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Are Scientists bounded by the “Scientific Method”?

by Senior Professor W.G.D. Dharmaratna, Dean, Faculty of Science, University of Ruhuna

In general, education can be considered as passing knowledge, skills and values to future generations through teaching, training and research. Sri Lanka had its own system of education for passing knowledge from generation to generation, which was ecologically sustainable and socially viable. Sri Lankans had a very rich, broad and balanced system of knowledge for the wellbeing of the society, especially, in the areas of agriculture, irrigation, health care, construction and food preparation & preservation. This system of knowledge was disturbed in the 18th century with Dutch and British Colonial invasion. Most of the traditional knowledge, which was not documented, might not have been passed to the next generation. Thus, with the arrival of the western knowledge which was widely accepted and absorbed into the system, passing of the traditional knowledge was abandoned violating principles of education. As a result, the traditional knowledge is facing the risk of extinction. At present, a great majority of the society believes that western science presents the absolute truth as it has been built on the “Scientific Method”.

The birth period of modern western science could be considered as the period of transition from geocentric (earth centred) model

to heliocentric (sun centred) model of the planetary system. Although the heliocentrism was proposed in 3rd century BC by Aristarchus of Samos, it was not taken seriously until Nicolaus Copernicus elaborated on sun centred circular orbits of planets in 16th century. Tycho Brahe with a great interest to verify the correct model, made very precise measurements on planetary motion. He hired Johannes Kepler to analyze the data but Brahe died unexpectedly before Kepler published the result. By late 1602, Kepler established a law that described elliptical orbits of planets with sun at one focus of the orbit, however, he could not publish until 1609 due to the legal battle over ownership of Brahe's data (today we refer it as protecting Intellectual property rights). Galileo Galilei confirmed the model with experimental observations using his telescope giving a deadly blow to geocentrism advocated by Aristotle and Ptolemy. The next essential knowledge needed for the development of science was analytical geometry and calculus. Rene Descartes was mainly credited for combining algebra with geometry of Euclid in formulating analytical geometry which was needed to describe the motion of a particle in space. In 1686, using analytical geometry and calculus, Isaac Newton

published his first book on *Principia Mathematica* explaining his famous law of universal gravitational force. (However, Robert Hooke accused Newton for using the “notion” of inverse square behaviour introduced by him in the gravitational law). Newton's finding was supported by Henry Cavendish in a laboratory experiment in 1798. The studies from Copernicus to Newton led to the foundation of modern “scientific method”. The method consists of steps; an observation, a tentative description called a hypothesis consistent with the observation, use the hypothesis to make predictions, test predictions via more experiments, and repeat last two steps until there is no discrepancy between the theory and the experiments.

Newton developed the first scientific paradigm which is now called as Classical Mechanics. Since then Newton's gravitational force has been used to explain planetary motion as well as when placing a satellite in an orbit and in understanding the motion of objects under gravity, approximately. However, in 1916, Albert Einstein introduced the subject called General Relativity which rejected Newton's gravitational force and attributed effects of gravity to properties of “space-time”. The idea of space-time as a

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continuum was introduced by him earlier with the introduction of special relativity explaining particles moving at high speeds. He suggested that gravity was not a force, but rather an artefact of the natural movement of objects through curved four-dimensional “space-time”. About 230 years after Newton, Einstein’s theory could give a better explanation of gravity without the Newton’s force of gravity. A man jumping off a building would not experience any force except air friction during his fall but would suffer severely hitting the ground as motion suddenly stops. Einstein suggested that in the vicinity of a heavy object the space-time is curved, and the objects are moving freely along certain paths called geodesic; generalization of the notion of a “straight line” in a curved space-time.

However, Newton’s hypothesis can be used for lighter objects moving at slower speeds, which is the reason a satellite can be placed in an orbit using his model. Predictions of Einstein’s theory agreed better with experiments.

Perihelion precession of planet mercury and light travelling along a curved path are some examples which have been correctly predicted only by the Einstein’s model.

So, what is gravity? Einstein has given the closest explanation: The gravitational acceleration of a particle is a result of the curvature of space-time and the speed of the particle. However, Newton’s as well as Einstein’s explanations may not provide the correct picture of gravity quantum mechanically. We may have to wait until the “Quantum Gravity” is understood to have a better understanding of gravity. The above discussion clearly indicates that even an underline theory built on scientific method based on experimental measurements is not definite, but keeps changing. This is the nature of the scientific method. However, all scientists agree on measurements within experimental uncertainties. Einstein had once said “All our science measured against reality is primitive and child-like, and yet it is the most precious thing we have.”

Sri Lankan traditional

knowledge had been established long before the modern scientific method. Therefore, many scientists accustomed to the scientific method hesitate to accept traditional knowledge. In this situation, should such knowledge be disregarded without making an attempt to use them, even when those have been practised for centuries? Again Einstein had said “Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted”. Therefore, as Sri Lankan scientists we have a great responsibility of protecting traditional knowledge and practices as well as studying and exploring them deeper for better understanding and continuing those traditions. Farmers in some parts of the country have returned to traditional farming, free of chemical pesticides and fertilizer in paddy cultivation. The results of such organic farming need to be systematically analysed considering problems encounter when chemical fertilizer and pesticides are used. Also, economics involved and foreign exchange spent on those

chemical imports need a thorough assessment. Einstein had said that “We can’t solve problems by using the same kind of thinking we used when we created them”.

Further, the possibility of inventing new marketable products using native raw materials has to be persuaded. For example, materials as well as construction methods used in building colossal structures before invention of cements and concrete should be studied further, as no thorough understanding exists of how they withstood for centuries. If traditional knowledge is properly blended with modern technology, there is a great potential in contributing towards economical development of the country. Such knowledge has to be integrated in to the present education system and has to be transferred to the next generation through formal education. Therefore, universities, other higher education and research institutes and relevant ministries have to initiate collective action without delay to preserve and transfer traditional knowledge to the modern system of teaching and learning.

Launching of Ruhuna Journal of Management and Finance

Ruhuna Journal of Management and Finance (RJMF) was launched on 23rd April 2014 at the University Library Auditorium with the presence of Senior Prof. Gamini Senanayake, Vice Chancellor, Dr. AMN Alagiyawanna, Deputy Vice Chancellor, Prof. HSC Perera, Dean of the Faculty of Management and Finance, Librarian, Academic and

Non-academic staff members. Prof. Mangala Fonseka, Director of Post Graduate Institute of Management, delivered the keynote speech. RJMF is a peer reviewed international journal published bi-annually by the Faculty of Management and Finance. Online version of RJMF was launched by the Vice Chancellor, University of Ruhuna during the event

and is now freely accessible at <http://www.mgt.ruh.ac.lk/rjmf/>. Mrs. GT Wasantha Sriyani, Editor-in-Chief, and

the editorial board coordinated the event with the support of Dean and staff of the Faculty.



President's Awards for Publications

Prof. Mahinda Atapattu, Mr. S Wijethunga, Dr. KKIU Arunakumara, Dr. DAL Leelamanie, and Mrs. D Senaratne from the Faculty of Agriculture received the President's Awards for

Scientific Publications (2007, 2008, 2009). The ceremony was held on 17th January, 2014 at Hotel Waters Edge, Battaramulla.



Commonwealth Academic Fellowships

Prof. LP Jayatissa, Professor of Botany and Dean of the Faculty of Postgraduate Studies, Prof. D. Premachandra, Professor in Zoology and Dr. VP Bulugahapitiya, Senior Lecturer in Chemistry, were awarded Commonwealth Academic Fellowships in year 2013.

Under this fellowship, Prof. LP Jayatissa worked in Edinburgh Napier University, UK as a member of multi-disciplinary team focusing on 'Understanding the fiscal regulatory mechanisms necessary to achieve Climate Compatible Development

(CCD) in the coastal zone of Sri Lanka. Prof. Dammini Premachandra carried out research training on "Identification of soil nematode community "at James Hutton Institute, UK, and Dr. Vajira P Bulugahapitiya carried out research on "Conversion of atmospheric pressure carbon dioxide into industrially important Organic compounds" at Department of Chemistry, Loughborough University, UK.

They all have successfully completed the Fellowship during the period of three months in United Kingdom.



Samasri Deshamanya Award - 2014

Samasri Deshamanya honour was awarded to Prof. Piyasiri Vithanage attached to the Department of Economics, Faculty of H&SS for his contributions to the Social Services. He is one of the

most senior academics of the University of Ruhuna and he presently serves as the Proctor of the University. This honour was awarded by The United Organization for All Communities.



Young Professional Conference Awards

All grand prizes for the best papers in Present Around The World (PATW) - 2013 organized by IET-Young Professional section of Sri Lanka were won by the graduates of Department of Electrical and Information Engineering, Faculty of Engineering, University of Ruhuna.

The Best Paper Award was won by the paper titled "Smart Phone Based Irrigation Planning and Controlling System". Project Supervisors: Mr. JSL Senanayaka and Mr. TN Weerasinghe Project Students: Amaratunga M.M.,

Anjana HLW, Charith KWJ, Mendis WUK.

The Runner Up Award was won by the paper titled "In-Shoe Plantar Pressure Analyzer". Project Supervisor: Dr. ND Jayasundere Project Students: Ashly LGI, Fazlan MNM, Godage AS, Rasul MJMA. The Second Runner Up Award was won by the paper titled "Microcontroller Based SVPWM Generation for Three Phase Voltage Source Inverters ". Project Supervisor: Dr. PDC Perera Project Students: Bhasura PLS, Palatuwa MP, Parsad SMK, Premachandra HDNB.



Survey and Levelling Activity at Malimboda with University Students

Final year students of Department of Agricultural Engineering has carried out a survey and levelling work at Malimboda area under the supervision of Prof. KDN Weerasinghe, Senior professor, Department of Agricultural Engineering on pilot scale project to mitigate the disasters associated with climate change in Nilwala river basin. This was helping

to enhance the practical skills of undergraduate students with exposure to the real field conditions. Contour map of the site was prepared and it was very helpful to make decisions on disaster preparedness and mitigation in this area under the project conducted with the funds coming through Asian Disaster Preparedness Center.



University-Industry Partnership Development for Improvement of Cinnamon Industry

Department of Agricultural Engineering is engaging with a research and development program to address mechanization and machinery issues in cinnamon industry since 1998. Under HETC-QIG Window 4 project, a workshop was conducted on 11th February 2014 to build up awareness of the project activities among government, non-government institutions and the public engage in cinnamon industry in the south and to discuss the document formulation process between the University and industrial partners. Chief guest and Guest of Honour of this workshop were Senior Prof. Gamini Seannayaka,

Vice Chancellor and Prof. S Subasinghe, Dean Faculty of Agriculture respectively. Keynote speech on *Aspects of University industry Partnership Development under present Economic scenario* was delivered by Dr. Dareeen Gunasekara, Consultant, Social Entrepreneur Organization. Prof. HSC Perera, Dean Faculty of Management and Finance explained the importance of University industry partnership. After the round table discussion chaired by Prof. KDN Weerasinghe, an MOU was signed between the University and industrial partners.



Workshop on “Music for Stress Release”

A half-day workshop was conducted on “Music for stress release” at the Prof. Alawaththagoda Pemadasa Auditorium on 30th April 2014. Lecture on “Music for spiritual health” was conducted by Dr. Sunil Seneviratne Epa (VP, Nursing Home, Matara) and a lecture on “Appreciation of

music” was done by a popular musician in Sri Lanka, Mr. Chandradasa Bogoda. This was organised for the students in the Faculty of Science with the sponsorship of UDG project. Prof. WTS Dammini Premachandra, Dept. of Zoology, organized the event.

Acquisition of Microscopic Slide Processor

Department of Fisheries and Aquaculture recently acquired a modern microscopic slide processor through Transforming University of Ruhuna to International Status (TURIS) project. The Department plans to commence the production of microscopic slides that are useful for schools and

other educational institutions for teaching, particularly, all kinds microscopic slides required for GCE Ordinary Level and Advance Level examinations. These slides will be made available for a nominal fee through the Department of Education.

Awareness Campaign on Sri Lankan Food, Healthy Food Habits and Healthy Living

An awareness campaign on *Sri Lankan food, healthy food habits and healthy living* was held on 26th April 2014 at Panakarapitiya, Ratnapura. Dr. EPS Chandana of Department of Zoology, organized this programme with the help of a group of Level III students. Bandaranayake Memorial Ayurveda Research Institute (BMARI) funded the activity and a group of ayurvedic doctors from BMARI participated in the event. Ministry of Education and Ratnapura Provincial Council supported the event by selecting participants. Participants indicated that their knowledge was enriched and commended the university students, the staff and resource persons. Their feedback also indicated that the event eliminated their misconceptions towards university students. Vice Chancellor of University of Ruhuna, Director of Bandaranayake Memorial Research Institute, Maharagama, and Dean/Faculty of Science, University of Ruhuna have patronized the event.



Program on Water and Sanitation

First year students in BSc Green Technology Degree Program of the Faculty of Agriculture organized a programme for World Water Day-2014 on 18th February 2014 at MR/ Deniyaya Rajapaksha Maha Vidyalaya under the supervision of Department of Agricultural Engineering in collaboration with Sri Lanka Water Partnership, Nilwala Area Water Partnership and Net Water.

As people in Deniyaya area are lacking in proper sanitation practices Hepatitis is spreading in the area. The main objective of workshop was to make aware the students

under the theme of “Water & Sanitation” in Sinhala and Tamil medium. The Principal, Mr. Chandrathne Uyangoda, the Vice Principal Mr. S Rupasinghe, Prof. CM Nawarathne, Mrs. CP Rupasinghe, Mrs. Awanthi Mahanama from Department of Agricultural Engineering, members of the Local Government Authority, teachers and students of the schools attended this workshop.

This type of activity contributes to strengthen the student centered learning process of the undergraduate degree program of the University.



Orator of the Year Competition - 2014

Inter-Faculty *Orator of the Year* Competition was held on 2nd of April 2014 at the Faculty of Science Auditorium with the participation of Senior Prof. Gamini Senanayake, Vice Chancellor, University of Ruhuna, Dr. AMN Alagiyawanna, Deputy Vice Chancellor, University of Ruhuna, Deans, Academic staff and students. Mr. R Ragunathan, Consul General of the Indian High Commission, graced this occasion as the Chief Guest. The objective of this competition was to amplify oratory skills of the students while improving their knowledge and personalities. Financial assistance for the competition was provided by the Indian High Commission in Sri Lanka. The competition was held in Sinhala, English and Tamil mediums. Orations were focused on *Modernization and Environmental Sustainability*. Two students from the Faculty of Fisheries and Marine Sciences and Technology, Mr. Hettiarachchige Sachithra Amarin Hettiatatchchi and Ms. Anthony Romina, won Sinhala Medium and Tamil Medium Awards while a student from the Faculty of Agriculture, Ms. Walimuni Chamindri Sewanka Mendis Abeysekara, won the English medium Award.



3rd International Conference on Management and Economics – ICME 2014

3rd International Conference on Management and Economics was held on 26-27th February 2014 at the University of Ruhuna under the theme of *Reshaping Management and Economic Thinking Through Integrating*

Eco-friendly and Ethical Practices. The conference was organized by the Faculty of Management and Finance under the coordination of Dr. Manjula K Wanniarachchige. Senior Professor Gamini Senanayake, Vice Chancellor

as the Chief Guest, Dr. AMN Alagiyawanna, Deputy Vice Chancellor as the Guest of Honour graced the inauguration ceremony. Keynote speeches were delivered by Prof. Yasushi Suzuki, Japan; Prof. Arild Saether, Norway;

Prof. Hareendra Dissabandara, Sri Lanka; and Prof. Munim K Barai, Japan. Over 150 domestic and foreign scholars participated in the conference. Ten parallel sessions were held on 27th February 2014.



11th Academic Sessions and 10th Vice Chancellor's Awards Ceremony - 2014

11th Academic Sessions and 10th Vice Chancellor's Awards Ceremony was held on 19th March 2014 under the theme *Knowledge Sharing for Present and Future Needs* with the objective of creating a dialogue among scholars. The Academic Session consisted with an invited keynote speech, 13 parallel sessions and 6 poster sessions. Faculty of Management and Finance organized of this event under the coordinations of Dr. TSLW Gunawardana (Chairperson) and Prof. Dharma Rajapaksha

(Secretary). Inauguration was graced by Senior Professor Gamini Senanayake, Vice Chancellor, Dr. AMN Alagiyawanna, Deputy Vice Chancellor, Deans, Keynote Speaker, and other participants. The keynote speech was delivered by Prof. HD Karunaratne, Dean, Faculty of Management and Finance, University of Colombo and The oration was done by Dr. PMCS de Silva, Faculty of Science. Emirates professorships were awarded to Prof. D Atapattu, Prof. RN Pathirana, and Prof. C Pathirana.

The Vice Chancellor's Award for the Most Outstanding Scholar was awarded to Dr. P.M.C.S. De Silva. The Vice Chancellor's Award for the Most Outstanding Young

Researcher was awarded to Dr. G.H.M.J. Subashi. Joint applicants, Dr. AMN Alagiyawanna, Dr. NH Priyankara, and Dr. WKC Dayanthi won the Highest Recipient of Grants Award.



1st Ruhuna International Science and Technology Conference - RISTCON 2014

First Ruhuna International Science and Technology Conference (RISTCON 2014) was held on 22-23rd January 2014 (this is an upgrading of the Annual Science Symposium of the Faculty of Science to international status). The committee chaired by Dr. Madurani Edussuriya organized the conference. 260 participants were registered for the conference. Moving with the theme "Towards

trans-disciplinary Research Culture", four technical sessions were held with 59 oral and 62 poster presentations. It was remarkable that all public universities of Sri Lanka were among the participants in RISTCON 2014, in addition to other research organizations of the country. The keynote speech was delivered by Prof. SD Jackson of University of Glasgow. The Faculty dedicated the event to felicitate Senior

Prof. Ranjith N Pathirana also delivered an interesting for his invaluable service to the University for more than 30 years. Prof. Pathirana

also delivered an interesting and informative speech on medicinal chemistry.



International Symposium on Agriculture and Environment

International Symposium on Agricultural and Environment (ISAE-2013) was successfully held on 28th November 2013, Faculty of Agriculture. Prof. Kshanika Hirimburegama, Chairperson of the UGC participated as the Chief Guest. ISAE 2013 included Keynote speeches, and oral and poster sessions.



2nd International Symposium on Minor Fruits and Medicinal Plants

2nd Intl. Symposium on Minor Fruits & Medicinal Plants (ISMF & MP 2013) was held at the Faculty of Agriculture on 20th December 2013. Deshabandu Prof. Tuley de Silva, Vice Chancellor of Wayamba University participated as the Chief Guest. The symposium covered themes like Minor Fruits and Medicinal Plants; Crop Production and Protection, Production of Secondary Metabolites, and Biotechnology. 54 papers (incl. 30 international papers) were presented.



ACEPS-2013

International Symposium on Advances in Civil and Environmental Engineering Practices, for Sustainable Development (ACEPS-2013), was held on 27th September 2013 at the Faculty of Engineering with the participation of over 150 local and foreign delegates. Vice Chancellor, Senior Prof. Gamini Senanayake, participated as the Chief Guest of the opening ceremony. ACEPS-2013 was jointly organized by the Department of Civil and Environmental Engineering, University of

Ruhuna and the Department of Civil and Environmental Engineering, Saitama University to create a venue to discuss advanced sustainable engineering practices that are adopted in developing

the region. Three keynote speeches of leading academics from Saitama University and Toyama Prefectural University touched the important aspects of the symposium.



UCTIT Awards

Award for the test of Intermediate Level University Students' Competency Test of Information Technology (UCTIT) was received by WBMAC Bandara of Faculty of Agriculture, University of Ruhuna. Mr. WBMAC Bandara scored more than 90 marks.

Industry-Faculty Collaborations

Staff of the Faculty of Science, who volunteered to serve ITRCC (Industrial Training and Research Coordinating Center) activities, visited DSI (Pvt.) Ltd., Lucky Lanka Milk Processing Co. Ltd, Freelan Enterprises (Pvt.) Ltd., Harischandra Mills, Baff Polymers and Holcim Company (Pvt) Ltd. Participants have responded positively. About 25 students have been registered for projects under ITRCC in 2014.

Postgraduate Placements for Academics of FMST

Anushika Iroshani, Dept. of Oceanography and Marine Geology is to commence her PhD at the South China Sea Institute of Oceanology. Sakunthala Herath and Sanchala Darshani of Dept. of Fisheries and Aquaculture are to commence their PhDs at the Tokyo University of Fisheries and Marine Sciences. Kelum Sanjaya of Dept. of Limnology starts his PhD at Saitama University. Hashan Niroshana of Dept. of Oceanography and Marine Geology is to start his PhD at University of Brussels.



University of Ruhuna

Wellamadama

Matara, Sri Lanka. 81000

Phone: 94 (0)41 2222681/2

Fax: 94 (0)41 2227029

E-mail: pm@admin.ruh.ac.lk

Web: <http://www.ruh.ac.lk>

Available online at <http://www.ruh.ac.lk/pub/newsletter/>

To:

About UoR Highlights

Welcome to Vol. 3 No. 1 of UoR Highlights, the official newsletter of the University of Ruhuna.

We publish UoR Highlights biannually with the aim of fostering a dialog among our key stakeholders.

More specifically, the UoR Highlights publishes information on recent developments, events, research publications, conferences and collaborative research projects at the University of Ruhuna. In addition, in each

issue, we publish feature articles which address current topic in education and higher education.

Together with other publications at the University of Ruhuna, we believe that UoR Highlights will generate

interest among our stakeholders by creating a platform for fostering an effective dialogue.

We welcome your comments and suggestions that will enhance the future directions of UoR Highlights.

21st Convocation of the University of Ruhuna is scheduled to be held on 9th and 10th May 2014

Joint Effort to Survey Pigmy Blue Whales in the Indian Ocean Basin

In response to growing national and international concern, Faculty of Fisheries and Marine Sciences & Technology joined with Biosphere Foundation a non-profit organization in the United States, and *Raja & the Whales*, whale-watching vessel, to learn where the whales are distributed around the shipping lanes as well as south into the Indian Ocean. Additionally, marine mammal experts Russell Leaper, member of the International Whaling

Commission (IWC) and marine mammal scientists at the International Fund for Animal Welfare and Jonathan Gordon of St. Andrews University of UK have joined these efforts. Biosphere Foundation provided an Automatic Identification System (AIS) which can simultaneously tracking the locations of all large ships transiting east or west. This data provides baseline information about the distribution of marine mammals and ships along the southern coast.



Edited by

Professor Gamini Senanayake
Dr. AMN Alagiyawanna

Designed by

Dr. Manjula K Wanniarachchige

Coordinated by

Ms. KKNB Adikaram