

# S & T Book of Abstracts

## Titles

Schedule of Parallel Sessions / Venue: Y407

Schedule of Parallel Sessions / Venue: Y408

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Poster Presentations / Venue: Yuchengco Lobby

Oral Presentations

Adsorption Capacity of Kenaf Fibers (*Hibiscus cannabinus L.*) in Aqueous Lead Solution

Hydrotalcite Formation and Arsenic Immobilization during the Hydration of Coal Fly Ash mixed with MgO

A Survey of Indoor Air Quality Studies in the Philippines

A Decision Modeling Approach to Prioritize Remediation Options for Contaminated Sites

The Effect of Catalyst Preparation on the Surface Characteristics of Ni/MgO-ZrO<sub>2</sub>

Ni/MgO-ZrO<sub>2</sub> Catalyst for the Dry Reforming of Methane

Solvent Free Microwave Assisted Extraction of Corosolic Acid from Banaba (*Lagerstroemia speciosa*) Crude Extract

Ceramic Tile Wastes as Partial Substitution to Aggregates in Concrete Mix

Retrofitting of Steel Wide Flange Beams Using Exterior Post-Tensioning

Absorption of Atomic Hydrogen into Graphite via the Armchair Edge: A First Principles Study

A Distributed Manufacturing Approach On the Application of the Manufacturing Execution System

Development of Software Tool for Generation of Bill of Materials and Estimated Cost of a Telephone Wiring Design for Commercial Buildings

A Non-Contact Eye Infrared Thermal Imaging Sensor Device

FPGA-Based Built-In Self Test for a 4-bit BCD Adder

Small-scale Automated Biodiesel Production from *Jatropha Curcas* Using Microwave Assisted Extraction and Transesterification

Challenges and Issues Faced in the Product Development Process: A Comparison between Established and Start Up Firms

Fast Feedback in Physics Teaching

Teaching Research Ethics to Undergraduate Chemical Engineers: A Transformative Approach

How Do Education Students Learn Physics?

## **Titles**

Development and Validation of a Concept Test in Introductory Physics for Biology Students' Understanding of Forces: Similarities and Differences among Sixth Graders and Senior High Students

Aiding Students' Problem Solving Development in Physics through a Learning Module

Examining Conceptions and Attitude towards Climate Change

High School Chemistry Experiments:  
The Green Chemistry and Filipino Approach

Exploring Students' Alternative Conceptions on Genetics

A Metacognitive Approach to Students' Preconceptions Concerning Solving Linear Equations in One Variable

Developing Students' Skills and Attitudes towards Algebraic Expressions using Term Tiles: A Case Study

Use of Manipulatives to Develop Second Year High School Students' Understanding of Equality and Linear Equations

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Parasite Biodiversity in Philippine Domestic and Peripatetic Mammalian Species

Abundance, Biomass, and Primary Productivity of Middle Meadow Seagrasses in Talin Bay, Batangas

Distribution of coral species threatened with extinction Philippines

Correlation Study of Sound and Respiration Rate Signals with EEG (Electro encephalogram) Signal at Different Sleep Conditions

Detection of Human Blood Glucose Concentration Using Non-Invasive Technique

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Quantum Dynamics Study on the Incident Angle Dependence of H<sub>2</sub> Dissociative Adsorption on Defective Pt(III) Surface

Synthesis of a Pyrazinamide Analog of Salicylic Acid

The Effect of Dwell Time in the Fabrication of Gallium Nitride Nanomaterials

Fabrication and Characterization of Yttria-Stabilized Zirconia

Synthesis of TiO<sub>2</sub> Nanomaterials by Modified Horizontal Vapor Phase Growth Technique

Characterization of Silver Nanomaterials, Synthesized by the Horizontal Vapor Phase Crystal Growth Technique, for Antimicrobial Purposes

Assessing Information Technology Adoption in Philippine SMEs: Validating the Applicability of the Technology Adoption Model (TAM) for Selected SMEs

Community Based Disaster Management for Buklod Tao Inc: Capturing Indigenous Knowledge for Community Based Management Capacity

Online Collaboration in e-Participation

## Titles

Assessment on the Use of ICT in Monitoring Maternal Health in the Philippines

Legal Digest Management System

Extending Student Information Systems to the Mobile End for Empowering Stakeholders

Design of an Immersive 3D Self-Organizing Map

Neural Network Implementation on the Graphics Processing Unit using CUDA

Learning in Neural Networks with Decision Trees

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Critical Success Factors for a Successful Implementation

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(Mandarin oranges)

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A Framework for Effective Marketing Information Systems

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A Proposed Environmental Assessment Tool for Concrete Batching Plant

Synthesis and Characterization of  $\text{In}_2\text{O}_3$  Nanomaterials

Synthesis of  $\alpha\text{-Fe}_2\text{O}_3$  Nanomaterials on (100) Silicon Substrate

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Design, Implementation and Evaluation of UbD Learning Plan on Finding the Slope of a Line

Design, Implementation and Evaluation of UbD Learning Plan on Special products

Design, Implementation and Evaluation of UbD Learning Plan on Writing Linear Equation in Two Variables

Design, Implementation and Evaluation of UbD Learning Plan on Cartesian Coordinate Plane

Creating Knowledge for Change

A Rapid Assessment of the Ecological Status of the Sitio Pita Bayan-Bayanan Uplands and of the Adaptation and Environmental Practices of its *Eva Aetas*



### Schedule of Parallel Sessions

Venue: Y407

Moderators: **Dr. Joseph Auresenia / Dr. Josephine Borja / Ms. Mary Ann Adajar**

Theme	Time (P.M.)	Title	Author/s
<b>Environmental Engineering</b>	1:00 – 1:20	Adsorption Capacity of Kenaf Fibers ( <i>Hibiscus cannabinus L.</i> ) in Aqueous Lead Solution	<i>Katrina Go, Rominick Lee, Jan Benedict Yap, Florinda Bacani</i>
	1:20 – 1:40	Hydrotalcite Formation and Arsenic Immobilization during the Hydration of Coal Fly Ash mixed with MgO	<i>Einstine M. Opiso' Xiaoji Liu, Tsutomu Sato</i>
	1:40 – 2:00	A Survey of Indoor Air Quality Studies in the Philippines	<i>Manuel C. Belino, Efren G. Dela Cruz, Jonathan M. Anastacio, Hans Felix R. Bosshard</i>
	2:00 – 2:20	A Decision Modeling Approach to Prioritize Remediation Options for Contaminated Sites	<i>Michael Angelo B. Promentilla</i>
<b>Catalysis / Separation</b>	2:20 – 2:40	The Effect of Catalyst Preparation on the Surface Characteristics of Ni/MgO-ZrO <sub>2</sub>	<i>Louie C. Shieh, Teddy G. Monroy, Leonila C. Abella</i>
	2:40 – 3:00	Ni/MgO-ZrO <sub>2</sub> Catalyst for the Dry Reforming of Methane	<i>Teddy Monroy, Leonila Abella, Susan Gallardo, Hirofumi Hinode</i>
	3:00 – 3:20	Solvent Free Microwave Assisted Extraction of Corosolic Acid from Banaba ( <i>Lagerstroemia speciosa</i> ) Crude Extract	<i>Aldrich A. Huang, Harleen Moya U. Jao, Patrick Jerome Ngo, Marylou M. Uy</i>
<b>Materials</b>	3:20 – 3:40	Ceramic Tile Wastes as Partial Substitution to Aggregates in Concrete Mix	<i>Ronaldo S. Gallardo, Jason Maximino C. Ongpeng</i>
	3:40 – 4:00	Retrofitting of Steel Wide Flange Beams Using Exterior Post-Tensioning	<i>Bernardo A. Lejano, Patricia C. Diaz, David Joseph J. Vidad</i>
	4:00 – 4:20	Absorption of Atomic Hydrogen into Graphite via the Armchair Edge: A First Principles Study	<i>Nelson Arboleda Jr., Hideaki Kasai</i>

### Schedule of Parallel Sessions

Venue: Y408

Moderators: **Mr. Roberto Caguin / Mr. Miguel Gutierrez**

Theme	Time	Title	Author/s
<b>Information Technology</b>	1:00 – 1:20	A Distributed Manufacturing Approach On the Application of the Manufacturing Execution System	<i>Arthur Brian Chua, Ronaldo V. Polanco</i>
	1:20 – 1:40	Development of Software Tool for Generation of Bill of Materials and Estimated Cost of a Telephone Wiring Design for Commercial Buildings	<i>Christian Jeffrey D. Chavez, Christian Ted F. Dogino, Bryan P. Gonzaga, Joseph Conrad T. Lantican, Ann E. Dulay</i>
	1:40 – 2:00	A Non-Contact Eye Infrared Thermal Imaging Sensor Device	<i>Christian Cruz, Marvin Cruz, Calvin Feliciano, David Ong, Lysander Ong, Marlon Musngi, Harvey Uy</i>
<b>Electronics System</b>	2:00 – 2:20	FPGA-Based Built-In Self Test for a 4-bit BCD Adder	<i>Norwynn Marian B. Bergonio, Rafael F. Halili, Maris Mei P. Lim, Chelyne G. Santiago, Ann E. Dulay</i>
	2:20 – 2:40	Small-scale Automated Biodiesel Production from <i>Jatropha Curcas</i> Using Microwave Assisted Extraction and Transesterification	<i>Maria Camilla Gliane, Julius Ramje Ng, Mark Ryan To, Enrique Manzano</i>
<b>Business</b>	2:40 – 3:00	Challenges and Issues Faced in the Product Development Process: A Comparison between Established and Start Up Firms	<i>Emilina R. Sarreal</i>

## Schedule of Parallel Sessions

Venue: Y409

Moderators : Ms. Louise Custodio / Ms. Joanne Cassanova

Theme	Time	Title	Author/s
<b>Education</b>	1:00 – 1:20	Teaching Research Ethics to Undergraduate Chemical Engineers: A Transformative Approach	<i>Luis F. Razon</i>
	1:20 – 1:40	How Do Education Students Learn Physics?	<i>Voltaire Mallari Mistades</i>
	1:40 – 2:00	Development and Validation of a Concept Test in Introductory Physics for Biology	<i>Marie Paz E. Morales</i>
	2:00 – 2:20	Students' Understanding of Forces: Similarities and Differences among Sixth Graders and Senior High Students	<i>May Ronda, Lydia Roleda</i>
	2:20 – 2:40	Aiding Students' Problem Solving Development in Physics through a Learning Module	<i>Anne Sangalang, Katherine Munda</i>
	2:40 – 3:00	Examining Conceptions and Attitude towards Climate Change	<i>Charles Vincent P. Obdianela</i>
	3:00 – 3:20	High School Chemistry Experiments: The Green Chemistry and Filipino Approach	<i>Ronald Santos, Armando Guidote, Jr., Auxencia Limjap</i>
	3:20 – 3:40	Exploring Students' Alternative Conceptions on Genetics	<i>Ana Michelle Ricalde, Maricar Prudente</i>
	3:40 - 4:00	A Metacognitive Approach to Students' Preconceptions Concerning Solving Linear Equations in One Variable	<i>Esmeralda S. Bunag, Auxencia Limjap</i>
	4:00 – 4:20	Developing Students' Skills and Attitudes towards Algebraic Expressions using Term Tiles: A Case Study	<i>Marvin Jordan D. Koa, Shera Marie Pausang</i>
	4:20 – 4:40	Use of Manipulatives to Develop Second Year High School Students' Understanding of Equality and Linear Equations	<i>Melanie Rivera, Mary Grace Sinfuego, Adrian Paul Tudayan</i>
4:40 – 5:00	An overview of the Design, Implementation and Evaluation of UbD Learning Plans in Elementary Algebra in Selected Diocesan Schools in Zambales and Bataan	<i>SIGS BATCH 3, Minie Rose C. Lapinid, Auxencia A. Limjap</i>	

**Schedule of Parallel Sessions**  
**Venue: Y507**

**Moderators: Dr. Anthony Lee / Dr. Jose Tristan Reyes**

<b>Theme</b>	<b>Time</b>	<b>Title</b>	<b>Author/s</b>
<b>Biology</b>	1:00 – 1:20	Parasite Biodiversity in Philippine Domestic and Peripatetic Mammalian Species	<i>Florencia Claveria and Mary Jane Cruz-Flores</i>
	1:20 – 1:40	Abundance, Biomass, and Primary Productivity of Middle Meadow Seagrasses in Talin Bay, Batangas	<i>Michael A. Clores, Jose Santos Carandang IV</i>
	1:40 – 2:00	Distribution of coral species threatened with extinction Philippines	<i>W. Y. Licuanan, M Quibilan, C. Reboton PM. Alino.</i>
<b>Instrumentation</b>	2:00 – 2:20	Correlation Study of Sound and Respiration Rate Signals with EEG (Electro encephalogram) Signal at Different Sleep Conditions	<i>Abigail S. Barbosa, Robert Phoebus A. Carranza, Jr., Romeric F. Pobre</i>
	2:20 – 2:40	Detection of Human Blood Glucose Concentration Using Non-Invasive Technique	<i>Katherine C. Gaw, Jana Pamela Y. De Leon, Romeric F. Pobre</i>
	2:40 – 3:00	Fabrication and Preliminary Characterization of a pH sensor Based on Conducting Polypyrrole	<i>J. Empino, R. Sasaki, C. Manzano, E. Manzano, R. Quiroga</i>
<b>Statistics</b>	3:00 – 3:20	Redesign Considerations for the 2011 Philippine Master Sample Design for Household Surveys	<i>Arturo Y. Pacificador, Jr.</i>
	3:20 – 3:40	Exploring Latent Factors Using Non-Bayesian and Bayesian Factor Analysis	<i>Shirlee Ocampo, Rechel Arcilla, Frumecio Co, Ryan Jumangit, Felipe Jose Diokno</i>
	3:40 - 4:00	Characterization of the Philippine Stock Exchange Composite Index Behavior	<i>Cristina Mae Janairo, Robert Roleda</i>
	4:00 – 4:20	The Extensive Form Game of A Graph Coloring Problem on Paths	<i>Yvette Fajardo-Lim</i>

**Schedule of Parallel Sessions**  
**Venue: Y508**

**Moderators : Dr. Gil Nonato Santos / Dr. Eric Punzalan**

Theme	Time	Title	Author/s
<b>Materials</b>	1:00 – 1:20	Quantum Dynamics Study on the Incident Angle Dependence of H <sub>2</sub> Dissociative Adsorption on Defective Pt(III) Surface	<b>Michelle Natividad, Nelson Arboleda Jr., Hideaki Kasai</b>
	1:20 – 1:40	Synthesis of a Pyrazinamide Analog of Salicylic Acid	<i>Glenn Alea, Faith Marie G. Laguna, Michael Dominic M. Ajero</i>
	1:40 – 2:00	The Effect of Dwell Time in the Fabrication of Gallium Nitride Nanomaterials	<b>N. Alcantara, R. R. Anciado, G. Castillon, A. Ladines, R. de los Reyes, G. N. C. Santos, R. V. Quiroga</b>
	2:00 – 2:20	Fabrication and Characterization of Yttria-Stabilized Zirconia	<b>Rose Ann Tegio, Shirley Tiong Palisoc, Michelle Natividad, Simon Gerard Mendiola</b>
	2:20 – 2:40	Synthesis of TiO <sub>2</sub> Nanomaterials by Modified Horizontal Vapor Phase Growth Technique	<b>Abel Ole P. M. B. Abrasaldo, G. Castillon, A. Ladines, R. de los Reyes, G. N. C. Santos, R. V. Quiroga</b>
	2:40 – 3:00	Characterization of Silver Nanomaterials, Synthesized by the Horizontal Vapor Phase Crystal Growth Technique, for Antimicrobial Purposes	<b>Wilfred Espulgar, Gil Santos, Reuben Quiroga</b>

**Schedule of Parallel Sessions**

**Venue: Y509**

**Moderators: Ms. Ma. Victoria Pineda / Ms. Charibeth K. Cheng**

<b>Theme</b>	<b>Time</b>	<b>Title</b>	<b>Author/s</b>
<b>ICT 4D</b>	1:00 – 1:20	Assessing Information Technology Adoption in Philippine SMEs: Validating the Applicability of the Technology Adoption Model (TAM) for Selected SMEs	<b>Sherwin Ona,</b> <i>Ma. Theresa Cristobal</i>
	1:20 – 1:40	Community Based Disaster Management for Buklod Tao Inc: Capturing Indigenous Knowledge for Community Based Management Capacity	<b>Christine Mae Tavera,</b> <i>Janine Vincente Casa,</i> <i>Dennis Dominic Diego,</i> <i>Quino James Legaspi</i>
	1:40 – 2:00	Online Collaboration in e-Participation	<b>Estefanie Ulit</b>
	2:00 – 2:20	Assessment on the Use of ICT in Monitoring Maternal Health in the Philippines	<i>Mary Jane Arcilla, Sean Camille Agustin, Camille Bernardez, Megan Lourdes Panopio</i>
	2:20 – 2:40	Legal Digest Management System	<b>Mary Jane Arcilla,</b> <i>Corinne Ang,</i> <i>Nadia Cayco,</i> <i>Barbara Kates Francisco,</i> <i>Andrew Melliza</i>
	2:40 – 3:00	Extending Student Information Systems to the Mobile End for Empowering Stakeholders	<b>Marivic Tangkeko, Terry Lim,</b> <i>Karl Morano,</i> <i>Leonard Tan</i>
<b>Neural Network</b>	3:00 – 3:20	Design of an Immersive 3D Self-Organizing Map	<i>Arnulfo Azcarraga, Sean Manalili</i>
	3:20 – 3:40	Neural Network Implementation on the Graphics Processing Unit using CUDA	<i>Ma. Francesca Barcelona,</i> <i>Byron Joshua Bautista, Shaun Raphael Candano,</i> <i>Marie Katherine Tadios,</i> <b>Florante R. Salvador</b>
<b>Neural Network</b>	3:40 - 4:00	Learning in Neural Networks with Decision Trees	<b>Remedios de Dios Bulos,</b> <i>Robert Carag,</i> <i>Therese Seares,</i> <i>Fu Yuen So</i>
<b>Digital Processing</b>	4:00 – 4:20	An Investigation to Understand Collaboration between Software and Arts for Creative Artworks	<b>Kishore Kosuri</b>
	4:20 – 4:40	A Proposed Generic Controller for Robotic and Automation Courses	<b>Gregory Cu</b>

<b>Poster Presentations</b> <b><u>Venue: Yuchengco Lobby</u></b>	
<b>Title</b>	<b>Author/s</b>
Automated Banana Peeling Machine	<i>Diana Rose Chua, Joanna Dona, Mark Lester Kiong, Mariae Francesca Ramos, and Marlon Luis Musngi</i>
The Building Blocks to a Successful Project Knowledge Management (PKM)	<i>Patricia Rovie B. Quadra and Ronaldo V. Polancos</i>
Comparative Physicochemical Analyses of Regular and Civet Robusta Coffee	<i>Stephanie C. Chan and Emmanuel V. Garcia</i>
Customer Relationship Management (CRM): Critical Success Factors for a Successful Implementation	<i>Victor John M. Cantor and Ronaldo V. Polancos)</i>
Determination of Psoralens in <i>Citrofortunella reticulata</i> (Mandarin oranges)	<i>Anthea A. Puebla, Kim Timothy Cruz and Jaime Raul O. Janairo</i>
Environmental Strategies of Small and Medium-Sized Restaurants in Manila	<i>Maria Victoria P. Tibon</i>
A Framework for Effective Marketing Information Systems	<i>Emmanuel Francis E. Javier and Ronaldo V. Polancos</i>
Glucosinolates in Salad Greens	<i>Gabriella Vita Galvez, John Felinor Mateo and Marissa G. Noel</i>
Ownership and Use of ICT Gadgets and Preferences and Experiences in Online Learning Among the PeLS 2010 Annual Conference Participants	<i>Dennis L. Berino</i>
Preliminary THz-TDS Measurements of Polypyrrole with Varying M of Na (p-TS)	<i>Manzano, C., Manzano, R., Santos, G.N.C., Quiroga, R.</i>
A Proposed Environmental Assessment Tool for Concrete Batching Plant	<i>Ronaldo S. Gallardo and Engr, Jason Maximino C. Ongpeng</i>
Synthesis and Characterization of In <sub>2</sub> O <sub>3</sub> Nanomaterials	<i>Manzano, C., Manzano, R., Santos, G. N. C., Quiroga, R.</i>
Synthesis of $\alpha$ -Fe <sub>2</sub> O <sub>3</sub> Nanomaterials on (100) Silicon Substrate	<i>De Mesa Donna Marie, de los Reyes, R., Lim, T. D., Castillon, G., Ladines, A. Santos, G.N.C., Quiroga, R. V.</i>
Synthesis of Various Nanostructures Using Static Vapor-Phase Deposition	<i>Laurenzo Alba, Wei-Ching Lee, Gwen Castillon, Nikko P. Quevada</i>
Design, Implementation and Evaluation of a Learning Plan on First Degree Inequalities In One Variable Using the Understanding by Design Framework	<i>Roy C. Alegado Emilia Abay</i>
Design, Implementation and Evaluation of a Learning Plan on Slope Of A Line Using the Understanding by Design Framework	<i>Tomas C. Benitez, Jr Marianne C. Taguba Irish De Guzman</i>
Design, Implementation and Evaluation of a Learning Plan on Special Products Using the Understanding by Design Framework	<i>Jessan De Castro Helen Lopez</i>
Design, Implementation and Evaluation of a Learning Plan on Special Products Using the Understanding by Design Framework	<i>Jessan De Castro Helen Lopez</i>
Design, Implementation and Evaluation of a Learning Plan on Writing Linear Equation in Two Variables Using the Understanding by Design Framework	<i>Garry L. De Dios Joselito B. Mariano</i>

Design, Implementation and Evaluation of a Learning Plan on Cartesian Coordinate Plane Using the Understanding by Design Framework	<i>Richel R. Quinto Raymundo Elera Palma</i>
Creating Knowledge for Change	<i>The Philippine Society of JSPS Ronpaku Fellows</i>
A Rapid Assessment of the Ecological Status of the Sitio Pita Bayan-Bayanan Uplands and of the Adaptation and Environmental Practices of its Eva Aetas	<i>Chona Camille E. Vince Cruz</i>

# ORAL PRESENTATION

## Adsorption Capacity of Kenaf Fibers (*Hibiscus cannabinus* L.) in Aqueous Lead Solution

**Katrina Go, Rominick Lee, Jan Benedict Yap, Florinda Bacani\***

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**Keywords:** Adsorption Capacity, Lead, Kenaf, *Hibiscus cannabinus*, Marilao River

The Marilao River system has been considered to be one of the most polluted river systems in the Philippines. The pollution is caused by the increasing concentration of heavy metals caused by nearby industries. In the report of Greenpeace, one of these heavy metals in the water was lead, with an alarming concentration of 190 ppm found in the discharge outlets of some of the lead recyclers in the area.

This study delved into the potential and effectiveness of Kenaf fibers to be used as an adsorbent on a simulated aqueous solution of lead nitrate. In determining the adsorbent loading for maximum removal, varying weights of the adsorbent were investigated in varying contact time at a constant concentration of 190 ppm and a volume of 100 mL. The adsorbent loading at maximum removal occurred at 7.5 grams and the contact time to reach equilibrium was 3 hours; these data will be used for the succeeding experimentations. At pH of 2.2, 3 hours, 190 ppm initial concentration and 7.5 grams of adsorbent loading it was observed that a maximum removal of 40.9149% was achieved. To further obtain the effectiveness of Kenaf fibers at pH of optimal removal as discussed by the different studies, removal of lead was tested at 7.5 grams, 3 hours, pH of  $5.2 \pm 0.25$ , 100 mL volume of solution. The percentage removal were observed to increase with decreasing concentration, and at a higher level of pH, higher percent removal was achieved up to 92.70975% and 92.28862% for 160 and 130 ppm initial concentration, respectively. The Freundlich isotherm was more favorable at pH of  $5.2 \pm 0.25$  which gave an  $R^2$  value of 0.9697 compared to Langmuir isotherm which gave an  $R^2$  value of 0.6383.

At pH of  $6.7 \pm 0.15$  based on the data of Marilao River for the 2nd Quarter of 2008 was also studied which obtained a higher percentage removal to as high as 98.2634% for 130 ppm initial concentration. Similar trend of decreasing concentration with increasing percentage removal was observed. The Langmuir isotherm was more favorable at pH of  $6.7 \pm 0.15$  which gave an  $R^2$  value of 0.9969 in comparison to Freundlich isotherm which gave an  $R^2$  value of 0.9508.

# Hydroxalite Formation and Arsenic Immobilization during the Hydration of Coal Fly Ash Mixed with MgO

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**Keywords:** Arsenic, Alkaline Materials, Hydroxalite, Fly Ash, MgO

Alkaline waste materials such as coal fly ash are widely recycled as construction materials to meet the zero emission requirements of power utilities fueled by coal. However, this material is currently not utilized in the Philippines since it could be a potential source of hazardous anions such as arsenic when subject to hydration and weathering. Hence, the need to develop a novel technology in limiting the leachability of toxic elements is necessary. Hydroxalite is known for its anionic retention ability due to its positive surface charge characteristics. This mineral can form easily at alkaline condition and stable in a wide range of pH. Hence, the need to investigate the generation of hydroxalite as major sorbing solids for anions during the use and disposal of coal fly ash can be considered. In this context, this study focused in controlling the chemical composition of coal fly ash to induce hydroxalite formation in order to minimize arsenate leachability. Different combinations of MgO with CFA were prepared based on the initial Mg, Al concentration of the original source material in order to control hydroxalite precipitation. The samples were hydrated at 50°C using deionized (DI) water with some samples were doped with 10 ppm arsenic concentration and reacted for 1 or 2 weeks. Arsenic leaching experiments were carried out using 1M HCl and DI water as standard in order to check if the leachability of arsenic pass the environmental regulatory requirements for arsenic mobility in sediments. The results showed that significant decrease in the amount of leached arsenic from CFA after MgO addition was observed. The formation of secondary hydroxalite phases after hydration experiments could possibly account for this arsenic immobilization. Therefore, this study has demonstrated that by controlling the chemical composition of CFA to induce hydroxalite precipitation, the leachability of arsenic can be minimized.

## A Survey of Indoor Air Quality Studies in the Philippines

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**Keywords:** Biological Contaminants, Chemical Contaminants, Indoor Air Quality

Indoor air quality (IAQ) studies in the Philippines are relatively new especially as a field of research in universities. This paper presents a survey of IAQ studies and related research works done in academic institutions, industry and government institutions over the last seven years. These studies cover a quite wide range of topics which include: interior air quality studies of surface transportation done in air-conditioned urban buses, taxicabs, light rail transit, and ship cabins; indoor air quality investigation of air-conditioned spaces in institutional buildings such as libraries, laboratories, classrooms and cafeterias, and indoor air quality investigation of commercial buildings such as shopping malls, offices and entertainment spaces. Design of IAQ monitoring laboratory and measuring apparatus as well as air-conditioning equipment and system was also done. Most of these studies have been undertaken as undergraduate thesis projects of the mechanical engineering students of Mapua Institute of Technology and De La Salle University.

In these studies, the contaminants investigated included chemical contaminants, biological contaminants and particulate matter. The assessment of biological contaminants was done by sedimentation test with the use of biostage impactor and tryptic soy agar as the medium. The medium was prepared in laboratory 2-3 days before sampling. The sampling apparatus was placed at various points of the air-conditioned space to be consistent with the protocol that was followed by different IAQ groups. The samples were placed inside an incubation chamber operating at temperatures between 34.1 0C- 35.1 0C for 24 hours.

For the IAQ studies on surface transportation, it can be seen that for urban buses and ship cabins the determined level of concentration of biological contaminants is not acceptable. However, for taxicabs the percentage number of units with acceptable level of biological contaminants is much higher compared to the non-acceptable. For the LRT, the results show 50-50% acceptable and non-acceptable level of concentration. For both the institutional and commercial buildings considered in this survey, the levels of concentration of the biological contaminants are generally acceptable.

Over-all, the studies that have been done are a good start to pave the way to a more advanced and sophisticated study of airborne bacteria as they affect the quality of conditioned air which ultimately lead to a healthy and safe indoor environment.

## **A Decision Modeling Approach to Prioritize Remediation Options for Contaminated Sites**

**Michael Angelo B. Promentilla**

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**Keywords:** Contaminated Sites, Analytic Network Process, Landfill

The management of contaminated sites is a universal problem not only among industrialized countries but also in the developing countries as well. The selection of an appropriate countermeasure is inevitably a balancing act of many diverse factors such as social, economic, political, legal, and technological issues. This requires making decisions while considering the scientific evidences along with the multi-faceted, value-laden input from many different stakeholders of different priorities and objectives. This study proposes a multiple criteria decision making (MCDM) method to assist decision makers in the prioritization of remediation options of contaminated sites. A strongly connected hierarchical network was used to adequately represent the decision structure. The prioritization method based on hierarchical network provides a more robust but flexible approach to measure the overall priorities of remediation options while capturing the complex interactions in the decision structure and quantifying the value judgment of decision makers. The prioritization technique was based on the supermatrix approach of the Analytic Network Process (ANP). An illustrative example is presented to elucidate the process, as being applied to the evaluation of a contaminated site caused by uncontrolled landfill. In this case study, three options were considered namely 1) complete removal of waste from the site, and off-site treatment and disposal of the excavated waste, and in-situ remediation of the surrounding area; in-situ remediation of the site and the surrounding area, plume control by capping and pump-and-treatment method; and 3) In-situ remediation of the site and the surrounding area, plume control by capping and vertical cut-off wall. Using the proposed decision model, the third alternative was found to be the most preferred alternative.

## **The Effect of Catalyst Preparation on the Surface Characteristics of Ni/MgO-ZrO<sub>2</sub>**

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**Keywords:** Pechini Sol-gel, Co-precipitation, Catalyst Preparation, Crystalline Structure

Methane dry reforming is a process by which carbon dioxide and methane are converted into syngas, carbon monoxide and hydrogen. Nickel-based catalysts are found to be suitable and cheap catalysts for this process. However, nickel-based catalysts are prone to carbon deposition, which lead to catalyst deactivation. One way to inhibit carbon deposition on the catalyst is by the method of catalyst preparation.

This study investigated on the effect of catalyst preparation on its surface characteristics of Ni/MgO-ZrO<sub>2</sub> catalyst prepared by the co-precipitation (CP) and Pechini sol-gel (PCH) preparation methods. The catalysts were characterized using the BET, SEM-EDX and TEM, XRD, and AAS, to measure the surface area, pore size, and pore volume, the surface morphology and surface elemental composition, the crystal structure, and total nickel content of the prepared catalysts, respectively. BET results revealed that the surface area, pore volume, and pore size were very similar for both catalysts. EDX results showed that the surface nickel content of the CP catalyst was 51.15% by mass while the PCH catalyst was 23.75% by mass. However, the AAS results revealed a close concentration of nickel for the two catalysts. TEM images revealed that some of the nickel particles were encapsulated by the support of the PCH catalyst due to the simultaneous synthesis of nickel, magnesia, and zirconia in the sol-gel method of preparation. The XRD patterns of both catalysts revealed the presence of a NiO-MgO solid solution, as well as a large difference in the crystalline phase of ZrO<sub>2</sub> between the two catalysts. The PCH catalyst was found to have 37.35% tetragonal ZrO<sub>2</sub> while the CP catalyst was found to have 88.12% tetragonal ZrO<sub>2</sub>, the remaining being m-ZrO<sub>2</sub>. This is due to the oxidation of the carbon species of the polymeric gel of the PCH catalyst during calcination, which caused an increase in the rate of crystallization.

Based on the results obtained and its theoretical implications on the catalytic activity of the catalysts, the CP catalyst would give better catalytic activity for methane dry reforming since the surface nickel content is higher and it has more t-ZrO<sub>2</sub>.

## Ni/MgO-ZrO<sub>2</sub> Catalyst for the Dry Reforming of Methane

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**Keywords:** Methane, Dry Reforming, Catalysis, Impregnation

The catalytic dry reforming of methane is considered as one of the primary routes in the conversion of methane to synthesis gas H<sub>2</sub> and CO. The reaction involves the reaction of methane with carbon dioxide in the presence of a catalyst. The catalysts used are often composed of a transition metal like nickel, supported on metallic and non-metallic oxides such as alumina and silica. In the industry, methane dry reforming is not yet widely used because of the problem of rapid catalyst deactivation due to excessive carbon deposition. A number of side reactions that simultaneously occur with methane dry reforming cause carbon deposits to block the catalyst active sites, in fact, more rampant at relatively low reaction temperatures. Past researches have discovered that the use of noble metals like platinum have actually reduced the amount of carbon deposits through time. However, use of these metals causes the catalyst to be several times more expensive. Several researches have also shown that the use of appropriate support materials can also minimize the rate of carbon deposition. This study focuses on the use of Ni/MgO-ZrO<sub>2</sub> as catalyst for the dry reforming of methane.

Magnesia was chosen as the support material because of the innate basicity of its surface and its crystal structure that leads to smaller and more dispersed nickel ensemble sizes on the catalyst surface. On the other hand, zirconia was added as a promoter to provide mobile oxygen species that helps in minimizing the rate of carbon deposition. Zirconia-promoted nickel-on-magnesia (Ni/MgO-ZrO<sub>2</sub>) catalysts were prepared by the wetness incipient method. 5, 10, and 15 wt% nickel was impregnated on a 1:1 mole ratio of MgO-ZrO<sub>2</sub> mixture, using a Ni(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O solution as precursor. The catalysts were dried at 40°C for 24 hours, 120°C for four hours and calcined in air at 800°C for another four hours. They were then pelletized, crushed, and screened to produce catalyst particle sizes ranging from 0.0165 to 0.0331 inch (- 20 to + 40 mesh). Finally, the catalysts were reduced at 500°C by a stream of 20/80 H<sub>2</sub>/He flowing at 100 ml/min. After the reduction step, that catalysts were characterized using the Atomic Absorption Spectroscopy for nickel content, Quantachrome Autosorb for surface area, pore volume, and particle size distribution, X-ray Diffractometer for crystal structure, Temperature Programmed Desorption Experiment for number of active and basic sites, Scanning Electron Microscopy for surface morphology, and Transmission Electron Microscopy for detailed chemical identity and crystal orientation. The prepared catalysts were then subjected to methane dry reforming at 800°C under a stream of 10/10/80 CH<sub>4</sub>, CO<sub>2</sub>, He at 100 ml/min for at least 20 hours.

## **Solvent Free Microwave Assisted Extraction of Corosolic Acid from Banaba (*Lagerstroemia speciosa*) Crude Extract**

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**Keywords:** Banaba, Solvent Free Microwave Assisted Extraction, Corosolic Acid, Yield of Extract, Yield of Corosolic Acid

*Lagerstroemia speciosa* (Banaba) crude extract was obtained from the plant's fresh leaves, one-week air dried leaves and naturally dried fruits using solvent-free Microwave-assisted extraction (SFME), and its corosolic acid content was determined using high performance liquid chromatography (HPLC).

Conditions such as drying time, extraction time, microwave power and temperature were varied and the best conditions that gave the highest yield in the crude extract and corosolic acid content were identified. Fresh leaves showed the highest yield at 170<sup>0</sup>C, a power of 600W and extraction time of 40 minutes. However, it was the fruit samples at 400W and 85<sup>0</sup>C that gave a high yield in corosolic acid equivalent to 2.65%. It was noted that for leaves samples, the yield increases with temperature and power at longer extraction time. Moreover, high corosolic acid content was registered at a power of 900W, with extraction time of one hour and 150<sup>0</sup>C temperature.

## **Ceramic Tile Wastes as Partial Substitution to Aggregates in Concrete Mix**

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**Keywords:** Concrete, Tiles, Wastes, Aggregates

This research evaluates the possibility of using ceramic tiles; wastes as a substitute on the coarse aggregate of normal strength concrete. In order to its viability, the researchers designed mixtures with 25%, 50%, 75% and 100% substitution of ceramic tiles' wastes. The resulting cylindrical specimens would then be compared to control specimens via compressive strength tests. Through this, the researchers were able to determine which percent substitution yields the highest compressive strength.

The compressive strength tests show that the samples with 25% and 50% substitution, along with the control specimen, exceeded the target strength of 15 MPa. The tests show that the samples of the traditional mix had the highest average compressive strength, followed by the 25%, 50%, 75% and 100% group. However, when statistical analysis was performed on the control specimens and the samples with 25% of tiles as coarse aggregates, it was discovered that at a 90% confidence level. This proves that the wastes generated in the tile industry can be used as a partial substitution to aggregates in producing concrete mixes.

## **Retrofitting of Steel Wide Flange Beams Using Exterior Post-Tensioning**

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**Keywords:** Exterior Post Tensioning, Retrofitting, Wide Flange Beam, Steel Structures, Deflected Beam

Structural steel beams under excessive load may not only be damaged, but deform significantly when subjected to heavy loads over a certain span of time. It could deflect and permanently deform. In this study, a retrofitting technique is developed particularly intended to address problems of steel beams that has excessively deflected. The proposed retrofitting technique is a simplified technique of Exterior Post-Tensioning (EPT) that enables a structural steel beam to be retrofitted after it has reached conditions beyond its elastic range. Unlike the conventional way of using hydraulic jack to prestress the tendon, the proposed EPT is done by simply tightening a turnbuckle connected to the tendon. This makes the technique very simple, inexpensive and not requiring specialized apparatus and machines. The applicability of the proposed EPT was validated by retrofitting steel wide flange beam specimens that were deflected beyond the elastic limit. Experimental tests were also conducted to determine the performance of the steel wide flange beams with the proposed EPT as compared to beams without EPT. Analyses of data through graphs and tables are presented and the effectiveness of the proposed exterior post-tensioning was measured. The EPT was analysed according to its consistency, serviceability, and load capacity. Data show that the EPT was able to compensate the weakness of the beam due to excessive loads. Results show that EPT can be applied again and again with no significant change in its effectiveness. Furthermore, in observance of its serviceability, the beam with applied EPT was able to exceed the original strength of the beam. Also, it is significant to note that the load carrying capacity of the beam with EPT increased.

## **Absorption of Atomic Hydrogen into Graphite via the Armchair Edge: A First Principles Study**

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**Keywords:** Nanomaterials, Carbon, Graphite, Reaction Path,  
Fuel Cell

We investigate the absorption behaviors of atomic hydrogen (H) incident on graphite via the armchair edge. DFT-based total energy calculations performed show the existence of a reaction path where H can enter the region between graphite sheets. A strong trap for H atom exists just above the surface C atoms, which strongly suggests that H termination of the edge C atoms' dangling bonds most likely will occur during absorption. Beyond the surface, the negative potential energy along the reaction path fluctuates and seems to approach zero, which indicates that H absorption deeper into the subsurface becomes more difficult without reconstruction. During absorption, H stays near one of the graphite sheets. H motion parallel to a C row is also observed, while interlayer hopping is most unlikely to occur. Also, the barrier to H desorption between rows is always less than that to absorption.

# **A Distributed Control Systems Approach on the Application of the Manufacturing Execution System on a Distributed Manufacturing Network**

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**Keywords:** MES, Multi-Agent Systems, Distributed Manufacturing

Industries today face intense competition, where at the forefront of these challenges is to maintain the capability and capacity to respond to rapid and dynamic customer demands. This paper shall explore an integration of systems that bridges the gap between the enterprise and shop floor levels with intelligent decision-making entities for distributed manufacturing environments which would allow for a highly responsive manufacturing system.

## **Development of Software Tool for Generation of Bill of Materials and Estimated Cost of a Telephone Wiring Design for Commercial Buildings**

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**Keywords:** Telephone Wiring Design, GUI, BICS, MDF, Telephone Bill of Materials

Building layouts and design of telephone wiring system of infrastructures are prepared by architects, electrical engineers and electronics engineers. The design and layout can be prepared manually using drawing boards, technical pens, rulers and other drawing materials or they can be generated using computer-aided design (CAD) tool. Nonetheless, as of this writing, there is no computer tool yet that generates the bill of materials automatically. This project aims at developing a tool that can generate the bill of materials automatically given a telephone wiring design or building layout. The wiring design is based on the BICS standard (Building Industry Consulting Service) unless the owner of the building specifies his own specifications as to the number of lines per floor and the number of risers for the whole building. The software is developed using Visual Basic, Microsoft Visio, and Microsoft Excel. The tool is evaluated using two building layouts. The designs developed in the tool are submitted to an experienced building telephone system plan designer for evaluation. The human designer certified the correctness and conformity of the design of the tool to the standard.

## **A Non-Contact Eye Infrared Thermal Imaging Sensor Device**

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**Keywords:**      **Infrared Thermal Imaging, Eye Thermometer**

Inflammation of the human eye could cause blindness. Doctors have a hypothesis where in inflammation is directly proportional to its temperature. The more inflammation a person has in the eye the higher the temperature is. As of today Ophthalmologists do not have quantitative data to determine how much inflammation an eye has. Doctors depend on the estimation process where in they flash a beam of light into the eye and count the white blood cells. The method is not sufficient for the doctors to determine the level of inflammation thus the right amount of medication is approximated. Through the advancement of infrared technology, temperature could be obtained in a non-contact, non-invasive and non-destructive method. Every object emits radiation called infrared energy; this infrared energy could be measured without contact. Sensors are primarily use to detect infrared energy. By using the concept of imaging system, it enables an image to be captured at a certain position. One of the most common ways of capturing an image is through a use of a webcam. With the combined knowledge in infrared technology and imaging system brought the concept of Non- Contact Eye Infrared Thermal Imaging Sensor Device. The device is proved to be a reliable way of determining the temperature of the eye with quantitative results needed by the doctors.

## **FPGA-Based Built-In Self Test for a 4-bit BCD Adder**

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**Keywords:**      **BIST, FPGA, Built-In Self-Test, Stuck-At-Fault, Scan Chain, CUT, DFT**

Testing of integrated circuits (aka chip or ICs) is one crucial and vital piece of procedure being carried out before the ICs are sent to the market. As the size of the chip becomes enormously large, and so does testing. Typically, digital chips are tested using an automated test equipment (ATE). However, the large size of the chip makes it impossible to test the inner nodes without unrealistically increasing the number of external pins. The remedy to this problem is to insert a circuit within the chip which would allow testing of the internal nodes. This circuit is known as built-in-self-test (BIST) and is a standard developed by IEEE. This standard is not relatively new. However, topics like this are not covered in the regular courses especially in the undergraduate program of the ECE Department. The purpose of this study is to demonstrate using an FPGA how a BIST is developed. The circuit under test (CUT) is a 4-bit BCD adder. The BIST can detect stuck at faults and bridging faults. The faults detected are stuck-at-zero and stuck-at-one and bridge faults (shorts). The 4-bit adder with bridge faults cannot be implemented within the FPGA since forcing two pins to short is a design rule violation in FPGA. An external 2-bit adder circuit is instead constructed for demonstrating testing of bridging faults. Basically, the VHDL code used to test the stuck-at-faults is also used to test the bridging fault. A look up table is provided for both the stuck-at-fault and bridging fault tests to determine the type and the location of the error. The stuck-at-fault system detects the errors per node and it can detect varying faults from all nodes simultaneously. All stuck-at-one and stuck-at-zero faults were detected. The bridging fault can detect errors at the input level but detects only one error at a time.

## **Small-Scale Automated Biodiesel Production from *Jatropha curcas* using Microwave-Assisted Extraction and Transesterification**

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**Keywords:** Control Systems, Biofuels, *Jatropha*, Microwave-Assisted Extraction

The world of biodiesel industry has continually sought for “out of the box” solutions to the ever-growing demand for alternative fuels. The Philippines who take part in this search has invested research in the use of expellers to extract biodiesel from *Jatropha* seeds. Research has already been done and has proved that Microwave-Assisted Extraction (MAE) or microwave-assisted extraction can extract at a higher efficiency than expellers. To keep up with the pace of continuous research, this study has shown the possible use of automation to industrialize the extraction from *Jatropha* seeds by means of MAE. A microcontroller application board was used to act as the heart of the system which stores the program and controls the other devices. Altogether, the incorporation of relays, solenoids, and a thermocouple made possible the automation of the manual MAE process of extraction. The prototype was able to obtain an extraction efficiency of 80.14%.

## **Challenges and Issues Faced in the Product Development Process: A Comparison Between Established and Start Up Firms**

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**Keywords:** New Product Development, Creativity, Technology Development, Innovation, Product Failures

This paper explored as its main problem the similarities and differences in terms of challenges (Chandra & Neelankavil, 2008) faced by established and reputable firms and start up businesses in developing countries using the basic product development process of Crawford and di Benedetto (2008).

Similar challenges faced by these groups of firms include technology development issues due to lack of equipment needed to produce new products, and creativity concerns. In Balasbas, Dy, Tan and Te (2010), technology can be linked to creativity which made some overwhelming ideas impossible to bring to realization because technology to develop it is not readily available. Just as the established, reputable firms are concerned with not thoroughly screening the product ideas during idea generation and inception stage, start up firms of the entrepreneurship program also encounter such uncertainty no matter how straightforward their ideas are in relation to the rules set by the program.

Completely overlooked issues by both groups are price income levels and capital constraints which highly contribute to product failure. This can be attributed to both groups' fixation to implementing reduced time to market as well as first to market. Additional risk to this includes the common strategies among firms in developing countries of using adaptive product and imitation. Potential solutions include adjustments in the product and setting them aside until technology becomes available, testing the product further along the product development process, and reviewing the courses of action taken using factors that influence the product development process.

## **Fast Feedback in Physics Teaching**

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### **Keywords:**

Fast feedback: Diagnosis of conceptual problems and feedback in "real time" in the classroom, is that possible in Philippine classes of 40 - 70 students? Through the use of graphical methods (graphs, sketches, force diagrams, optics ray diagrams, reaction equations, etc.) it is possible to assess answers and misconceptions of a representative sample of students in some 10 seconds. The teacher can provide quick individual or plenary feedback and progress of students becomes very visible when applying this method step-by-step in concrete activities such as kinematics graphs or force diagrams. In the Netherlands we even used the methods to teach application of conservation laws to reactions of elementary particles. The seminar will describe and model the method. Written examples are available as pdf.

## **Teaching Research Ethics to Undergraduate Chemical Engineers: A Transformative Approach**

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**Keywords:** **Transformative Learning, Undergraduate Research, Research Ethics, Methods of Research, Student-Centered Learning**

One of the requirements for the Bachelor of Science in Chemical Engineering is a thesis which has grown from simple projects recreating previous results to complex research problems whose results are often published in research journals. A need has arisen to enhance the understanding of undergraduates of potential ethical issues and dilemmas encountered in the conduct of scientific research. An invaluable tool has been the document "On Being a Scientist: Responsible Conduct in Research", published by the Committee on Science, Engineering and Public Policy of the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine of the United States. Case studies from this publication dwell on a wide variety of topics: selection of data; industrial sponsorship of academic research; publication practices and authorship; plagiarism among others. Over the past 8 years, the approach has evolved from a straight lecture with occasional questions and answers to a primarily student-facilitated discussion. In the latter approach, a pre-class meeting is held with the student facilitators wherein the following are shared: (1) the true ethical issues in the case; (2) approaches to motivating the students to share their thoughts and (3) tips in leading an effective group discussion. A reaction paper is required from the rest of the class after the case discussion. Student discussion was found to be most spontaneous when the instructor has kept to the background during the actual case discussion. There has been only one formal evaluation by the Institutional Testing and Evaluation Office (ITEO) of this class and this was done during the earlier years of the approach. Results from this evaluation were outstanding. Student feedback indicates that the students greatly appreciated the opportunity to discuss real-life issues and that the approach has provided an eye-opening experience for many students to realize that there may be ethical issues in situations where none may seem to exist.

## **How do Education Students Learn Physics?**

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**Keywords:** Attitudes, Beliefs, Introductory Physics, Learning

Research in physics education has identified students' attitudes and beliefs that contribute to higher gains in learning. The study investigates the extent of change in Education majors' attitudes, beliefs, and cognitive expectations after going through an Introductory Physics course. Using the Maryland Physics Expectations (MPEX) Survey and the Colorado Learning Attitudes about Science Survey (CLASS), the students' responses are compared with the responses of 'life-long learners of Physics'. In the MPEX, the students' post-instruction responses reflected high agreement with the experts' response in the Concepts, Effort Link, Reality Link, and Math Link dimensions of the survey. The students posted high agreement with experts' beliefs in the CLASS categories relating to Personal Interest, Real World Connections, Sense Making / Effort, and Problem Solving (Confidence). The relationship between the attitudes, beliefs, and cognitive expectations they held and their academic performance is also presented. The results of the correlation analysis reveal that providing opportunities for students to make sense of the information given to them leads to a deeper appreciation and interest in the subject matter and allows them to connect their real-world experiences with concepts and ideas learned in their physics class. Meaningful learning in a physics class is achieved when students are able to make sense of the information given to them, leading them to exert the effort required of them. This eventually empowers them to create connections and relationships among and between the ideas they learned.

## **Development and Validation of a Concept Test in Introductory Physics for Biology**

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**Keywords:** Misconception test, Assessment tool, Physics for Biology, Concept Test, Validity

The study is focused on the development and validation of a concept test in Introductory Physics for Biology students as a diagnostics tool, misconception test, formative assessment tool and a summative test. Its final form is a 55-item multiple-choice concept test in Introductory Physics for Biology on which each item is preceded by four (4) choices where one of these 4 served as the correct answer while the rest of the choices are considered the distracters. This was originally developed as a 67 -item multiple choice concept test in Introductory Physics for Biology covering all the topics specified in the syllabus of the said course offered at the Philippine Normal University. Classical test item analysis and validation was conducted to establish the test validity while the item reliability was done using the Cronbach – alpha and compared with KR21. Analysis of the distracters was also done to determine the physics misconceptions that can be diagnosed by the said instrument. This misconception diagnostic capability of this test is a feature which can be of help to physics teachers for better concept attainment of students.

## **Students' Understanding of Forces: Similarities and Differences among Sixth Graders and Senior High Students**

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**Keywords:**        **Conceptions, Force and Motion, Watt's Framework**

This study identified the sixth graders and senior high school students' conceptions of force. Alternative conceptions were categorized according to Watts's framework. Aside from noting the similarities and differences in the conceptions between the groups, this study sought to find out if students of varying abilities use different models in explaining the same phenomena. The two groups of respondents of this study were 15 sixth grade and 15 senior high school students from a public school in Quezon City. They were of varying scholastic abilities as gauged from their academic grades in the previous year. Initial results showed that, within the same group, there was no remarkable difference in the understanding of the students with regard to force with the exception of conception on gravity. In situations depicting motion, most students from both levels, view force as a requirement to cause and maintain motion. Also, in situations involving a person, students from both levels view the person as the agent of force.

## **Aiding Students' Problem Solving Development in Physics by Learning Translation of Different Modes of Representation through a Learning Module**

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**Keywords:**        **Problem Solving, Translation, Problem Solving in Physics, Learning through a Module**

This research paper focuses on investigating the progress experienced by students from learning 'Translation'. As cited by Moore in 2003 there are four major modes of representation which includes: Pictorial Representation, Conceptual Representation, Mathematical Representation, Checking and Evaluation. These four modes are most essential in the problem solving process. A total of ten randomly selected students participated in this study where the entries that they had in the different representations and in different problems were qualitatively analyzed through a rubric. These entries were problems that the students selected from the module.

## Examining Conceptions and Attitude towards Climate Change

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**Keywords:** Climate change, Conception, Attitude, Students, Education

The purpose of this paper is to examine the conceptions and attitudes of students towards climate change. Descriptive research design was used for this study. The study surveyed the level of conceptions and attitudes and thereby assessed the conceptual understanding of 2nd year high school students ( $n = 71$ ) from Paco Catholic School using Perceptions on Climate Change Survey and Climate Change Concept Test (CCCT). The results of the study showed that, generally, the participants were aware of climate change and its negative implication. They expressed concern of what climate change may cause to living things but revealed hesitation to take action. It was also found that the students have low scientific understanding ( $\bar{X}=8.1$ ) of the mechanism of climate change. Moreover, results suggest that students are influenced by their understanding. The four factors of Attitude are correlated with three factors of Conception, belief – concern ( $r = 0.60$ ) and consequence – concern ( $r = 0.66$ ) were moderately correlated,  $p < .05$ . In addition, the CCCT and surveys on attitude and perception were correlated, and yielded a low correlation.

### High School Chemistry Experiments: The Green Chemistry and Filipino Approach

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**Keywords:** High School Chemistry Experiments, Green Chemistry, Filipino Enculturation of Chemistry, Practical Work, Chemistry Education in the Philippines

This paper is a call for teachers to initiate measures in improving the quality of high school science education in the Philippines and that is by going back to practical laboratory work- the most effective method of teaching science.

While there may be constraints in using practical work as a teaching tool, high school teachers through their creativity may design experiments that are cost-efficient yet of high pedagogical value. Experiments that are designed carefully leading to the understanding not only of chemical concepts but of their implications in the student's life.

The five experiments which are presented in the paper are proofs to the possibility of tailor-made experiments that integrate principles of green chemistry – the growing and evolving philosophy of responsible stewardship in the context of doing chemistry. Integrating green chemistry concepts in the design of high school chemistry experiments makes students aware of the responsibility that goes with the use and production of chemicals.

Moreover, the experiments were designed to consciously integrate aspects of Filipino culture, values, and traditions. Such enculturation of chemistry by giving it a Filipino flavor makes the students own the science and not view it as something that is highly foreign. When students can relate to the chemical concepts illuminated in their culture they become more appreciative and receptive of the science giving them meaningful and lasting learning.

## Exploring High School Biology Students' Alternative Conceptions on Genetics

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**Keywords:** Genetics Concepts, Alternative Conceptions, High School Biology, Problem Solving Strategies, Conceptual Understanding

The study explored 100 high school biology students' alternative conceptions on genetics. The main instrument utilized to identify students' conceptions involved a researcher-prepared and validated 30-item concept test ( $KR_{21} = 0.615$ ). Results based on the frequency of errors showed that the errors committed by the students tend to concentrate generally on the same item numbers, revealing strong patterns which were considered as the alternative conceptions of student examinees. Findings revealed that students had difficulty in problem solving and committed random errors in mathematical computations. In dealing with problem solving, students find it difficult to analyze the nature and characteristics of the problem. Their inability to understand the problem can be traced from their fragmented understanding of the relationships that exist between/among basic genetics concepts. In view of the results obtained, it can be deduced that the students' have alternative conceptions on some basic genetics concepts (i.e. recessive trait; alleles, homozygous, heterozygous and genotypic ratio). In this context, it is recommended that instruction in genetics provide emphasis on the relationships of these basic genetics concepts and principles (i.e., chromosomes, genes, alleles and traits) to reinforce students' problem-solving strategies and ensure students' conceptual understanding.

## A Metacognitive Approach to Students' Preconceptions Concerning Solving Linear Equations in One Variable

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**Keywords:** Solving Linear Equations in One Variable, Metacognitive Approach, Preconceptions in Mathematics, Meaningful Learning, IMPROVE Approach

This study examined how a metacognitive approach to addressing student errors or preconceptions in mathematics may prove helpful to teachers and more importantly, to learners. The investigation employed the IMPROVE Approach of Mevarech and Kramarski (1997). It promotes the idea that by explicitly giving attention to the preconceptions of the students, errors may serve as opportunities for learning. A pre-test was administered to ascertain the errors of the students in solving linear equations in one variable. On the basis of the identified and observed errors, a learning plan employing the IMPROVE Approach was developed and conducted. It featured two different sets of activities that were designed to examine conceptual changes of the learners towards the correction of their errors as shown in the pre-test results. At the end of the lesson, a post-test was conducted to identify which errors of the learners have been corrected. The comparison of pre-test and post-test results shows that there is a decrease in the number of learners who committed the following types of errors: (a) on properties: wrong justification and not attempting to answer the question; (b) on solving equations: insufficient explanation, wrong explanation, wrong sum/difference/product/quotient, correct procedure-wrong solution, no procedure-wrong solution, wrong choice-wrong reason, and not attempting to answer the question; and (c) on problem solving: not attempting to answer the question. On the basis of the results, it is recommended that teachers adopt metacognitive approaches to addressing learners' errors to facilitate more meaningful learning.

# Developing Students' Skills and Attitudes Towards Algebraic Expressions Using Term Tiles: A Case Study

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**Keywords:** Algebraic Expressions, Term Tiles, Diagnostic Test, Pattern Recognition, Discovery Approach, Independent Learners

This case study used the descriptive research to examine and analyze the effectiveness of the "Term Tiles" in developing the students' skills and attitudes towards factoring algebraic expressions. Diagnostic test, activities and post test were utilized to assess the development of the skills of the participants in algebra. Evaluation sheets were used to gauge the performances of every participant for each activity. Consultations on how they obtained their answers were also employed to determine the participants' awareness and understanding of algebraic expressions. Scores on these assessment tools were analyzed to evaluate the development of their algebraic skills. Their attitudes towards the manipulative tool "Term Tiles" were assessed using the Likert scale.

Results show that with the use of manipulative tools like "Term Tiles", the skills in solving algebraic expressions were improved. It became easier for the participants to learn the procedures using manipulatives. It helped them visualize the concepts and ideas taking place in the algebraic procedure and transform the concrete procedures into an understanding of such concepts as factoring algebraic expressions. As they were mastering and developing their skills on how to manipulate and maneuver the tiles, they recognized patterns and understood the concepts behind the procedures resulting to correct performance in factoring. With the positive outcome achieved by the students, self-confidence was attained during the course of their own exploration and discovery using "Term Tiles". They became independent learners. With new activities that were introduced, they used what they already know to learn new algebraic skills and claim ownership of their new knowledge through exploration and discovery. Based on the Likert scale, the students had a positive attitude towards learning factoring of algebraic expressions.

## Use of Manipulatives to Develop Second Year High School Students' Understanding of Equality and Linear Equations

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**Keywords:** Equality, Linear Equations, Equal Sign, Manipulatives, Conceptual Understanding, Persistent Errors in Solving Linear Equations

This study investigates how second year high school students understand the concept of equality and the use of the symbol equals or the equal sign and how well they are able to solve algebraic equations. Descriptive research was used in the investigation. Triangulation was employed in gathering and analyzing the data from scores in activities, observation and interview. Manipulatives were used to help learners improve their understanding of the concept of equality and their skills in solving algebraic equations. The study shows that while their conceptual understanding of equality improved, there are still persistent common minor errors that students commit when applying the concept in solving linear equations.

# **An Overview of the Design, Implementation and Evaluation of UbD Learning Plans in Elementary Algebra in Selected Diocesan Schools in Zambales and Bataan**

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**Keywords: Understanding by Design, Elementary Algebra, Learning Plans, Structure of Knowledge, Big Ideas, Conceptual Understanding, Procedural Knowledge**

This is a collection of action research undertaken by a group of secondary mathematics teachers from selected schools in Zambales and Bataan who completed a masteral program on teaching mathematics (Batch 3) under the St. La Salle Institute of Graduate Studies (SIGS) of the De La Salle University. It aims to design, implement and evaluate learning plans in various topics in Elementary Algebra using the framework of Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). Topics include first degree inequalities, Cartesian coordinate plane, slope of a line, special products, and linear equations in two variables. It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings in a particular learning plan which are the significant features of UbD plans. Alignment of the three stages of the UbD plans were ensured through peer critiquing and critiquing by experts.

The action researches also sought to investigate the conceptual and procedural understanding of the students in Elementary Algebra. The participants were high school freshmen from selected diocesan schools in Zambales and Bataan. Worksheets and other paper and pencil tests as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. The action researches collectively reveal that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plans employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans. The teachers encountered problems though in the time allotment for implementation of the learning plans because the pedagogy used required more time than what the school curriculum allows.

## Parasite Biodiversity in Philippine Domestic and Peripatetic Mammalian Species

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A summary of our findings on the biodiversity of protozoan and helminthic infections and ectoparasites endemic in livestock and other mammalian species in the country is herein presented. Many of these findings have been properly documented, as these species constitute new reports in the Philippines. Sarcocystis, a coccidian parasite identified based on the ultrastructure of the sarcocyst wall, is prevalent in water buffaloes (*S. fusiformis* and *S. levinei*); cattle (*S. cruzi* / *S. bovicanis*); hogs (*S. miescheriana* / *S. suicanis*); goats (*S. capracanis*); chickens (*S. horvathi*); and rats (unidentified species). The orangutans (*Pongo* spp.) at the Aylon Zoo carry *Ascaris* sp., *Entamoeba coli* and hookworm infections. Horses and stray dogs are infected with *Babesia equi* and *B. caballi*, and *B. gibsoni*, respectively. These mammals as well as, the water buffaloes and cattle are infested with ixodid ticks species belonging to genus *Rhipicephalus*, *Boophilus*, *Ixodes*, *Haemaphysalis* and *Dermacentor*, hard ticks associated with the transmission of babesiosis. The liver flukes, *Fasciola hepatica* and *F. gigantica* are common in water buffaloes and cattle, while hogs carry high parasitemia of *Ascaris suum*. Residential, commercial and agricultural-dwelling *Rattus* spp. carry myriad of parasites such as, the avirulent and virulent *Toxoplasma gondii*, *Babesia rodhaini*, *Capillaria hepatica*, *Taeniaformis taeniaformis*, *Hymenolepis* spp., *Raillietina* sp, *Echinostoma* sp., different species of roundworm, and ectoparasites *Chirodiscoides* sp., *Radfordia ensifera*, *Laelaps nutalli* and *Ornithonyssus bacoti*, *Xenopsylla cheopis* and *Polyplax spinulosa*. Our work on parasite biodiversity in other animals including the invertebrates is continuing.

## Abundance, Biomass, and Primary Productivity of Middle Meadow Seagrasses in Talin Bay, Batangas

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Pre-disturbance, baseline, or reference information that reflect the condition and resilience of seagrasses are needed to better understand and appreciate their ecological importance and the need to preserve them. The main purpose of this study is to assess quantitatively the seagrass community in Talin Bay, Batangas. Specifically, it aims to determine certain biophysiological parameters such as biomass and primary productivity and important ecological attributes specifically abundance, relative frequency and importance value of seagrass species in the bay. Leaf area and leaf area index was also measured and computed for each seagrass species. Methods include identification of dry weight of aboveground (green photosynthetic blade) system of the seagrasses; determination of primary production through modified light and dark bottle technique; and spectrophotometric measurement of chlorophyll a and b. Seawater analysis was done to report water temperature, pH, dissolved oxygen, electrical conductivity and salinity. The most abundant species of seagrass in the site is *Halodule pinifolia*, followed by *Cymodocea rotundata*, and *Thalassia hemprichii*. Although *T. hemprichii* has the highest wet weight, leaf area and leaf area index among the three most abundant seagrass species, it has the lowest productivity. *H. pinifolia* has the least leaf area and leaf area index, yet it has the highest productivity and *T. hemprichii* has the lowest productivity. Although *C. rotundata* has moderate productivity, its respiration demand is highest.

## Distribution of Coral Species

## **Threatened with Extinction in the Philippines**

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Carpenter et al (2008) recently published an International Union for the Conservation of Nature Red List for stony corals of the world. In this Red List, 225 species or one third of all the species were classified as having elevated risk of extinction (i.e., Vulnerable, Endangered, and Critically Endangered IUCN categories). This emphasized the impact of increased sea surface temperatures globally as well as the local effect of human activities. Many of the 225 species are reported from the Philippines since the country is part of the Indo-Pacific center of diversity of corals. Veron and Fenner (2000) has the most comprehensive recent listing of valid corals found locally, and we used their lists from 37 sites around the Calamianes islands, Palawan to examine the distributions of the high risk species. Although none of the critically endangered species are found locally, two endangered and 50 vulnerable coral species were recorded in the Calamianes. We found all 37 sites had species classified as Vulnerable, and 15 (41%) had species classified as Endangered. The number of vulnerable species per site ranged from four to 23. We find similar patterns for other locations in the country. These findings highlight the importance of Philippine reefs in coral conservation, but also indicate the need to come up refined criteria for the local use of the global Red List for corals if we are to identify manageable priority areas within the country.

## **Correlation Study of Sound and Respiration Rate Signals with EEG (Electroencephalogram) Signal at Different Sleep Conditions**

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We correlated sound and respiration rate signals of human subjects with one of the standard diagnostic methods, EEG (Electroencephalogram) at different sleep conditions. In order for us to have a better understanding of different sleep conditions, we limited our investigation on sleep conditions that experienced REM (Rapid Eye Movement) and NREM (Non-Rapid Eye Movement) sleep cycles. We monitored simultaneously the respiratory rate and snoring (sleep related sound) characteristics of the test subjects through the respiration rate sensor and sound sensor respectively. We showed the relationship of these metrics with the standard EEG spectrum present in REM and NREM cycles. A total of 16 subjects, 7 males and 7 females were enrolled in the study whose ages range from 18- 25 years old. Direct measurements in the duration of their sleep were made using the SPARK instrument for both the sound and respiratory sensors then ADInstrument for the EEG. Results have shown moderate to strong correlations between snoring and respiration signals with EEG signals at various sleep stages of the test subjects. There was no indication of gender bias among the test subjects that underwent correlation study. The cost and inconvenience of the standard diagnostic method, polysomnography, which includes the use of Electrooculogram (EOG), Electroencephalogram (EEG), Electrocardiogram (ECG) and Electromyogram (EMG), makes this simplified approach very desirable in the strategy of detection of sleep conditions which can also lead to the detection of sleep related disorders.

## **Detection of Human Blood Glucose Concentration Using Non-Invasive Technique**

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**Keywords:** **Medical Optics Instrumentation, Near-Infrared Spectroscopic Instrumentation, Light Propagation in Tissues, Blood or Tissue Constituent Monitoring.**

We developed a non-invasive technique in detecting human glucose concentration using Near Infrared Spectroscopic (NIS) measurement. Coupling a cost-effective near infrared (NIR) light emitting diode (LED) with a hand-held fiber optic cabled Ocean Optics spectrometer through an improvised clothes peg, we were able to device a novel non-invasive detection system on how to determine glucose concentration with NIR-LED absorbance spectrum through two different skin targets (i.e. the ear lobe, and the skin between the thumb and index finger). A total of 30 unbiased gender subjects were enrolled in the study whose age ranges from 19-76 years old. Direct measurements of the absorbance of NIR-LED through these human skin targets lead to the linear behavior of human glucose concentration using Abbott's Medisense Optimum Xceed reference glucosemeter. Clark error grid plots showed that 93% of the total number of subjects falls within 20% of reference glucose concentration with error bars of  $\pm 26$  mg/dl and 400 mg/dl dynamic range limit.

## **Fabrication and Preliminary Characterization of a pH Sensor Based on Conducting Polypyrrole**

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A pH sensor was fabricated from electrochemically polymerized polypyrrole. The conducting polypyrrole films were galvanostatically synthesized from aqueous solutions containing pyrrole monomer and 0.09M Na-pTS as electrolyte and dopant. The films were exposed to various media and pH solutions and the change in the resistance of the polypyrrole films were determined by Van der Pauw technique. The effect of film thickness on the response time and stability of the sensor were also studied.

# Philippine Master Sample Design for Household Surveys

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**Keywords:** Master Samples, Sample Cumulation, Replication, Small Area Estimation

Sample surveys has and still continues to be a major source of data that will be essential in monitoring progress and effectiveness of governance and information source for an empowered citizenry. Over the years, the national household surveys were designed to provide reliable estimates for several critical indicators at the national and regional levels primarily due to the limited resources in such undertaking. In 2003, a design for the master sample for household surveys was initiated resulting on a national sample of about 50,000 households aimed at generating reliable estimates at the national and regional levels. The timing for the redesign of such surveys usually coincides with the availability of results from the Census of Population and Housing which provides valuable material for such design. To date, the 2003 design is still being utilized to provide valuable information of income and poverty, employment, health and nutrition, and energy utilization among others. Also, there is growing clamor to generate more reliable statistics at the sub-regional levels such as province at the very least. It is estimated that to achieve such goals, the current sample size should be increased four-fold to respond to such demands. In addition, as the results of the design of the 2006 Multiple Indicator Cluster Survey of the UNICEF shows, that the current design of the 2003 MS cannot easily be used to generate provincial level estimates even if funds are available for the corresponding increase in the sample size.

This paper will present some re-design considerations and solutions to improve on the 2003 MS design. In particular, the concept of sample cumulation will be introduced that will result in increasing effective sample size for some critical surveys such as the Family Income and Expenditure Surveys without necessarily increasing the requisite cost and at the same time allow for the provision of reliable estimates at the province level.

## Exploring Latent Factors Using Non-Bayesian and Bayesian Factor Analysis

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The paper aims to explore latent factors using the non-Bayesian and Bayesian factor analysis using complete enumeration data on learning beliefs and practices under a new learning pedagogy. Principal factor method with Harris-Kaiser orthooblique rotation was applied under the non-Bayesian factor analysis model  $X_j = \mu + \Lambda f_j + \varepsilon_j$  where  $X_j$  is the vector of observations,  $\mu$  is the overall population mean,  $\Lambda$  is the matrix of factor loadings,  $f_j$  is the vector of factor scores for subject j, and  $\varepsilon_j$  is the vector of errors. The paper further employed the Bayesian multivariate factor analysis model  $(X_j | \mu, \Lambda, f_j) = \mu + \Lambda f_j + \varepsilon_j$  which can be rewritten to incorporate the prior knowledge on the mean vector and factor loadings as  $(X_j | C, f_j) = Cg_j + \varepsilon_j$  where  $C=(\mu, \Lambda)$  and  $g'_j = (1, f'_j)$  utilizing Gibbs sampling and iterated conditional modes. Non-Bayesian factor analysis using SAS 9.1 and Bayesian factor analysis using Matlab both yielded seven correlated factors namely: performance assessment of learning, students' learning environment, teacher's work, use of computer statistical software, students' learning process with emphasis on real-life applications, attitude towards learning statistics under the learning pedagogy and independent learning.

## Characterization of the Philippine Stock Exchange

## **Composite Index Behavior**

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The behavior of the stock market is widely regarded as unpredictable and erratic. However, erratic physical systems can be predicted to some extent by using appropriate models. In this study, the empirical behavior of the Philippine stock market was considered by using the daily historical values of the Philippine Stock Exchange Composite Index (PSEi) from 1993 to 2009. Analysis of the time series for the index, return and acceleration suggests that the regularity of the dynamics of PSEi is more transparent when studied in terms of return rather than the index itself. Regularity in the probability distribution is however found only in the acceleration of the index. The empirical probability distributions of index, return and acceleration suggest that simple random walk, random walk with drift, geometric Brownian motion, and Levy flight models do not apply to the Philippine stock market. A study of autocorrelation however showed that the PSE index is independent and identically distributed. A study of the probability of the scaled return to origin shows a power law characteristic, indicative of fractal behaviour. Phase space diagram analysis however revealed that the seemingly chaotic behaviour of the Philippine stock market is only approximate.

## **The Extensive Form Game of A Graph Coloring Problem on Paths**

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The graph coloring problem involves assigning colors to vertices in a graph such that adjacent vertices have distinct colors. Here we focus on a modified graph coloring problem posed as a two-person game, with one person (Alice) trying to color a graph, and the other (Bob) trying to prevent this from happening. Alice and Bob alternate turns, with Alice having the first move. A move consists of selecting a previously uncolored vertex  $x$  and assigning to it a color from the color set  $X$  distinct from the colors assigned previously (by either player) to neighbours of  $x$ . The game ends if no more moves are possible. This happens if either all vertices are colored, or there are uncolored vertices, but for each of the uncolored vertices, its colored neighbors used all the colors. If at the end of the game, all the vertices are colored, then Alice wins the game. Otherwise Bob wins. The extensive form game contains all the information about a game, by defining who moves when, what each player knows when he moves, what moves are available to him, and where each move leads to. Extensive form games can be conveniently represented by tree diagrams. The objective of this paper is to represent the graph coloring game played by Alice and Bob on paths in its extensive form.

# Quantum Dynamics Study on the Incident Angle Dependence of H<sub>2</sub> Dissociative Adsorption on Defective Pt(111) Surface

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**Keywords:** Hydrogen, Adsorption, Quantum Dynamics, Coupled Channel Method, Local Reflection Matrix

In this study, quantum dynamics calculations are performed using previously obtained potential energy surfaces(PES) for the dissociative adsorption of H<sub>2</sub> on defective Pt(111) surface with H<sub>2</sub> approaching the surface at different incident angles and approach sites. The coupled channel method via the local reflection (LORE) matrix is used to obtain the reaction probabilities for sticking of H<sub>2</sub>. To investigate the dissociative adsorption dynamics of H<sub>2</sub> on the defective Pt(111) surface, the calculated sticking probability S<sub>n</sub> for H<sub>2</sub> is plotted against its initial translational energy E<sub>t</sub>. Moreover, initial vibrational states of H<sub>2</sub> are assumed to test if the sticking probability has any dependence on the vibrational energy of the incident hydrogen molecule and whether it would lead to vibrationally assisted sticking.

## Synthesis of a Pyrazinamide Analog of Salicylic Acid

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**Keywords:** Friedel Crafts Acylation, Pyrazinamide, Salicylic Acid

A pyrazinamide derivative of salicylic acid (1) was synthesized. The synthesis involves the Friedel Crafts acylation of methyl salicylate using octanoyl chloride and  $ZnCl_2$  catalyst followed by hydrolysis to produce compound (2). Attachment of the pyrazinamide moiety to compound (2) via imine formation produced (1) in 53% yield. This compound may exhibit improved activity against pyrazinamide resistant strains of *Mycobacterium tuberculosis*. The intermediate compound (2) may also be utilized as a precursor to the synthesis of an aspirin analog of pyrazinamide (3). A recent study has shown that the activity of pyrazinamide is enhanced if administered together with aspirin.

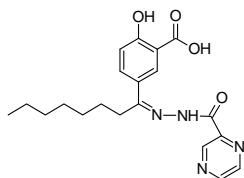
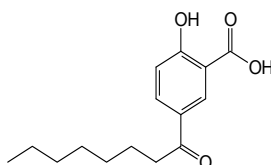


Fig 1: Pyrazinamide Analog of Salicylic



Acid(1)

Fig 2: 5-n-Octanoylsalicylic acid (2)

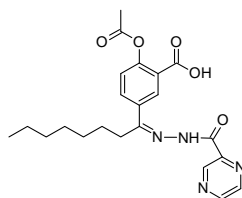


Fig 3: Pyrazinamide Analog of Aspirin (3)

## **The Effect of Dwell Time in the Fabrication Of Gallium Nitride Nanomaterials**

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In this study, the Horizontal Unseeded Vapor Phase Growth (HVPG) Technique was used to grow Gallium nitride (GaN) nanomaterials. Gallium nitride powder with purity rate of 99.99% weighed to 35 milligrams and placed in a sealed quartz tube with a pressure of  $10^{-5}$  Torr or better. The quartz tube was baked in a programmable tube furnace set with temperature range of 750°C to 1100°C with dwell times from 4 hours to 8 hours. Scanning Electron Microscopy revealed that Gallium nitride nanowires were grown for all dwell times from 820 °C to 1100 °C while hexagonal nanoplates were grown for an 8 hour dwell time for temperatures 750 °C to 1100 °C, 6 hour dwell time for temperatures from 1000 °C to 1100 °C, and for a 4 hour dwell time of 1100 °C. Energy Dispersive X-ray results confirm the 1:1 elemental percentage ratio of Gallium to Nitride. X-ray diffraction results reveal single-phase wurtzite structure was formed.

## **Fabrication and Characterization of Yttria-Stabilized Zirconia**

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Yttria-stabilized zirconia (YSZ) thin films were fabricated on three different substrates namely silicon, silver and steel using the spin coating technique. Suspensions with varying concentrations of YSZ (10wt %, 30wt % and 50wt %) were used to process the YSZ thin films on each of the substrates. The surface morphology, thickness and cross-section of the films were investigated using scanning electron microscopy (SEM). SEM results of the surface showed the continuity of the film. As the concentration of YSZ gets higher, the more visible the particles become. Thickness of  $\sim 1\mu\text{m}$  was achieved on the films with 10wt % YSZ,  $\sim 7\mu\text{m}$  on the films with 30wt % YSZ and  $\sim 100\mu\text{m}$  on the films with 50wt % YSZ for a single coating cycle with fixed spinning rate and time. These clearly show the dependence of the thickness of the films to the concentration of YSZ. The cross-sectional view of the films showed that the films were well adhered to the substrates. Raman spectroscopy and x-ray diffraction both revealed a cubic structure YSZ film.

## Synthesis of TiO<sub>2</sub> Nanomaterials by Modified Horizontal Vapor Phase Growth Technique

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TiO<sub>2</sub> nanomaterials were fabricated via the Horizontal Vapor Phase Growth (HVPG) technique, modified by adding an additional step involving annealing and gas purging. The technique utilized TiO source powder which was sealed inside a quartz tube along with a Silicon substrate. The sealed quartz tube was placed inside a programmable furnace that was set to have a dwelling temperature ranging from 900°C to 1200°C, and a growth time between 4 to 8 hours. The tubes were taken out of the furnace after it was allowed to cool to room temperature, and were cracked to obtain the silicon substrates that had been deposited with nanomaterials. The nanomaterials along with the substrate were annealed at 300°C for 1 hour while allowing O<sub>2</sub> gas to strike the surface of the substrate. The annealed samples were harvested and were subjected to the characterization process. Using the scanning electron microscope, it was determined that the nanostructures formed across the surface of the substrate was in the form of curvy and flexible wires. EDX analysis of these nanostructures proved that it was composed of Titanium and Oxygen with an approximate stoichiometric ratio of 1 Ti : 2 O. Further characterization of the nanomaterials using XRD analysis verified that the nanowires were indeed TiO<sub>2</sub> with both anatase and rutile polymorphs present.

# **Characterization of Silver Nanomaterials Synthesized by the Horizontal Vapor Phase Crystal Growth Technique for Antimicrobial Purposes**

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Triangular silver nanoplates, of different orientations, and other nanostructures were successfully synthesized for antimicrobial purposes using the Horizontal Vapor Phase Crystal (HVPC) growth technique. The starting material for the synthesis was thirty-five (35) mg of 99.99 % pure silver powder. Varied growth temperatures (800 °C, 900 °C, 1000 °C, or 1100 °C) and growth times (4 hours, 6 hours, or 8 hours) at a fixed ramp time of 80 minutes were used as parameters in this study. Scanning Electron Microscope (SEM) and Energy Dispersive X-ray (EDX) were used on the grown nanomaterials to determine the structures and the elemental composition. The SEM micrographs, which was supported by the EDX analysis, showed that nanoparticles, triangular nanoplates, hexagonal nanoplates, nanowires, nanoribbons, nanorods, and nanocubes can be grown in the HVPC technique. Analyses of the various parameters revealed that silver nanostructures are formed in all four zones of the quartz tube. Optimum size and number of nanoplates, whether triangular or hexagonal, were best grown at a low growth temperature of 800°C and a short growth time (4 hours and/or 6 hours) at zones 1 and 2. Spherical nanoparticles were best grown at the end of zones 2 and 4. The desired size can be achieved by increasing the growth time regardless of the growth temperature. Nanowires and nanorods are best grown at a high growth temperature (1100°C) and a short growth time (4 hours). Also, odd structures such as bled triangular plates, re-adsorbed particles, flakes, and forming wires were found at zones 1 and 3. Analyses of data led to the conclusion that the mechanism for deposition, nucleation, and growth of silver nanomaterials followed the vapor-solid process. Deposition of particles was affected by the growth temperature. At 800°C and 900 °C, vaporization is believed to be slow that promoted growth of 2-dimensional nanostructures. At 1000 °C and 1100°C, vaporization is believed to be fast that promoted the growth of one-dimensional nanostructures. Heterogeneous nucleation is believed to be predominantly occurred in the process since the quartz tube acted as a substrate. However, homogenous nucleation could occur when there is a decrease in saturation level brought by deposition of particles or decrease in temperature. Spectral Imaging Microscope was further used to explain why some grown nanomaterials emit different color. Real-time images of nanoparticles with spherical structure exhibited twinkling effect which was due to localized surface plasmon resonance. The pour-plate technique was employed to test the antimicrobial potency of the grown silver nanomaterials. The number of colonies grown on a plate containing silver nanomaterials, a plate containing silver powder, and a plate that do not contain silver powder were compared. Results revealed that the number of E. coli colonies grown when 10<sup>5</sup> CFU/mL of bacterial solution was exposed to a quartz tube with silver nanomaterials was decreased compared to when it was exposed to a quartz tube with or without silver powder.

# **Assessing Information Technology Adoption in Philippine SMEs: Validating the Applicability of the Technology Adoption Model (TAM) for Selected SMEs**

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**Keywords:** **Technology Adoption Model (TAM), Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), Grandon and Pearson Model, Small & Medium Scale Enterprises (SMEs), Information and Communication Technologies (ICT), Community Informatics (CI).**

Small and medium enterprises (SMEs) are vital components for economic growth. For a developing country like the Philippines, SMEs are regarded as one of the factors that contribute to national development. At present, 99.6 percent share of the registered businesses in the country are considered as SMEs employing an estimated 69.9 percent share of national labor force. It is estimated that SMEs contribute 32 percent to the country's gross domestic product (GDP).

Recognizing the crucial role of SMEs in economic development, Republic Act 8289 (RA 8289), more commonly known as the Magna Carta for Small Enterprise, emphasize the need to empower SMEs and increase their productivity by creating a suitable environment for growth. With this recognition comes the need for SMEs to harness the power of information and communications technology (ICT). The utilization of ICT is widely seen as a factor that can open new opportunities and increase the SMEs' capacity to respond to the ever changing demands of the global market.

This paper subscribes to the idea of ICT as an enabling tool that has the capacity to create synergies and open new opportunities. Interaction among people has increased and the importance of time and space has decreased because of ICT (Kim, Lim, & Sison, 2008). Recognizing the need to harness ICT's transformational effect, the paper will be explore the relevance of technology adoption models in ensuring that the utilization of ICT contribute to increase in productivity and competitiveness for Philippine SMEs.

# **Community Based Disaster Risk Management for Buklod Tao Inc: Capturing Indigenous Knowledge for Community Based Disaster Management Capacity**

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**Keywords:** Community Based Disaster Risk Management (CBDRM), Information and Communication Technologies (ICT), Community Informatics, Disaster Management.

In the Philippines, where the country is being battered by an average of twenty typhoons every year, local communities have continued to rely heavily on their own experience and knowledge to deal with natural disasters. These communities have a vast body of local knowledge on disaster mitigation, preparedness, response and recovery. Republic Act 10121 or more commonly known as the Disaster Risk Reduction and Management Act of 2010 highlights the need of *disaster risk reduction measures that are sensitive to indigenous knowledge systems*. However, this indigenous knowledge is not properly captured and disseminated. With this recognition, comes the need to tap the potential of ICT tools and use it to the advantage of communities to develop a community based disaster management capacity.

This study will focus on Brgy. Banaba, a rural area in San Mateo, Rizal. This community is situated between two major rivers, Marikina and Nangka. With a population of around 5800 families, this community has an organization called *Buklod Tao* (BT) that helps the community cope with environmental hazards. This paper will highlight the processes, components, and gains of community based disaster risk management (CBDRM) in capturing local knowledge for Buklod Tao.

## **Online Collaboration in E-Participation**

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**Keywords:** e-Participation, Online Collaboration, ICT for Development, e-Governance, Virtual Communities

There is often a missing link between the use of technology and the task that is intended to be accomplished. This issue is present in e-Governance and e-Participation. In fact, among the gaps in e-Participation are the use of the appropriate ICT tools and the best practices involved in the online activity. Since e-Participation is particularly new, the concept of the system opens up a wide array of research opportunities, specifically in the area of online collaboration. Online collaboration is commonly perceived as a casual online activity in order to answer questions from the virtual community and discuss ideas and opinions covering a certain field of interest. This perception provides a shallow understanding of the concepts, structures, and issues of interaction involved in a collaborative environment. Additionally, it limits the conceptualization of other useful functions of the online structure for e-governance. The establishment of virtual communities should not only be seen as an online phenomenon but also as an enabling tool for good governance. E-participation takes advantage of internet technology in order to provide areas for information exchange and interaction between the government and citizens.

This research will further explore the integration of online collaboration and e-Participation as web-based virtual communities. There is a need to analyze and evaluate how various stakeholders involved in government processes interact in order to accomplish endeavours that require collaboration. Online tools and principles will be examined and determine how they can be used in structuring an online e-Participation system.

## **Assessment on the Use of ICT in Monitoring Maternal Health in the Philippines**

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**Keywords:** Information and Communications Technology (ICT), Maternal Health, Information Systems, Maternal Health Information System (MHIS), Maternal Health in the Philippines

This paper provides an assessment on the use of Information and Communications Technology (ICT) in monitoring maternal health in a municipality in the Philippines. In particular, presented in this paper are the results from a qualitative study on the use of information systems in creating data-driven decisions through collaboration between key stakeholders in maternal health namely the municipality health officers, midwives, barangay health aides, general health practitioners, and expecting mothers. The methodology used in the study includes individual structured interviews with five barangay health centers, two hospitals, twelve general practitioners, barangay health aides, rural health midwives, and more than twenty expecting mothers over the span of a year. Results show that there is a high acceptance of implementing ICTs such as a Maternal Health Information System, an accessible digital library for self-care and midwife resources, and mobile technology-enabled information systems.

## Legal Digest Management System

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**Keywords: Information and Communications Technology, Law, Legal Digest Management System, Learning Management System, Electronic Document Management System, Rapid Applications Development**

The advent of information and communications technology (ICT) has paved the way for significant improvements in the learning and teaching processes of the academe. As such, Legal Digest Management System (LDMS) provides an ICT opportunity for the students and faculty of De La Salle University and Far Eastern University's joint Master of Business Administration – Juris Degree (MBA-JD) program in facilitating learning through sharing and evaluating legal digests amongst them. This paper aims to provide a breakthrough innovation in the way legal digests are created and how law classes are held by merging both the ICT and law disciplines.

As a hybrid of Learning Management System and Electronic Document Management System, the main modules of LDMS are focused primarily on the needs of the MBA-JD students and faculty. LDMS allows the faculty to assign cases to the students online, and for the students to create and share these digests. Furthermore, the system allows seamless peer evaluation, ranking, and versioning features which aid the overall process.

Rapid Applications Development (RAD) is the methodology that was used to simultaneously meet the user requirements and assist the proponents in developing the system. Since RAD allows fast development of core system capabilities, problems were identified and repaired in an early stage. The proponents obtained necessary opinions of law students from well-known law institutions and combined it with the data gathered from the main users. Thus, this paper produces reliable and noteworthy findings that would definitely help in the development of LDMS.

## Extending Student Information Systems to the Mobile End for Empowering Stakeholders

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**Keywords: Information Communication Technology (ICT), Student Information Systems (SIS), Mobile Application, Android, Java Mobile Edition (J2ME)**

The dawn of information communication technology (ICT) in the field of education has become prevalent in today's society that most schools are investing in student information systems (SIS) to support their administrative services. SIS is becoming a common asset for schools. Demand for process automation is now basic, while an increasing demand for information availability is now critical. Though most schools will already have this application there is still demand for the timely and easy access to information.

This paper will present a mobile solution that will extend the SIS services and information through the tips of the finger. It will present the design and development of an application developed for devices running Android and Java supporting operating systems. It will indicate how such services benefit the stakeholders particularly the students. The developed software has included a course catalog, calendar viewer that can show the class schedules and other school-related events, announcements, borrowing of books, and a directory listing. It also incorporated some of GLOBE's services like friend finder and Gcash.

## Design of an Immersive 3D Self-Organizing Map

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**Keywords:** Clustering, Self-Organizing Map, User Interface, Visualization

A Self-Organizing Map (SOM) is usually a 2D planar map that collapses within a 2D structure the topological relationships within the input environment of numerous data items such as text documents, pictures, music files, etc. Data items that are closely related (e.g. similar music genre) in the input environment would be spatially clustered near each other in the SOM. The usual interface of a SOM is for the user to view the 2D map and possibly click around the map – in the same way that users interact with the WebSOM, where each cell of the map corresponds to a cluster of text documents. It is, however, feasible to cast the input space into a 3D structure, and thus allow a user to interact with the map as if he/she is inside the 3D space. As such, instead of just viewing the map and clicking on the 2D structure, the user can be completely physically immersed in the 3D map, and would point with his/her finger at specific locations of the 3D map, instead of clicking the mouse. In the case of music files, a user can just point at a location in 3D space, and the 3D SOM would retrieve the music file associated to the location, and then play the music. With such an interface, even the visually impaired can interact with the 3D SOM. We have built a structured 3D SOM that is substantially designed in this manner, except that for now, the physical sensors that would accurately locate the finger-tip of the user is not yet integrated in the system.

Once the physical sensors have been fully tested, these can be easily integrated in the current 3D SOM. The 3D SOM, as it is designed, can now be used for all types of data, including hypothetical datasets, news documents, scientific papers/journals articles, and music files – except that for now, the user would still need to view the 3D map that is rendered on the computer screen, and would have to be content with just clicking on specific points on the screen to simulate the pointing (using a finger) at specific locations in 3D space.

## Neural Network Implementation on the Graphics Processing Unit Using CUDA

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Our research work is concerned with the implementation of a neural network, specifically, Kohonen's Self-Organizing Map (SOM), on a Graphics Processing Unit (GPU). The primary objective is to enable fast computation via parallel processing on the GPU's multiple cores. We considered SOM PAK, a serial CPU-based implementation of the SOM developed originally by Kohonen and his research group, as base code. The SOM PAK source codes are available in the public domain.

We studied, analyzed and experimented with SOM PAK to determine how it can be adapted from serial to parallel computation. In particular, we were interested in finding which routines contribute significantly to the neural network's training time. We considered candidate functions for parallel implementation, and wrote the corresponding CUDA codes to enable execution on a GPU.

We tested the GPU-enabled implementation on an NVIDIA GeForce 9800GT GPU using two sets of data, specifically, (i) animal SOM data and (ii) music classification data. For the animal data, the GPU-enabled implementation resulted into a maximum speed up of 3.11 times on a 256<sup>o</sup>—256 network compared with the CPU-based implementation. For the music classification data, the maximum speedup obtained was 2.72 also on a 256<sup>o</sup>—256 network.

## Learning in Neural Networks with Decision Trees

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**Keywords:** Data Mining, Neural Networks, Decision Tree Induction, Learning

This study investigated and implemented a data mining agent (DMAgent) that adopted Neural Networks with Decision Trees as learning algorithms in a competitive game playing environment. The snake gaming environment was used as the domain and test bed of the study. In building and training the DMAgent, games/matches against other learning agents were played. Data generated during the matches were logged, collected and mined. Two kinds of tests were performed: determine the survivability and competitiveness of the DMAgent.

## An Investigation to Understand Collaboration Between Software and Arts for Creative Artworks

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**Keywords:** Arduino, Creativity, Artwork, Open Source, Hardware, Software

The emergence of the digital media and computational tools has opened the doors for creativity. The cutting edge in the digital arts and role of new technologies can be explored for the possible creativity. This gives an opportunity to involve arts with technologies to make creative works. The interactive artworks are often installed in the places where multiple people can interact with the installation, which allows the art to achieve its purpose by allowing the people to observe and interact with the installation. The level of engagement of the audience depends on the various factors such as aesthetic satisfaction, how the audience constructs meaning, pleasure and enjoyment. The method to evaluate these experiences is challenging as it depends on integration between the artificial life and real life by means of human computer interaction.

This paper investigates “Role of hardware and software for developing artworks” using an artwork installation in the campus of NTNU. The main focus of this investigation has been to get an overview on the intersection between information technology and Arts. This gives an opportunity to understand various attributes like creativity, cooperation and openness of processes influencing the creative Artworks. The artwork is combination of Arduino and multimedia technologies. The data is mainly collected through the questionnaires from people interacting with the installation. This data collected proved that the choice of hardware and software plays a vital role in shaping the creative artworks; the investigation has also showed that the creativity differs from one person to another as creative work produced from other person, may not seem to be creative to others.

# **A Proposed Generic Controller for Robotic and Automation Courses**

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**Keywords:**      **Robotics, Robot Controller, Embedded Systems, Automation, Robotic Courses**

The author is proposing to design and develop a generic controller prototype for robotic systems. The controller should be easy-to-build using obtainable components that have enough capability to be used for research, projects development and teaching. This project has stemmed from the fact that commercial based robot controllers are relatively expensive that uses proprietary components and software.

# **POSTER PRESENTATION**

## **Automated Banana Peeling Machine**

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**Keywords:** Banana Peeling, Pneumatics, PLC, Automation

Banana is one of the Philippines' top agricultural crops, which contribute a lot to our economy. Demand for fresh and processed banana increases every year. A very good example of processed banana is the banana chips, whose export earnings alone can reach up to US\$35 million. Among the processes a banana goes thru to become banana chips, the peeling of the banana remains to be the manual process that takes most of the time and effort of 110 to 130 hired workers per day. While there had been attempts to automate the peeling process, given the unique size, shape, dimension, and other physical characteristics of the cardava (saba) banana, the task of making such a machine has not been very easy. Using pneumatic components, some slicers, cutters and a roller assembly with spikes/pins, a working prototype was fabricated and tested. Experiments were done and the machine was able to deliver with a 90% efficiency.

## **The Building Blocks to a Successful Project Knowledge Management (PKM)**

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**Keywords:** Project Knowledge Management, Organizational Culture, Knowledge Mechanisms

This paper aims to provide the critical factors that constitute to a successful Project Knowledge Management (PKM). PKM established in this paper as a house and each of the factors contributed in the building of the house will be represented as the building blocks of the house which are the foundation, the house body and the roof. This paper ends with the conceptual framework; thus, the validation of the model is recommended to be done in further studies.

## **Comparative Physicochemical Analyses of Regular and Civet Robusta Coffee**

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Regular and Civet coffee beans of the *Coffea robusta* variety were analysed for  $\alpha$ -tocopherol and caffeine contents by HPLC, surface microstructure by SEM, minerals by EDX. Probably due to absorption, the  $\alpha$ -tocopherol content of the Civet coffee beans was lower compared to the Robusta coffee beans. Heating damages the cell membrane and vacuoles, causing an increased release of  $\alpha$ -tocopherol and caffeine. Interestingly, calculations showed that roasting produced a more pronounced increase in  $\alpha$ -tocopherol content in regular Robusta than in the Civet counterpart. Meanwhile, the caffeine content increase of the Civet coffee beans may be attributed to the possible formation of amino acids which are precursors of caffeine biosynthesis. SEM revealed that Civet coffee beans acquired surface micro-pitting due to the action of digestive enzymes. The roasted Robusta and Civet coffee beans showed a smoother surface due to the fusion of cellulose in the cell wall. The mineral content of the Civet coffee beans were lower than that of regular Robusta which may have been an effect of absorption by the Civet cat.

## **Customer Relationship Management (CRM): Critical Success Factors for a Successful Implementation**

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**Keywords:** Customer Relationship Management, Knowledge Management, Key Customer Focus

Customer relationship management (CRM) is the integration of people, process, and technology that seeks to understand an organization's customers. CRM has evolved throughout the years and its applications expand from a single department up to its linkage to business strategy of a company. The very nature of CRM is in integration which requires company-wide, cross-functional, and customer-focused business process re-engineering efforts. However, organizations failed to see that CRM integration is complex and should not be viewed as a technology-only solution. Managing a successful CRM implementation requires an integrated and balanced approach to technology, process, and people. As such this study seeks to develop a conceptual framework of successful CRM implementation by identifying critical success factors (CSFs) that is anchored and focused to the customers.

## **Determination of Psoralens in *Citrofortunella reticulata* (Mandarin oranges)**

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**Keywords:** psoralens, *Citrofortunella reticulata*, Mandarin oranges

Psoralens and their derivatives are photo-activated molecular compounds which regulate damage to fruit and plants due to uncontrolled exposure to radiation. Studies indicate that they may be responsible for the onset of cutaneous melanoma and other effects on the human integument. In this study, the presence of psoralens in mandarin orange was determined. Orange peels were extracted with methanol, partitioned and fractionated using column chromatography. Fractions obtained were subjected to uv-visual spectral measurement. Those that absorb at ~270nm were further analyzed by hplc for comparison against a psoralen reference sample. UV spectra and retention times indicate that mandarin oranges contain psoralens on their

## **Environmental Strategies of Small and Medium Sized Restaurants in Manila**

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**Keywords:** Environmental Strategies, Small and Medium-Sized Restaurants, Cluster Analysis

Small and medium enterprises (SMEs), which outnumber the large firms in a national scale, face the challenge to operate in an environmentally sustainable manner. Business operations of SMEs, specifically restaurants, have significant negative effects on the natural environment. There have been efforts to reduce the impact of business processes through the implementation of environment strategies. This study looks into the extent of implementation of specific environmental strategies such as Pollution Prevention, Product Stewardship and Sustainable Development by small and medium-sized restaurants in Manila. A sample of 240 small and medium-sized restaurants was used. Their average responses were subjected to a cluster analysis using Ward's method, a hierarchical clustering procedure. Unlike past studies conducted in other countries on environmental strategies of SMEs, results show that there is a high level of implementation of environmental strategies among small and medium-sized restaurants in Manila. A four cluster solution was derived, identifying four different groups of small and medium sized restaurants on the basis of environmental strategies. The lowest levels of environmental strategies are to be found in the "active" group followed by the "constructive" group, the "leading edge" and the highest levels are at the "environmentally excellent" group. These small and medium-sized restaurants are strategic or proactive, that is, having a managed approach to improving environmental performance. Thus, the "active", "constructive", "leading edge" and "environmentally excellent" groups identified by this study are "proactive" types.



## **Ownership and Use of ICT Gadgets and Preferences and Experiences in Online Learning Among the PeLS 2010 Annual Conference Participants**

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**Key words:** online learning, ICT

The Philippine eLearning Society (PeLS) is an organization of online learning professionals, practitioners and advocates from the academe, business, government and other organizations. It conducts an annual online learning conference to educate and inform its members as well as other interested individuals about trends, techniques and applications of online learning. The 2010 annual conference, held in Cebu City, had a theme of “Effectiveness, Efficiency and Equity in eLearning” with 125 participants from across the country. This paper is a survey of the 2010 annual conference participants in terms of ownership and use of ICT gadgets as well as preference and experiences in online learning. It will compare and contrast results coming from responses of student and teacher conference participants. The results will help contribute to the continuing body of research and knowledge about ICT and online learning use and appreciation among sectors of the country. The results will also be compared to a similar initial study done by the author among the 2009 annual conference participants held in Baguio.

## **Preliminary THz-TDS Measurements of Polypyrrole with Varying M of Na (p-TS)**

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Using an optoelectronic THz beam system for THz time-domain spectroscopy (THz TDS), the output THz pulse transmitted was measured through the Polypyrrole samples with varying M of Na (p-TS) and amplitude spectra of input pulse and transmitted. The absorption of the conducting polypyrrole film was obtained from low frequencies to 3.5 THz.

## **A Proposed Environmental Assessment Tool for Concrete Batching Plant**

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**Keywords: Environment, Concrete Batching Plant, ISO 14001**

Presently, the building and construction sector is accelerating in a very rapid pace and one of the vital elements of the construction sector is concrete. The benefits it brings to society are enormous. It is the premier construction material across the world and the most widely used for providing essential infrastructure for transport, industry and habitat or human shelter. However, concrete is a manufactured product requiring raw materials, processing plant, energy supply and transport. Over the past few years, tough targets set by evolving environmental legislation, to be met on a global scale, have placed greater emphasis on effectively managing these sorts of risks. For these reasons, International Environmental Standard ISO 14001 was created. The development of ISO14001 came about because of the need for improved environmental performance expressed at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. The International Organization for Standardization (ISO) was charged with creating an internationally recognized environmental management system (Bansal and Bogner, 2002). This study was conducted to develop an environmental assessment tool and evaluate the environmental performance of concrete batching plants. A survey of 32 concrete batching plants was reported. Two of which are ISO 14001 accredited batching plants and thirty of them were non-ISO 14001 accredited batching plant. Survey questionnaire consisting of 90 questions were directed to managers, engineers, and non-technical staff of the batching plants. The results were evaluated by means of several statistical methods. The implications of the study for environmental performance of concrete batching plants are then discussed.

## **Synthesis and Characterization of In<sub>2</sub>O<sub>3</sub> Nanomaterials**

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Indium (III) Oxide (In<sub>2</sub>O<sub>3</sub>) nanomaterials were grown on glass and Silicon (100) substrates using the horizontal vapor phase crystal growth technique. A considerable amount of nanomaterials was retrieved on the glass substrate compared to that of Silicon (100) substrate. Nanopyramids, nanooctahedrons, nanotriangles, and faceted nanoparticles were obtained at temperatures of 1200°C, 1000°C, and 800°C. EDX results of revealed an atomic composition of ~40% indium and ~60% oxygen. XRD results showed that the nanomaterials produced were indeed indium oxide and that the sample grown on Silicon (100) had better crystallinity than those formed on glass.

## Synthesis of $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> Nanomaterials on (100) Silicon Substrate

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Hematite iron oxide ( $\alpha$  - Fe<sub>2</sub>O<sub>3</sub>) was synthesized through the process called Horizontal Vapor Phase Growth (HVPG) with and without silicon substrate. Though the source material had a purity rate of 97.60%, it did not inhibit the growth of nanomaterials. The HVPG technique was able to isolate the impurities specifically at zone 3 with the intended nanomaterial products grown at zone 2 which made the synthesis distinctive in its purpose. The growth temperature was varied at 900°C, 1000°C, 1100°C and 1200°C with dwell times of 4, 6, and 8 hours respectively. Nanomaterials without substrate revealed hexagonal nanoplates with an average thickness of 70 nm grown at 1100°C for 8 hours. EDX obtained from the nanomaterial without substrate shows an atomic percentage of 25.56 % Fe, 12.75% Si, and 61.70% O. The iron oxide formed was indeed hematite and was also consistent with the elemental ratio of Fe, O, and Si of 2:5:1. Silicon was included in the analysis due to the silicate composition of the quartz tube. For samples grown on silicon substrate, hexagonal nanoplates were also observed with an average thickness of 80 nm grown at 1000°C for 8 hours. Results from EDX showed a stoichiometric ratio of 40% Fe and 60% O indicating that the nanomaterial formed was indeed  $\alpha$  - Fe<sub>2</sub>O<sub>3</sub>. The crystal structure of the nanomaterial exhibited a low intensity XRD peak brought about by the random direction of the samples though an XRD peak was obtained at 41° with a plane of index of (311).

## Synthesis of Various Nano Structures Using Static Vapor-Phase Deposition

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Various nanostructures were prepared from carbon powder with or without a metal or metal oxide dopant using static vapor-phase deposition. The type of nanostructures produced turned out to be quite dependent on the type of dopant used and the region of the quartz tube in which the nanostructure deposits. Also, several types of nanostructures are generally obtained for a given type of dopant. The optimum temperature was 1,200°C using a 6-8 hour baking time.

# Design, Implementation and Evaluation of UbD Learning Plan on Inequalities in One Variable

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**Keywords:** Understanding by Design, inequalities in one variable, learning plans, structure of knowledge, big ideas, conceptual understanding, procedural knowledge

The purpose of this study is to design, implement and evaluate an a learning plan on linear inequalities in one variable using Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings. Alignment of the three stages of the Ubd plans were ensured through peer critiquing and critiquing by experts.

This study sought to investigate the conceptual and procedural understanding of the students. The participants were high school freshmen from T. R. Yangco Catholic Educational Institute, San Antonio, Zambales and Magsaysay Memorial College, San Narciso, Zambales. Worksheets and other paper and pencil tests as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. This action research revealed that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plans employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans.

## Design, Implementation and Evaluation of UbD Learning Plan on Finding the Slope of a Line

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**Keywords:** Understanding by Design, slope of a line, learning plans, structure of knowledge, big ideas, conceptual understanding, procedural knowledge

The purpose of this study is to design, implement and evaluate an a learning plan on finding the slope of a line using Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings. Alignment of the three stages of the Ubd plans were ensured through peer critiquing and critiquing by experts. This study sought to investigate the conceptual and procedural understanding of the students. The participants were high school freshmen from San Andres School of Masinloc, and Saint Augustine's School of Iba ,Zambales. Worksheets and other paper and pencil tests as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. This action research revealed that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plans employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans.

## Design, Implementation and Evaluation of UbD Learning Plan on Special Products

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**Keywords:** Understanding by Design, special products, learning plans, structure of knowledge, big ideas, conceptual understanding, procedural knowledge

The purpose of this study is to design, implement and evaluate an a learning plan on special products using Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings. Alignment of the three stages of the UbD plans were ensured through peer critiquing and critiquing by experts. The action researches also sought to investigate the conceptual and procedural understanding of the students. The participants were high school freshmen from St. Joseph College High School Dept. in Olongapo City. Worksheets and other paper and pencil tests as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. This action research revealed that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plans employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans.

## Design, Implementation and Evaluation of UbD Learning Plan on Writing Linear Equations in Two Variables

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**Keywords:** Understanding by Design, linear equations in two variables, learning plans, structure of knowledge, big ideas, conceptual understanding, procedural knowledge

The purpose of this study is to design, implement and evaluate an a learning plan on special products using Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings. Alignment of the three stages of the UbD plans were ensured through peer critiquing and critiquing by experts. This study investigated the conceptual and procedural understanding of the students. The participants were high school freshmen from St. Joseph College High School Dept., Olongapo City, Zambales, and Saint Peter of Verona Academy in Hermosa, Bataan. Worksheets and paper and pencil tests, as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. This action research reveal that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plan employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans.

# Design, Implementation and Evaluation of UbD Learning Plan on the Cartesian Coordinate Plane

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**Keywords:** Understanding by Design, Cartesian coordinate plane, learning plans, structure of knowledge, big ideas, conceptual understanding, procedural knowledge

The purpose of this study is to design, implement and evaluate a learning plan on the Cartesian coordinate plane using Understanding by Design (UbD) by Grant Wiggins and Jay McTighe (2003). It shows how the structure of knowledge template is vital in determining the big ideas and essential understandings. Alignment of the three stages of the UbD plans were ensured through peer critiquing and critiquing by experts. This study investigated the conceptual and procedural understanding of the students. The participants were high school freshmen from Columban College High School Dept. in Olongapo City. Worksheets and other paper and pencil tests, as well as authentic assessment instruments were used to find out the level of conceptual understanding and the procedural knowledge of the students. Data gathering was accomplished using students' activity worksheets, tests, observations and interview. Levels of conceptual understanding and procedural knowledge of students were assessed to verify if the goals of the UbD plans were achieved. Observers evaluated the implementation of the UbD learning plans by the teacher-researchers. This action research reveals that high school freshmen have deepened their understanding when they construct their own knowledge through activities that provide exploration, discovery, and making generalization which the UbD plans employed. The essential understandings were exhibited in the students' responses to the various assessment instruments used in the study. The teachers got very satisfactory evaluation in the implementation of the UbD plans.

# Creating Knowledge for Change

The Philippine Society of JSPS Ronpaku Fellows

## A Rapid Assessment of the Ecological Status of the Sitio Pita Bayan-Bayanan Uplands and of the Adaptation and Environmental Practices of its Eva Aetas

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### ABSTRACT

The degradation of upland ecosystems in South East Asia is no longer news. It is an uninterrupted tale of woe plaguing the region despite various efforts towards intervention. Factors believed to contribute to this problem are ascribed to activities of uplanders, such as swidden farming and timber extraction. Indigenous people find themselves in the middle of programs made to affect the situation, but with changing approaches towards environmental rehabilitation, their roles as victims, or beneficiaries, of change have evolved to proponents of development. The Aetas of Biloto, Orion, Bataan have found themselves stewards of an unproductive upland environment 125 km from Manila, known as Sitio Pita Bayan-Bayanan, for more than seven decades. How they have endured in such a territory provides relevant information in order to assess how better to make the upland ecosystems of the country more productive. A rapid assessment of the ecological status of the Sitio as well as a focused group discussion (FGD) was done with the five elders of the indigenous group to identify distinct features of their culture relevant to ecological management. Results showed a people maintaining the value of their traditions despite changes brought about by modernity and globalization, and capable of surviving ecologically unproductive lands such as the 50 hectare cogon grassland they are left with. Their resilience, however, cannot hide their impoverished state that calls for the appropriate action from local government units.