhim Khan Baloch emphasized that outer space could be utilized for the establishment of communication infrastructures for early warning systems which could mitigate the effects of natural disasters.

Austrian companies evince interest in investment in Pakistan:
ISLAMABAD, October 11: Pakistan and Austria today agreed to enhance cooperation and undertake joint collaboration projects in the field of food, agriculture and livestock, petroleum and natural resources, industries and production, investment in Heavy Electrical Complex, water, education and science and technology. These decisions were reached at the concluding Session of the Pak-Austria Joint Working Group meet held October 8 and 9.

Iran takes part in 'Abdus Salaam' confab in Italy:
LONDON, Oct 6: Irna Ministe of Science, Research and Technology Jafar Towfiqi participated at the 'Abdus Salam' (Pakistani Nobel Laureate in Physics) International Physics Conference which began in the Italian city of Trieste on Tuesday. Iran's State News Agency (IRNA) reported.

Dr Abdus Salam Remembered on his 4th death anniversary:
WASHINGTON: Dr Abdus Salam was remembered and tribute paid to his great achievements as a scientist, a visionary and humanitarian at a meeting last week in Toronto. Ziauddin Ahmad, moderator of the meeting, said in his opening remarks that if the Pakistan Government and certain people had discriminated against or ignored Dr Salam, it was only evidence of their short-sightedness as it had deprived the country of the wisdom and knowledge of a true son of the soil.

US Explores new avenues in education field with Pakistan, Nancy Powell:
ISLAMABAD: The Bush administration and USAID would continue to explore new avenues in the field of educational cooperation between the two countries and expressed their satisfaction with the pace and progress the Ministry of Education had made to uplift the education in the country.

Pakistanis Educators Study at OSU:
OREGON: A program designed to encourage educational improvement and innovation in Pakistan, and begin breaking down cultural stereotypes in that country and in the United States, will begin this fall when a group of 18 rural Pakistani educators come to Oregon State University.