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INTERNATIONAL CONFERENCE ON APPLIED RESEARCH IN EDUCATION (2025)

Programmes & Abstracts

9-10 January, 2025
Nay Pyi Taw, Myanmar

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A Message from Union Minister

Auspiciousness to you all.

It is with great honour and enthusiasm that I extend my warmest welcome to all participants to ***The International Conference on Applied Research in Education (2025)***, scheduled for January 9–10, 2025, in Nay Pyi Taw, Myanmar. This significant event reflects our shared commitment—alongside esteemed partners—to advancing education, science, and innovation through global collaboration.

Conference Theme: "Navigating the Future: Education, Science and Technology for the Brighter and More Prosperous Societies"

This year conference serves as a unique multidisciplinary platform, bringing together the expertise from the diverse fields, including Teacher Education, Arts and Science, Ocean and Earth Sciences, Micro, Small & Medium Enterprises (MSME), Technical and Vocational Education and Training (TVET), and the latest advancements in Natural Language Processing (NLP) and Artificial Intelligence (AI) Technology. By fostering the meaningful dialogue and forging the strategic partnerships, this conference aims to address the pressing challenges and develop sustainable solutions that will benefit education systems, economic growth, and societal development worldwide.

Nay Pyi Taw, with its world-class facilities and cultural richness, provides the perfect setting for this conference. Myanmar International Convention Centre II (MICC-II), the chosen venue, offers an inspiring space for the learning, networking, and collaboration. As Myanmar's administrative capital, Nay Pyi Taw combines the modernity with the cultural depth, ensuring the memorable experience for all participants.

I extend my heartfelt appreciation to the Ministry of Education and our esteemed co organizers, including ASEAN Teacher Education Network (AsTEN), Southeast Asian Ministers of Education Organization, Regional Center for Technical Education Development (SEAMEO TED), Southern University of Science and Technology, the Second Institute of Oceanography, Guangzhou Marine Geological Survey, and many other distinguished institutions. Their tireless efforts and dedications have been instrumental in making this event a reality.

This conference makes a significant milestone for the country, as it marks the first multidisciplinary international research conference organized directly by the Ministry of

Education. With one hundred and thirty-three research papers presented by the scholars from ASEAN countries, China, India, South Korea, Japan, Russia, and beyond, this gathering highlights the power of collaboration. In addition to the insightful presentations and discussions, the signing of Memoranda of Understanding (MoUs) between the local and international universities will set the stage for enduring the academic partnerships.

Through the publication of a *Proceedings Book* by a globally recognized Academic Board, we ensure that the valuable knowledge shared here gains the international recognition. More importantly, we aim to bridge the gap between the research and its practical applications, leveraging the innovative solutions for real-world impact.

I firmly believe that this conference will elevate Myanmar's educational standard and strengthen the regional and global academic collaborations. Together, we can create transformative advancements that empower educators, students and researchers to contribute meaningfully to their communities and nations.

Let us seize this opportunity to exchange the knowledge, inspire one another, and shape a sustainable future. I look forward to welcoming all of you to Nay Pyi Taw and wish the conference every success.

Warmest regards,

Prof. Dr. Nyunt Phay
Union Minister, Ministry of Education, Myanmar

International Conference on Applied Research in Education (2025)

Theme

"Navigating the Future: Education, Science and Technology for Brighter and More Prosperous Societies"

Objectives

1. Foster Collaboration:
   To promote partnerships across educational, scientific, and business sectors for knowledge sharing and best practices.
2. Enhance Education:
   To examine the role of teacher education in sustainable development and achievement of Sustainable Development Goals (SDGs).
3. Support MSMEs:
   To identify challenges faced by MSMEs and advocate for strategies that promote growth and innovation through vocational training.
4. Advance Research in Ocean and Earth Sciences:
   To disseminate findings related to ocean and earth sciences to deepen understanding of environmental challenges.
5. Promote NLP and AI:
   To share learning experiences about the strategies on using NLP and AI in education.

Expected Outcomes

- Cultivate potential researchers.
- Establish collaborative networks to foster ongoing partnerships.
- Generate actionable insights and recommendations for educational policies and practices.
- Encourage the exchange of innovative research findings and technological advancements.
- Strengthen the role of education in sustainable development and economic growth of the region.

Date, Time and Venue

Date and Time:

January 9-10, 2025. 09:00 to 17:00 Myanmar Standard Time.

Venue:

MICC – II, Nay Pyi Taw, Myanmar

About the Event

The International Conference on Applied Research in Education (2025) aims to unite a diverse community of educators, researchers, policy makers, and industry professionals to promote interdisciplinary collaboration and innovation in applied research. This event will offer a platform for engaging discussions on topics such as Teacher Education, Arts and Science, Ocean and Earth Sciences, MSMEs and TVET, as well as the latest developments in Natural Language Processing (NLP) and Artificial Intelligence (AI).

The conference, "Applied Research in Education: Teacher Education, Arts and Science, the 7th Substantial Scientific Collaboration of Ocean and Earth Sciences (SSCOE), Micro, Small & Medium Enterprises (MSME) and Technical and Vocational Education and Training (TVET), and Advancements in NLP and AI Technology", will be held in Nay Pyi Taw, Myanmar, from January 9-10, 2025.

This multidisciplinary conference will focus on applied research across several sectors: education, economic development, earth sciences, and the rapidly evolving fields of language resources and technology. It will serve as a venue for the exchange of research findings and provide opportunities to strengthen collaborations between academic institutions and researchers globally.

Delegates will have the opportunities to foster cooperation between universities and educational institutions, engage in collaborative researches across key areas such as Teacher Education, Arts and Science, Ocean and Earth Sciences, MSME and TVET, and explore advancements in NLP and AI. The conference will also facilitate networking, helping the participants identify the global partners for the future joint ventures and the research initiatives.

The outcomes of the conference are expected to make significant contributions to the cutting-edge technological developments and foster knowledge exchange in frontier scientific fields, ultimately paving the way for the future global the collaborations and innovations.

Host

Ministry of Education (MOE)

History of Ministry of Education

Ministry of Education (MOE), **Myanmar** is the Government Body responsible for overseeing and regulating the country's education system, from the primary to higher education. It formulates the policies, encourage developing the curricula, and ensures the quality education across all levels. The Ministry focuses on teacher training, professional development, and the promotion of inclusive education, ensuring equitable access for the marginalized groups. It also manages the higher education institutions and supports the research and innovation, alongside promoting the technical and vocational education to develop the skilled labour for the labour market. Through international collaborations and digital education initiatives, the Ministry works to align Myanmar's education system with the global standards, aiming to foster socio-economic development and enhance the overall quality of education in the country.

Supervisory Committee

Chairman : Prof. Dr. Nyunt Phay (Union Minister, Ministry of Education)
Vice-chairmen : Dr. Zaw Myint (Deputy Minister, Ministry of Education),
Dr. Moe Zaw Tun (Deputy Minister, Ministry of Education)
Secretary : Dr. Than Than Myint (Director General, Department of Education Research, Planning and Training)
Deputy Secretary : Dr. Soe Moe Lwin (Deputy Director General, Department of Education Research, Planning and Training)
Comittee Members :

Name	Position	Institution
Dr. Win Tun	Director General	Department of Higher Education
Daw Hnin Kyi	Director General	Department of Teacher Education
U Kyaw Swa Thwin	Director General	Department of Basic Education
Dr. Myo Thant	Director General	Department of Myanmar Examination
U Kyaw Win	Director General	Department of Alternative Education
Dr. Chaw Chaw Sein	Director General	Department of Monitoring and Evaluation
Dr. Aung Kyaw	Acting Director General	Ministry of Education
Dr. Thant Zin Aye	Acting Director General	Department of Myanmar Nationalities Languages
Dr. Kay Thwe Hlaing	Rector	Yangon University of Education
Dr. Win Win Than	Rector	Dagon University
Dr. Than Zaw Oo	Rector	West Yangon University
Dr. Myo Min Tun	Deputy Permanent Secretary	Ministry of Education
Dr. Min Maung Maung	Deputy Permanent Secretary	Ministry of Education

International Universities and Organizations in the Conference

1. CODES Centre of Ore Deposit and Earth Sciences, University of Tasmania, Australia
2. Jashore University of Science and Technology, Bangladesh
3. Institute of Technology of Cambodia, Cambodia
4. SEAMEO TED, Cambodia
5. Guangzhou Marine Geological Survey, China Geological Survey, China
6. Second Institute of Oceanography, Ministry of Natural Resources, China
7. President of International Business for Sichuan Tinayi Network Company Limited, China
8. Third Institute of Oceanography, Ministry of Natural Resources, China
9. South China Sea Institute of Oceanology, Chinese Academy of Sciences (CAS), China
10. Shenzhen Foreign Language School, Guangdong, China
11. Shandong University of Science and Technology (SDSUT), China
12. Heidelberg University (Ruprecht-Karls-Universität), Germany
13. Chhatrapati Shahu Institute of Business Education & Research (CSIBER), India
14. Indian Institute of Technology Bombay, India
15. CSIR-NGRI, India
16. Wadia Institute of Himalayan Geology, Dehradun,
17. USDC Global Private Limited, India
18. Faculty of Geological Engineering, Universitas Padjadjaran, Indonesia
19. University of Jemeber, Indonesia
20. Universitas Pendidikan Education, Indonesia
21. Kanazawa University, Japan
22. Chung-Ang University, Korea
23. National University of Laos, Laos PDR
24. Department of Geology Polytechnic College, Laos PDR
25. Kolej Universiti Perguruan Ugama Seri Begawan, Malaysia
26. Mara University of Technology (UiTM), Malaysia
27. Consortium of Asia-Pacific Education Universities/ UPSI, Malaysia
28. Philippine Normal University/Association of Southeast Asian Teacher Education Network (AsTEN)
29. Academics Philippine Normal University, Philippines
30. Polytechnic University of the Philippines
31. Philippine Normal University, Philippines
32. Kurgan State University, Russia
33. Moscow Institute of Physics and Technology (MIPT), Russia
34. Algorithms and Programming Technologies, MIPT, Russia
35. Moscow Institute of Physics and Technology (MIPT) Phystech School of Applied Mathematics and Computer Science) FPMI, Russia
36. Continuing Education and IT Development, Russia
37. Chulalongkorn University, Thailand
38. Kasetsart University, Thailand
39. Mahidol University, Kanchanaburi Campus (MUKA), Thailand
40. Director of the Southeast Asian Ministers of Education Organization Secretariat (SEAMEO Secretariat), Thailand
41. Policy and Planning Specialist, of the Southeast Asian Ministers of Education Organization Secretariat (SEAMEO Secretariat), Thailand
42. Southern University of Science and Technology, Shenzhen, China and Department of Earth and Planetary Sciences, University of California Santa Cruz, California, USA
43. The International School Yangon (ISY), USA
44. Hanoi University of Mining and Geology, Vietnam
45. University of Social Sciences and Humanities (AsTEN), Vietnam

Ministries Participating in the Conference

A total of four hundred and fifty (450) scholars from the local universities and colleges of the following Ministries will attend the conference:

1. Ministry of Transport and Communications
2. Ministry of Defence
3. Ministry of Border Affairs
4. Ministry of Religious Affairs and Culture
5. Ministry of Agriculture, Livestock, and Irrigation
6. Ministry of Cooperatives and Rural Development
7. Ministry of Natural Resources and Environmental Conservation
8. Ministry of Energy
9. Ministry of Industry
10. Ministry of Education
11. Ministry of Science and Technology
12. Ministry of Health

Conference Organizers

Department of Education Research, Planning and Training

- Prof. Dr. Than Than Myint
- Prof. Dr. Soe Moe Lwin

Yangon University of Education

- Prof. Dr. Kay Thwe Hlaing

Shandong University of Science and Technology, China

- Prof. Dr. Xiwu Luan

Second Institute of Oceanography, Ministry of Natural Resources, Hangzhou

- Prof. Dr. Feng Zhou

Guangzhou Marine Geological Survey

- Dr. Tu Guanghong
- Dr. Li Bo

AsTEN (ASEAN Teacher Education Network)

- Dr. John Carlo M. Ramos

SEAMEO TED (Southeast Asian Ministers of Education Organization, Technical Education Development)

- Dr. Ai Songheang

PROGRAMMES

Day-1 Programmes - January 9, 2025 (Thursday)

Programme of the Opening Ceremony

Arrival of VIP Guests: **08:45 AM**

Arrival of the Chairman of the State Administration Council: **08:55 AM**

Opening Ceremony Commencement: **09:00 AM**

No.	Programme	Duration	Time	
			From	To
Part One: Programme				
Item 1	Marking the opening of the Ceremony with a ribbon-cutting conducted by the Vice-Chairman of the State Administration Council, and designated government officials	5 minutes	09:00	09:05
Item 2	Pressing the opening button to formally inaugurate the Conference by the Chairman of the State Administration Council and Prime Minister Senior General Min Aung Hlaing	5 minutes	09:05	09:10
Part Two: Programme				
Item 3	Announcement of the Official Opening of the Conference	5 minutes	09:30	09:35
Item 4	The song "Mingalabar" performed by the students of Yangon University of Education	10 minutes	09:35	09:45
Item 5	Lighting the Candle of Knowledge to mark the commencement of the Conference by the Chairman of the State Administration Council and Prime Minister Senior General Min Aung Hlaing accompanied by the members of State Administration Council and Union Minister of Education	5 minutes	09:45	09:50
Item 6	Delivering the Opening Speech by the Chairman of the State Administration Council and Prime Minister Senior General Min Aung Hlaing	20 minutes	09:50	10:10
Item 7	(a) Performance by the students of the Yangon University of Education (b) Performance by the students of Education Degree Colleges	15 minutes	10:10	10:25
Item 8	Documentary Photography Session	15 minutes	10:25	10:40

Item 9	Announcement of the Conclusion of the Opening Ceremony	5 minutes	10:40	10:45
Item 10	Touring and Viewing the Research Poster Booths	60 minutes	10:45	11:45
Item 11	Lunch Reception	60 minutes	11:45	12:45
Total Duration		3 hours and 45 minutes		

Part Three: Programme

Time	Title
13:00 – 13:20	Welcoming Remarks and Keynote Speech by Prof. Dr. Nyunt Phay, Union Minister of Education, Myanmar
13:20 – 13:40	Congratulatory Address by Prof. Dr. Gaowen He, Deputy Chief Geoscientist, Guangzhou Marine Geological Survey, Ministry of Natural Resources, China
	Congratulatory Address by Prof. Dr. Siba Prasad Rath, Director, CSIBER, Kolhapur, India
	Congratulatory Address by Prof. Dr. Oleg Ivchenko, Programming Technologist, Moscow Institute of Physics and Technology, Russia
	Congratulatory Address by Datuk Dr. Habibah Abdul Rahim, Director of the Southeast Asian Ministers of Education Organization Secretariat (SEAMEO Secretariat)
	Congratulatory Address by Prof. Dr. NGO Thi Phuong Lan, President of the University of Social Sciences and Humanities, Chairperson, AsTEN, Vietnam
13:40 – 14:10	Signing of the Memorandums of Understanding (MOU)
14:10 – 14:20	Presentation of Certificates of Appreciation
Tea Break (14:20 – 14:40)	
Keynote Address	
14: 40 – 14: 50	Prof. Dr. Ai Songheang Centre Director, SEAMEO TED, Cambodia
14: 50 – 15: 00	Prof. Dr. Chen Jianfang Deputy Director General, Ministry of Natural Resources, China
15:00 – 15:10	Prof. Dr. Tetsuya Sagawa Professor, Kanazawa University, Japan
15: 10 – 15:20	Prof. Dr. Kyi Shwin Rector, Yangon University of Foreign Languages (YUFL), Myanmar

15:20 – 15:30	Daw Khine Khine Nwe Secretary General, the Union of Myanmar Federation of Chambers of Commerce and Industry, Myanmar
15:30 – 15:40	Prof. Dr. Roger Chao Jr. Professorial Chair Holder on Education, Polytechnic University of the Philippines and Member of the Internationalization of Higher Education Panel of Eminent Experts, Commission on Higher Education, Philippines
Special Talk	
15:40 – 15:55	Prof. Dr. Xiwu Luan Professor, Shandong University of Science and Technology, China
15:55 – 16:10	Prof. Dr. Siba Prasad Rath Director, CSIBER Kolhapur, India
16:10 – 16:25	Prof. Dr. Thet Tin Nyunt Director General, DGSE, MONREC, Myanmar
16:25 – 16:40	Prof. Dr. Tin Bhone Kyaw Project Director, Myanmar Language and Literature Improvement Project, Myanmar
16:40 – 16:55	Professor Dr. Pitsanupong Kanjanapayont Deputy Dean of the Faculty of Science, Chulalongkorn University, Thailand

Day – 2 Porgrammes - January 10, 2025 (Friday)

Part One: Programme

Parallel Sessions: 1, 2, 3, 4, 5, 6 & 7 (08:00 – 14:00)		
Session 1	**Teacher Education**	**Room (1)**
Session 2	**Arts and Science**	**Room (2)**
Session 3	**Ocean and Earth Sciences (1)**	**Room (3)**
Session 4	**Ocean and Earth Sciences (2)**	**Room (4)**
Session 5	**MSME and TVET**	**Room (5)**
Session 6	**NLP and AI Technology**	**Room (6)**
Session 7	**Young Scientists**	**Room (7)**

Part Two: Programme

Programme of the Closing Ceremony

Item 1	Recapping the Event	30 minutes	14:15	14:45
Item 2	Closing Remarks by Prof. Dr. Nyunt Phay, Union Minister of Education	10 minutes	14:45	14:55
Item 3	Announcement of the Completion of the Closing Ceremony	5 minutes	14:55	15:00
Total Duration		**45 minutes**		

Part Three: Programme

Gala Dinner

Item 1	Opening Announcement of the Ceremony	5 minutes	18:00	18:05
Item 2	Presentation of Certificates of Honor	10 minutes	18:05	18:15
Item 3	Dinner Reception with Musical Performances by University Students	100 minutes	18:15	19:55
Item 4	Closing Announcement of the Ceremony	5 minutes	19:55	20:00
Total Duration		**2:00 hours**		

Parallel Session – 1
Teacher Education

Session 1: Teacher Education (08:00 – 14:00)			**Room (1)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Ohmmar Win	An Analytical Study into Teaching Aptitude of Student Teachers in Relation to Their Teaching Competency	**Dr. Tetsuya Sagawa** **Dr. Pooja MahadevPatil**
08:15-08:30	May Cho Min	The Relationship Between Empathy and Professional Identity of Teachers	
08:30-08:45	Wah Wah Win Htet	Teachers' Perceptions on Inclusive Education for Children with Disabilities	
08:45-09:00	Thatchavee leelawat	Mahidol University Kanchanaburi Campus and Earth Sciences Education	**Dr. Khin Mar Khaing** **Dr. Narudol Semchuchot**
09:00-09:15	Su Mon Aung	Teacher Educators' Perception and Use of Information and Communication Technology in Universities of Education	
09:15-09:30	John Carlo M.Ramos	Pre-service Teachers' Use of Chat GPT and Acquired Moral Dissonance	
Tea Break			
09:45-10:00	Thet Thet Khine	Exploring Teacher Educators' Knowledge and Potential Practices for Integrating Entrepreneurship Education	**Dr. Udomluk Koolsriroj** **Dr Khin Mar Ni**
10:00-10:15	Ei Ei Phyo	A Study of the Innovative Education Management Strategies for the 21st Century	
10:15-10:30	Pyae Phyo Aung	A Preliminary Investigation into School Self-Evaluation Framework for Basic Education High Schools	
10:30-10:45	Nan Cherry Nway Nway	Organizational Climate and Organizational Mindfulness of Basic Education High Schools	

10:45-11:00	Theingi Aung	Factors Affecting Implementation of Primary Science Curriculum in Myanmar	**Dr. John Carlo M.Ramos** **Dr. Khin Hnin Nwe**
11:00-11:15	Ei Khaing Win	Relationship between Novice Teachers' Reflective Practices and Teacher Professionalism	
11:15-11:30	Myat Thandar Aye	An Analytical Study of School Violence Management Strategies	
Lunch			
12:30-12:45	John Carlo M.Ramos	Towards Transitioning Internationalization of Teacher Education into the Post-Pandemic Era	**Dr. Kay Thwe Hlaing** **Dr. Hoang Mai Khanh**
12:45-13:00	Narudol Semchuchot	A Survey of the Reading Habits of Myanmar Undergraduate Education Students	
13:00-13:15	Zaw Tun Aung	An Evaluation of Lower Secondary Level English Textbooks in the Context of Myanmar	
13:15-13:30	Thae Hsu Khine	Strategies to Enhance Primary Teachers' Receptivity toward the KG+12 Curriculum Implementation in Myanmar	**Dr. Khin Mar Khaing** **Dr. Sasigaran Moneyan**
13:30-13:45	Saw Ohnmar	Investigating the Impact of Pedagogic Skills Models on Preservice Teachers' Classroom Management	
13:45-14:00	Zaw Myint Lin	The Impact of Curriculum Reform on Primary Teachers' Instructional Perception and Practices	
Tea Break			

Parallel Session – 2
Arts and Science

Session 2: Arts and Science (08:00 – 14:00)			**Room (2)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Nay Aung	Narrow Down the Skills Gap in Higher Education of Myanmar (Conceptual Approach)	**Dr. Khin Thida** **Dr. Zaw Win**
08:15-08:30	Phyu Phyu Nyein Thwe	နိုင်ငံခြားသားများကို မြန်မာဘာသာ စကားသင်ကြားမှုပုံစံ	
08:30-08:45	Aye Aye Thinn	Tracing the Origin of Raw Material for Brick Production in Wadee Ancient Phu City	
08:45-09:00	Nwe Ni Hlaing	Calcium Oxide-Based Precursor Adsorbents for Carbon Dioxide Adsorption	**Dr. Tin Maung Tun** **Dr. Than Zaw Oo**
09:00-09:15	Yan Naing Tun	Electronic Behaviors and Atomic Scale Analysis in Some Transition Metals Using Angular Correlation of Annihilation Radiation Method	
09:15-09:30	Htaik Nandar Kyaw	Analysis of Single Hypernucleus Events with Neutron and Neutral Pion Decay Products	
Tea Break			
09:45-10:00	Yee Yee Than	Removal of Lead, Copper and Chromium Ions from Wastewater by Agricultural Waste	**Dr. Ni Ni Oo** **Dr. Theingi Shwe**
10:00-10:15	Tin Myo Thant	Structural Elucidation of 2-(3,4-dihydroxyphenyl) chromane-3,5,7-triol and Antimicrobial Activity of Bark of *Dalbergia cultrata* Grah. Extracts	
10:15-10:30	Aung Than Htwe	Extraction of SiO2 Nanoparticles Derived from Giant Reed (*Arundo donax* L.) Leaves and Some Characterization	
10:30-10:45	Pyai Pyai Phyo	ZIF-8 Derived Zn1-xCdxS Nanocomposites: Cost-Effective and Scalable Photocatalysts for Sustainable Hydrogen Production under Visible Light Irradiation	

10:45-11:00	Moe Sandar Shein	Study on Some Myanmar in Native Orchids Temperate and Subtropical Regions	**Dr. Aye Kyi** **Dr. Soe Soe Aung**
11:00-11:15	Aye Thida Win	Study on Morphology, Acute and Sub-Acute Toxicity and Antioxidant Activities of *Stemona burbilli* Pran	
11:15-11:30	Khaing Wai Wai Nyunt	Fermentation and Characterization of Wine from Fruits of *Xantolis tomentosa* (Roxb.) Raf.	
Lunch			
12:30-12:45	Kay Lwin Tun	Production of Ready-to-use Fish Food Moina Capsule for Fish Larviculture	**Dr. Myitzu Min** **Dr. Thandar Aung**
12:45-13:00	Aung Win	Success of New Clinical Training Program on House Officer Performance at Prosthodontic Clinic, University of Dental Medicine, Mandalay	
13:00-13:15	Okka Minn	Dietary Intake, Nutritional Status and Body Composition of Players in Myanmar National Football Academy (U12, U14, U16, U19)	
13:15-13:30	Sint Sint Myat	Accessing Research Ethics Awareness Among Social Science Scholars in Myanmar's Higher Education Sector	**Dr. Myo Min Tun** **Dr. Aye Aye Yu**
13:30-13:45	Lae Yin Win	Comparison between the Two numerical Fluxes for Muscl.Hancock Method to the One Dimensional Modified Chplygin Gas Equations	
13:45-14:00	Zaw Zaw Thein	Floods Wreak Landslide Damage in Myanmar Triggered by Typhoon Yagi: A Case Study Approach	
Tea Break			

Parallel Session – 3
Ocean and Earth Sciences

Session 3: Ocean and Earth Sciences (08:00 – 14:00)			**Room (3)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Prinya Putthapiban	New Evidence and Tectonic Processes on the Closure of the Paleo Tethys in Western Thailand	**Dr. Ko Ko Gyi** **Dr. Mega Fatimah Rosana**
08:15-08:30	Aye Ko Aung	Some Important Paleozoic Fossils from Myanmar: Implications for Paleogeography, Paleobiogeography and Paleoclimatology	
08:30-08:45	Kapsea Lokho	Geodynamic evolution of the Indo-Myanmar Range from the Mesozoic to the Cenozoic: Inferences From the Fossil Records	
08:45-09:00	Maung Maung	Study on the Drowning Unconformities in some Paleozoic and Mesozoic Sequences of the Southern Shan State, Myanmar	**Dr. Aye Ko Aung** **Dr. Chen Jianfang**
09:00-09:15	Santi Dwi Pratiwi	Nannofossil Distribution on Ciletuh Palabuhanratu Unesco Global Geopark of Indonesia: Application for Paleoclimate Changes	
09:15-09:30	Soe Moe Lwin	Paleogene Index Microfossil of Central Basin: Implication on the Crude Oil Production	
Tea Break			
09:45-10:00	Luo Xiaowen	Introduction to the Construction of Global Sea Level Change Ocean Co mprehensive Station	**Dr. He Gaowen** **Dr. Chuanxiu Luo**
10:00-10:15	Piyaphong Chenrai	A Preliminary Assessment of the Geological Carbon Dioxide Storage Potential of the Mae Moh Mine, Thailand	
10:15-10:30	Abir Banerjee	Exploration for Lithium in the Amareshwar region, Dharwar craton, Southern India	

10:30-10:45	Theik Htet Aung	Histological Changes in the Gill and Liver Tissues of Some Fish Species from Mone Creek near the Nyaung Ghone Village, Pwintphyu Township, Magway Region	
10:45-11:00	Win Maung Aye	Analysis on Water and Quality for Empowering Water Safely Education in Mekhong River Basin of Myanmar	**Dr. Xixi Zhao** **Dr. Chit Sein**
11:00-11:15	Li Bo	Magnetic Properties of Sediments in the Western Continental Slope of the South China Sea and Its Environmental Significance	
11:15-11:30	Chen Jianfang	Ecosystem Response to the Rapid Sea Ice Retreat in Arctic Ocean	
Lunch			
12:30-12:45	Thet Tin Nyunt	Fluid Inclusion Study of Beryls from Shwetharlyaung (Weibu) Hill Pegmatite, Kyaukse District, Mandalay Region, Myanmar	**Dr. Guo Ruoyu** **Dr. Kyi Kyi Lin**
12:45-13:00	Chuanxiu Luo	The Impact of Sea Level Changes on Mangrove Establishment Around Sundaland Since the Last Glacial Maximum	
13:00-13:15	Yun Qiu	Understanding Marine Heatwaves in the Bay of Bengal: Progresses and Future Endeavors	
13:15-13:30	Wunna Aung	Carbonate Hosted Copper Mineralization at Kyaukse (East), Central Myanmar	**Dr. Than Than Oo** **Dr.Siba Prasad Rath**
13:30-13:45	Aung Min Oo	Geochemical Investigation of Hot Springs in Hlaingbwe Township, Kayin State, Myanmar: Implications for a Hot Spring Genesis	
13:45-14:00	Phyo Zaw Aung	Geochemical Characterization of Rare Earth Element Deposits in the Bawbadan-Kyatpyin Area, Mogok Stone Tract, Myanmar	
Tea Break			

Parallel Session – 4
Ocean and Earth Sciences

Session 4: Ocean and Earth Sciences (08:00 – 14:00)			Room (4)
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Xixi Zhao	Paleomagnetic, Rock Magnetic and Microscopic Analyses of Deep-sea Sediments Offshore Sumatra: Remagnetization Associated with Subduction of Indian and Asian Blocks	**Dr. Xiwu Luan** **Dr. Aung Win**
08:15-08:30	Khin Zaw	Critical Metals Potential in Volcanic-Hosted Massive Suphide Deposits (VHMS) in SE Asia: Insight from the Bawdwin Deposit in Myanmar	
08:30-08:45	Siba Prasad Rath	Disappearance of River Sarasvati in India - An Environmental Perspective, Lessons for the Future	
08:45-09:00	Guo Ruoyu	Diversity Patterns and Ecological Assembly Mechanisms of Bacterial Communities in the Northeastern Indian Ocean Epipelagic Waters During The Northeast Monsoon	**Mr. Yun Qiu** **Dr. Aung Kyaw Thin**
09:00-09:15	H. M. Zakir Hossain	Multiproxy Approach to Estimate Organic Matter Source and Paleoclimate Variability of Multicore Sediments From The Andaman Sea	
09:15-09:30	Zhou Feng	Investigate the Diluted Water Signals Detected from the RAMA Buoys in the Bay of Bengal	
Tea Break			
09:45-10:00	Ye Ruijie	Effect of Turbulent Mixing on the Formation of Intermediate Nepheloid Layer over the Northern Continental Slope of the Andaman Sea	**H. M. Zakir Hossain** **Dr. Win Naing**
10:00-10:15	Chawalit Charoenpong	Mercury Trophic Transfer and Biomagnification in Gulf of Thailand Food Webs	

10:15-10:30	Tongtong LIU	Dissolved Oxygen Recovery in the Oxygen Minimum Zone of Arabian Sea in the Recent Decade Observed by BGC-Argo Floats	
10:30-10:45	Phyoe Swe Aung	Seismic Microzonation Hazard Map for Sagaing City, Myanmar: Assessing the Effects of Rupture Scenario Events from the Sagaing Fault	
10:45-11:00	Mega Fatimah Rosana	Earth Science Education for SDGs Application in Geopark Development, A Case Study in Indonesia Geoparks	**Dr. Tu Guanghong** **Dr. Soe Moe Lwin**
11:00-11:15	Khin Kyawt Kyawt Oo	An Assessment of the Physical and Chemical Properties of Dispersive Soils in Wundwin Area, Mandalay Region, Central Myanmar	
11:15-11:30	Wang Zhe	Pliocene Tectonic Transformation from Strike-Slip to Thrust Along the Eastern Margin of Pamir Salient	
Lunch			
12:30-12:45	Tu Guanghong	China-Myanmar Yangon Estuary Joint Environmental Geological Survey	**Dr. Nay Win Oo** **Dr. Pitsanupong Kanjanapayont**
12:45-13:00	Aung Moe	Kinematic Tectonic Implications of the Geological Structures and Stratigraphy for Reconstructing the Kyaukse-Lungyaw Plain, Myanmar	
13:00-13:15	Mohd Qaim Raza	Chlorite chemistry and thermometry of base metal mineralisation, Nallamalai Fold Belt, Cuddapah Basin, India: Implications for mineral exploration	
13:15-13:30	Sai Naing Lin Aung	Multivariate Classification of Petroleum Systems in the Salin Basin: A Case Study of Yenangyaung, Chauk, and Letpando Oilfields	

13:30-13:45	Zhu Yongling	The Operation of RV Dayanghao in Support of Training and Educational Programs	**Dr. Aye Aye Han** **Dr. Chawalit Charoenpong**
13:45-14:00	Bounhueng Phanpasert	Preliminary Study on Geology, Mineralogy, and Geochemistry of the Nam Xan Gold Prospect in Northeastern Laos	
Tea Break			

Parallel Session – 5

MSME and TVET

Session 5: MSME and TVET (08:00 – 14:00)			**Room (5)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Khin Mar Kyaw	Integrating Entrepreneurship Education into TVET Programs in Myanmar	**Dr. Pyae Kyaw Thu** **Dr. Maw Maw Tun**
08:15-08:30	Maw Maw Tun	Identifying Ways to Improve Access to Upper Secondary TVET Education Among Disadvantaged Youth for Advancing Sustainable Development in Myanmar	
08:30-08:45	Naing Myint Htet	Moving Towards AI Technology in TVET Cooperating with MSME	
08:45-09:00	Thida Htun	Creative Approach to be Effective Industry-Academic Collaboration for MSMEs and TVET	**Dr. Nu Nu Lwin** **Dr. Aye Aye Win**
09:00-09:15	Kyi Kyi Thant	Literacy and Entrepreneurial Performance of Micro, Small, and Medium Enterprises in Naypyitaw	
09:15-09:30	Kyi Lae Han	Exploring New Technology Adoption in Myanmar's a MSME Sector from Traditional to Digital Practices: Perspective from Human Capital Development	
Tea Break			
09:45-10:00	Ko Ko Aung	Colour Fastness Properties of Swietenia Macrophylla King (Mahogany) Bark on Cotton Cloths	**Dr. Than Zaw Oo** **Dr. Myint Thida**
10:00-10:15	Su Su Aung	Low-Cost, Sustainable Clay Base Biocomposites Filters for Water Purification	
10:15-10:30	San Dar Win	Preparation, Characterization and Application of the Cross-Linked Chitosan-Starch Composite Film	
10:30-10:45	Sabai Phyu	Effect of Sewage Biosolid Fertilizer on Growth and Yield of Mustard	

10:45-11:00	Choong Yong Ahn	Micro, Small & Medium Enterprises & Technical and Vocational Education and Training (MSME & TVET): The Case of South Korea	**Dr. Ba Han** **Dr. Nay Aung**
11:00-11:15	Nay Lwin Htut	The Impact of SMEs Development Policy on SMEs Performance in Myanmar	
11:15-11:30	Kalaya Lu	Communities Participation in Manufacturing of Value-added Toddy Palm Products for the Development of MSME in Mandalay Region	
Lunch			
12:30-12:45	Thazin Han	Challenges, Needs, and Recommendations for the Development of MSMEs in Myanmar's Food and Beverage Sector	**Dr. U Win** **Dr. Saw Kay Thwe Moe**
12:45-13:00	Myint Thida	Micro, Small & Medium Enterprises Empowerment in Mon State	
13:00-13:15	Thiha Htun	The Effects of Innovation on Performance of Weaving Firms in Amarapura Township	
13:15-13:30	Win May Khaing	Successful MSME Models and Service Quality Impact on Student Satisfaction in Higher Education Institutions in Myanmar	**Daw Khine Khine Nwe** **Dr. Nay Thwe Kyi**
13:30-13:45	Khin Zar Win	Effect of Financing on SME Growth in Thanlyin Township, Yangon	
13:45-14:00	Moe Hnin Phyu	Prospects of Human Capital for Labour Productivity (A Case Study of Local Brand MSME Garment Firms in Yangon, Myanmar)	
Tea Break			

Parallel Session – 6
NLP and AI Technology

Session 6: NLP and AI Technology (08:00 – 14:00)			**Room (6)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Ei Paing Phyo	Challenges in Myanmar Speech-to-Digital Code Conversion: Feature Extraction with MFCC and Analysis of Accuracy Limitations	**Dr. Tin Bhone Kyaw** **Mr. Wong Wai Yin**
08:15-08:30	Sai Aung Thet Oo	Developing an Abstractive Text Summarization System for the Myanmar Language Using a Fine-Tuned mT5 Model	
08:30-08:45	Yan Naing Soe	A Generative Approach to Medical Question-Answering in Myanmar Language Using Transformers	
08:45-09:00	Moe Yin Nyein	Challenges in Part-of-Speech (POS) Tagging of Particles: Revealing Multifunctionality and Its Effect on NLP Applications	**Dr. Thant Sin Aye** **Dr. Yi Mon Shwe Sin**
09:00-09:15	Nan Sanda Win	The Analytical Study of Myanmar Interjections for NLP Context	
09:15-09:30	Nwe Nwe Win	A Study of Different Part-of-Speech (POS) Tagsets for Myanmar Dependency Parsing	
Tea Break			
09:45-10:00	Nang Kham Htwe	Syllable Length-limited Tacotron 2 Based Myanmar Dhamma Text-to-Speech Synthesis	**Dr. Win Pa Pa** **Mr. Gushchin Aleksunder Vladimirovich**
10:00-10:15	Yi Mon Shwe Sin	Domain Adaptation of Myanmar-English Statistical Machine Translation System	
10:15-10:30	Win Lai Lai Phyu	Myan Speech: Enhancing Myanmar Automatic Read Speech Recognition with Subsampling Techniques of TDNN	
10:45-11:00	Khin Maung Zaw	The Usefulness and Awareness of Using AI Applications in Higher Education: Large Language Model (LLM)	

10:30-10:45	Nataliia Nefedova	Integration of AI Methods with Hadoop Ecosystem	**Dr. Nay Lynn** **Dr. Naing Naing Khin**
11:00-11:15	Myat Nyein Moe	Harnessing Machine Learning to Predict and Enhance Student Academic Performance: A Study in UDNR, Myanmar	
11:15-11:30	Htet Nandar Aung	The Use of Machine Translation by Undergraduate English Language Students; Attitudes and Perceptions of English Language Teachers from Mandalay University of Foreign Languages	
Lunch			
12:30-12:45	Khin Myat Myat Thwe	An Investigation into the Natural Language Processing Capabilities and Issues Supported by Google Machine Translate (Myanmar - English)	**Dr. Zaw Min Khaing** **Dr. San Su Su Yee**
12:45-13:00	Min Thway Han	GFPGAN-Based Deblurring for Enhanced Face Recognition from Low-Resolution CCTV Images	
13:00-13:15	Myo Myat Thu	Integrating Apache Spark for Efficient Deep Learning-Based Remote Sensing Analysis in Developing Countries	
13:30-13:45	Kyaw Kyaw Lin	Improving Weather Forecast Accuracy for Nay Pyi Taw City Using Bi-directional LSTM and Exponential Moving Averages	
13:15-13:30	Min Thu Aung	A Comparative Analysis of Feature Fusion for End-to-end Named Entity Recognition from Myanmar Speech Using Voice Activity Detection and Fusion Based Feature Extraction Methods	**Dr. Win Lae Kay Khaing** **U Tay Zar Lin**
13:45-14:00	Linn Htoo Naing	Different Tokenization Approaches for optimizing Statistical Machine Translation in Myanmar Language	
Tea Break			

Parallel Session – 7
Young Scientists

Session 7: Young Scientists (08:00 – 14:00)			**Room (7)**
Time	**Author**	**Title**	**Chairman**
08:00-08:15	Yu Yu Aung	Eestimation of Distance between Vehical and Webcam in Real-Time Using YOLOv8	**Dr. Yay Chan** **Dr. Yin Yin Su Win**
08:15-08:30	Tin Zar Win	Optimization for Administration Problem with the Use of E-Constraint Method	
08:30-08:45	Moe Zaw Hein	Analysing Combat Potential Approach to the Battle Outcomes in Generalized Lanchester (n, 1) Model	
08:45-09:00	Chaw Su Hlaing	The Subfertility Journey: Voices of Women Undergoing Fertility Treatment	**Dr. Win Win Than** **Dr. Kay Lwin Tun**
09:00-09:15	Tin Phyo Phyo Lwin	Acquisition of Nurses' Professional Knowledge through Daily Nursing Care Practices in Pediatric Settings: A Grounded Theory Approach	
09:15-09:30	Thwe Zin Oo	Nutritional Value of Some Small Indigenous Fish Paste in Igaloung Kyun, Hlaing River Segment, Taikkyi Township, Yangon Region	
Tea Break			
09:45-10:00	Khin Thant Sin Tun	An Analysis of Illocutionary Speech Acts in the Utterances of the Main Character, Barbie Margot in the Movie *Barbie* (2023)	**Dr. May San Yee** **Dr. Paul Benedict Sicard**
10:00-10:15	Nan Aye Thiri Oo	The Engagement of Teacher Educators' Continuous Professional Development in Education Degree College	
10:15-10:30	Paing Thi Ko	A Study of Myanmar-English Translation Methods Focusing on Similies in the Selected Short Stories of Thein Pe Myint Translated into English by Patrica Meredith Milne	

10:30-10:45	Aung Kaung Khant	Valorization of Wild Taro Stalk for Green Biochemical and Biofuel Preparation	**Dr. Khin Si Win** **Dr. Khin Hnin Aye**
10:45-11:00	Pwint Phyu Nyein	Study on the Preparation and Characterization of Fermented Fish Products (Ngachin)	
11:00-11:15	Nilar Aung	Effective Degradation of Rhodamine B Dye Using the Magnetite-Activated Carbon-Clay Composite as a Fenton Catalyst	**Dr. Hnin Hnin Than** **Dr. Ni Ni Than**
11:15-11:30	Aye Nyein Aung	Extraction and Characterization of Collagen from the Skins of *Megalaspis cordyla*, *Pampus argenteus*, and *Nemipterus swainson*: Yield, Purity, and Mineralization Analysis for Potential Applications	
Lunch			
12:30-12:45	Swan Pyae Sone	The Role of Cost-Effective Green Buildings in Climate Change Adaptation and Sustainable Resource Use	**Dr. Gregory Hedger** **Dr. Thiri Kyaw**
12:45-13:00	Han Thu Aung	A Study of Teacher Educators' Followership Styles and Altruism in Education Degree Colleges	
13:00-13:15	Myat Su Hlaing	Effect of Flipped Classrooms on Empowerment and Social Connectedness of Student Teachers	
13:15-13:30	Swan Yi Htet	Isolation, Morphology and Microscopical Characters of Endophytic Fungi from *Zingiber officinale* Rosc.	**Dr. Phyu Phyu Lwin** **Dr. Soe Soe Aung**
13:30-13:45	Arkar Moe Myint	Gemological Characteristics of Sapphires from Baw Mar Deposit, Mogok Region, Myanmar	
13:45-14:00	Khin Kyi Cin Linn	Study on Ahlone Waterway in the Chindwin River	
Tea Break			

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ABSTRACTS

An Analytical Study into Teaching Aptitude of Student Teachers in Relation to Their Teaching Competency

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Abstract

The main purpose of this study is to conduct an analytical study into teaching aptitude of student teachers in relation to their teaching competency. A total of 1232 student teachers (439 male and 793 female) from three universities of education participated as a sample and was chosen by using simple random sampling technique. Descriptive research design and quantitative survey method was used. To collect required data, Teaching Aptitude Scale (TAS) and Teaching Competency Scale (TCS) constructed and validated by researcher were used. The reliability coefficients of teaching aptitude scale and teaching competency scale were 0.935 and 0.934 respectively. Findings from field testing revealed that the teaching aptitude and teaching competency of student teachers were satisfactory. According to the results, there were significant differences in teaching aptitude by gender, institution and reason of professional selection. But there were not significant differences in teaching competency by gender, institution and reason of professional selection. The result of the correlation showed that student teachers' teaching aptitude was significantly and positively related to their teaching competency. Moreover, student teachers' teaching aptitude was significant prediction on their teaching competency and it explained about 32% of the variance of teaching competency. Therefore, this study highlighted that teaching aptitude can enhance the teaching competency of student teachers.

Keywords: Teaching Aptitude, Teaching Competency, Student Teachers

The Relationship Between Empathy and Professional Identity of Teachers

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Abstract

Teachers' professional identity stands at the core of the teaching profession. It guides his or her actions and practices and influence the teachers' behaviors and attitude. To achieve those professional identity, teachers adapt well with the challenges and need to enhance empathic skills. Empathy is an important skill for teachers to facilitate the creation of a positive learning environment with students and professional responsibilities of teachers to be empathic are defined in standards framework worldwide. Empathy is often cited as a very important characteristics of teachers, which enable adequate communication between the participants of the educational process. In Myanmar, there are few studies that highlight teachers' empathy

and professional identity. Therefore, the primary purpose of this study is to investigate empathy and professional identity of teachers. The specific objectives of the study are to examine empathy of teachers by gender, age, designation and teaching experience, to investigate teachers' professional identity by gender, age, designation and teaching experience, to explore the relationship between teachers' empathy and professional identity, and to investigate the effect of empathy on professional identity of teachers. The quantitative research design was used in this study. A total of 539 teachers (128 primary assistant teachers, 229 junior assistant teachers, 182 senior assistant teachers) participated in this study. The instruments used in this study were the Empathy Quotient Scale (, Lawrence et al., 2004) and the Professional Identity Questionnaire (Beijaard et al., 2000). Regarding empathy, cognitive empathy was the highest among the subscales of empathy (cognitive empathy, emotional empathy and social skills). The result revealed that male teachers had higher emotional empathy than female teachers. The findings of this study indicated that younger teachers have higher in social skills and the overall scale of empathy than older teachers. The results indicated that there was no significant difference of teachers' empathy by designation, whereas there were significant differences in emotional empathy, social skills and the overall scale of empathy by teaching experience. Regarding professional identity, pedagogical expert was the highest in the subscales of professional identity (subject-matter expert, pedagogical expert and didactical expert). The result revealed that there was no significant difference of professional identity by gender and age. The results of this study indicated that primary assistant teachers were significantly higher in subject-matter expert, pedagogical expert, didactical expert, and professional identity (total) than those of junior and senior assistant teachers. Moreover, there were significant differences in all three subscales and the overall scale of professional identity by teaching experience. Furthermore, the results indicated that teachers' empathy was positively correlated with professional identity of teachers. Finally, the results revealed that empathy was a positive predictor of professional identity of teachers. Therefore, teachers' empathy is a key feature of teachers who have strong professional identity, allowing them to effectively establish good teacher-student relationship and a relaxed teaching environment. This study suggests that educators should pay attention to the cultivation of empathy ability to enhance teachers' professional identity.

Keywords: Empathy, Professional Identity, Myanmar Teachers

Teachers' Perceptions on Inclusive Education for Children with Disabilities

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Abstract

Researchers globally have emphasized the crucial role of teachers' attitudes in the success of Inclusive Education (IE). According to Rajashekar, N (2021), addressing the challenges in inclusive education is essential to fostering positive perceptions, which can be achieved

through the provision of adequate support. The main objective of this research is to explore teachers' perceptions on inclusive education for children with disabilities. A total of 400 participants, including Principals, Junior Assistant Teachers (JAT), Primary Assistant Teachers (PAT), and Senior Assistant Teachers (SAT) were included in this study. The research design of this study was descriptive. The instrument used in this study namely Teacher Perceptions on Inclusive Education (TPIE) was validated through the explanatory and confirmatory factor analysis for measuring teachers' perceptions on inclusive education. Descriptive statistics, One-way ANOVA and post-hoc Tukey HSD tests were employed to analyze the data. According to the descriptive statistics, teacher perceptions on inclusive education has a valid agreement in beliefs towards regular classroom, barriers to inclusive education and supports needed for implementing inclusive education. This reveals that teachers have moderately positive perceptions of inclusive education for students with disabilities. Each subscale provides unique insights. Beliefs towards regular classrooms for disabilities students (M: 3.87, *SD:* 1.05) reveals generally positive beliefs about the inclusion of students with disabilities in regular classrooms, such as fostering social interaction, mutual understanding, and emotional development. However, some items (e.g., specialized teacher support) received lower agreement, indicating mixed views on certain aspects. The barriers to inclusive education (M: 3.80, *SD*: 0.96) subscale reflects a moderate agreement that barriers such as lack of teacher training, insufficient resources, bullying, and curriculum rigidity hinder the effective inclusion of students with disabilities in regular classrooms. In the supports needed for implementing inclusive education (M: 3.81, *SD*: 0.76), the highest mean score indicates strong agreement on the importance of providing adequate support, such as teacher training, collaborative efforts, inclusive curricula, and governmental support. Overall, teachers generally have a favorable perception toward inclusive education, with teachers acknowledging both the challenges and the supports required for its successful implementation. Furthermore, the results stated significant differences in beliefs and perceived barriers across job positions ($p < .01$), while perceptions of support showed no significant difference. PAT teachers reported the lowest beliefs about inclusive education and the highest perception of barriers compared to other groups. In contrast, JAT teachers expressed the most positive beliefs, and principals perceived the highest levels of support, reflecting their administrative perspective. These findings underscore the need for enhancing PAT teachers' beliefs and reduce barriers by improving training, resources, and systemic support. On the whole, this study highlights teachers' perceptions on inclusive education for children with disabilities students which are foundations to implement strategies for educational stakeholders to inclusive environments that benefit all students by addressing barriers and investigating needed support.

Keywords: Teacher Perception, Disability, Inclusive Education

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Abstract

To extend the regional higher educational opportunities for the provincial communities, the Thai government in 2538 (1995) issued a policy demanding the country well established universities to set up their branches in regional areas. As a result, Mahidol University (MU), an autonomous research institution in Thailand has established three regional campuses and Mahidol University Kanchanaburi Campus (MUKA) is one of them. The MUKA was formally established on April 18, 2541 (1998). However, the Geoscience Program, an Outcome-Based Education (OBE) and the Area-Based Learning curriculum was set up in April 2004. Since then, the program has produced a large number of competent geoscientists with high responsibility and both breadth and depth of academic knowledge. MUKA collaborate with partner organizations including POSN Foundation "The Promotion of Academic Olympiad and Development of Science Education Foundation under the patronage of Her Royal Highness Princess Galyani Vadhana Krom Luang Naradhiwas Rajanagarind, IPST "Institute for the Promotion of Teaching Science and Technology", OBEC "Office of the Basic Education Commission, Ministry of Education", International Organization and a number of domestic institutions both governmental and private sectors. This collaborative effort has led to promoting Earth Sciences Education in Thailand on a local, regional and global scale. We organized the 12th International Earth Science Olympiad (IESO 2018) competition on the theme "Earth Science for All" to raise awareness of global environmental challenges at MUKA campus during 8-17 August 2018. MUKA, POSN, IPST, OBEC and other institutions established the Thailand Earth Sciences Olympiad (TESO) center to organize and conduct training sessions to select six candidates to participate in the final TESO competition to seek four high-school Thai students to represent Thailand at the annual IESO competition. MUKA has become one of the seven TESO centers since 2020 and hosted the 1st Thailand Earth Science Olympiad (TESO 2021) at our Kanchanaburi campus during 26 to 29 June 2021. From 2020 to 2024, over 200 high school students have participated in training sessions of MUKA TESO center. In addition, MUKA and IPST have carried out a number of Earth Science Teacher Training Programs. From 2019 to 2024, over 500 high-school Earth Science teachers have completed the training programs.

Keywords: Higher education opportunities, Mahidol University Kanchanaburi Campus (MUKA), Earth Science Education in Thailand, Earth Science Teacher Training Programs

Teacher Educators' Perception and Use of Information and Communication Technology in Universities of Education

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Abstract

A plethora of benefits that information and communication technologies (ICTs) have for teaching and learning has long been proven. In the light of this, the influence of teachers' perceptions on their incorporation in teaching should not be disregarded. However, only a few empirical studies have focused on teachers' perceptions on the integration of ICTs. Therefore, this study aimed to examine, through the lens of technology acceptance model (TAM) and technological pedagogical content knowledge (TPACK), the teacher educators' perceptions and use of ICT in the two universities of education. A descriptive, non-experimental survey variety of a quantitative research design, following a deductive strategy, was employed. A total of 297 respondents, selected by a systematic probability sampling technique, completed a questionnaire comprising close-ended items that were measured on a Likert scale. Data were analyzed using the descriptive and inferential statistics. The first part of the research findings pointed out that the majority of teachers strongly perceived the usefulness of ICT in teaching positively and the total mean scores for perceived usefulness, perceived ease of use, attitude towards using and behavior intention were (M = 24.60) (M = 23.06), (M = 23.92), and (M = 23.41) respectively. According to the second part of the research findings, the total mean scores for internal affective ICT strategies, internal metacognitive strategies, internal personal significance of ICT, internal importance of mobile tools, external curriculum-based limitations, external task-centered strategies, external use of ICT tools in teaching, and external motivating role of ICT were (M = 11.57), (M = 11.76), (M = 10.54), (M = 10.13), (M = 7.36), (M = 11.42), (M = 10.82), and (M = 11.89) respectively. The findings revealed that social and media tools are the commonly used ICT tools by the teacher educators. Furthermore, the results presented a moderate, positive and generally statistically significant correlation between teacher educators' perceptions and their use of ICTs (r = .542). This study recommended teacher development programs to improve teachers' ICT competences and also necessary interventions by the relevant education authorities in terms of investment and policies. Therefore, it is hoped that this study will make a number of contributions to the improvement of teacher education in Myanmar.

Keywords: Information and communication technology, Educational technology, Teacher educator, Teacher education, Perception

Exploring Teacher Educators' Knowledge and Potential Practices for Integrating Entrepreneurship Education

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Abstract

The primary objective of this study was to investigate teacher educators' knowledge and practices of entrepreneurship education. Using a mixed-methods approach, the study combined quantitative and qualitative research methods. The research sample consisted of 336 teacher educators from 10 education degree colleges, selected through simple random sampling. Data were collected via questionnaires and semi-structured interviews. The knowledge items in the survey achieved a KR20 score of 0.74, while the reliability coefficient for practice-related items was 0.72. In the qualitative phase, 16 teacher educators were purposively selected for interviews. Quantitative data analysis included descriptive statistics, independent samples t-tests, one-way ANOVA, and multiple comparisons, while qualitative data were analyzed thematically to identify recurring patterns. The study revealed that 45% of teacher educators had an above-satisfactory level of knowledge of entrepreneurship education. Key factors influencing their knowledge included age, academic qualification and prior exposure to entrepreneurship education. Regarding practices, the study found that teacher educators engaged moderately in integrating entrepreneurship education into their teaching, with a higher level of involvement in practical, experiential aspects (education for and through entrepreneurship) compared to foundational knowledge (education about entrepreneurship). However, challenges such as limited resources and curriculum integration issues were identified as barriers to more comprehensive implementation.

Keywords: Entrepreneurship Education

A Study of the Innovative Education Management Strategies for the 21st Century

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Abstract

The primary objective of this study is to explore innovative educational management strategies relevant to the 21st century. The specific aims of the study include: (1) examining the individual innovativeness of school principals; (2) investigating how individual innovativeness varies according to personal factors; (3) analyzing the extent of innovative educational management practices employed by principals; (4) evaluating the innovative educational management strategies utilized by principals in the context of the 21st century; (5) assessing the significant differences in innovative management practices among high school principals based on their level of individual innovativeness; and (6) identifying the significant differences in the strategies employed by high school principals at varying levels of individual innovativeness.

This study employed a quantitative research design, utilizing a questionnaire survey to collect data. A total of 100 high school principals participated in the study. The data were analyzed using quantitative data analysis techniques. The findings indicated that most principals were classified as early majority innovators. Additionally, the principals exhibited moderate engagement in innovative educational management practices and employed strategies such as collaborative decision-making, instructional supervision, teacher professional development, teamwork, and innovative funding practices at a moderate level. The analysis further revealed significant differences in the use of innovative management strategies between high school principals with high, medium, and low levels of individual innovativeness.
Keywords: Innovation, Management Strategies, 21st Century

A Preliminary Investigation into School Self-Evaluation Framework for Basic Education High Schools

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Abstract

The general objective of this study is to develop school self-evaluation framework for Basic Education High Schools. The specific objectives of this study are 1) to identify the domains and indicators for school self-evaluation in Basic Education High Schools 2 to validate the domains and indicators that should be included in school self-evaluation framework for Basic Education High Schools. Quantitative method was used in this study. Initially, the questionnaire was developed after reviewing the literature related with school self-evaluation. According to the pilot study, the internal consistency (Cronbach's Alpha) was 0.97. The participants included in this study were officers for monitoring and evaluation team, high school principals and teachers. In this study, the total number of participants were 1005. The collected data were analyzed by the using the Statistical Package for the Social Science Software SPSS and Analysis of Moment Structures AMOS software. Exploratory and confirmatory factor analysis were used to identify domains and indicators. The validation study was conducted by the panel of totally 32 expert teacher educators and high school principals. In the validated framework, there were two domains to evaluate principal, 1 domain to evaluate teachers and 2 domains to evaluate students under validated framework. There were 18 indicators in the domain of school management and instructional supervision, 7 indicators in the domain of leadership for school improvement,12 indicators in the domain of teacher professional practices, 8 indicators in the domain of students' learning experiences and 4 indicators in the domain of positive student interaction.
Keywords: School self-evaluation & School self-evaluation framework

Organizational Climate and Organizational Mindfulness of Basic Education High Schools

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Abstract

The general objective of this research is to study the organizational climate and mindfulness of Basic Education High Schools in Hpa-an Township, Kayin State. The specific objectives are to find out the levels of organizational climate perceived by principals and teachers, to study the variations of organizational climate perceived by principals and teachers in term of school level, to study the levels of organizational mindfulness perceived by principals and teachers, to study the variations of organizational mindfulness perceived by principals and teachers in term of school level, to study the relationship between organizational climate and organizational mindfulness. Questionnaire survey was used for quantitative study and open-ended questions were used for qualitative study. The reliability coefficient (Cronbach's alpha) of overall questionnaires was 0.85. From 8 schools, all 8 principals and 265 teachers were selected as the sample by using cluster sampling method. Descriptive statistics, One-way Analysis of Variance, Games-Howell Post Hoc Multiple Comparison Tests and the correlation analysis were used. Mindfulness is the act of developing a different point of view for every case and creating new sort, actively processing the meaning and context of any conditions (Langer, 1992). Mindfulness proposes to pay attention to the present moment without prejudices (Giluk, 2009). In this study, 2 schools were average level of organizational climate and 6 schools were high level organizational climate. According to mean values, the organizational climate level of school level A and school level B were high level (3.64 and 3.72) and school level C was average level (3.40). Additionally, 2 schools were average level of organizational mindfulness, 5 schools were high level and 1 school was very high level of organizational mindfulness. According to mean values, the organizational mindfulness level of school level A and school level B were high level (3.69 and 4.09) and school level C was average level (3.32). The correlation between organizational climate and organizational mindfulness was a positively relationship because the sig was less than 0.01. (r = .524, p < .01). The more principal and teachers respected and interacted with each other as competent professionals, the more mindful they perceived the actions of their colleagues to be. Relatedly, when teachers feel their colleagues are committed to students, capable of making sound professional decisions, and cooperative with one another in a supportive manner they also recognize their fellow teachers are engaging in mindful activities that decorate the academic and social atmosphere of the organization.

Keywords: Organizational Climate, Organizational Mindfulness

Factors Affecting Implementation of Primary Science Curriculum in Myanmar

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Abstract

As part of the National Education Strategic Plan (2016-2021), a new curriculum for basic education was developed, starting in the 2015-2016 academic year for Grade 1 and extending to the 2021-2022 academic year for Grade 5 in Myanmar. Revealing the factors affecting curriculum implementation is essential to support its successful implementation (Fullan & Pomfret,1977). Although primary science teaching practices of teachers were studied, there was still a limited research on factors affecting implementation of primary science curriculum in Myanmar. Thus, this study aims to reveal factors affecting implementation of primary science curriculum in Myanmar, with the specific objectives of exploring and confirming these factors. A quantitative research approach was employed. In the preliminary study, exploratory factor analysis was conducted with a sample of 380 primary science teachers from Nga Pu Taw Township, Ayeyarwaddy Region and Kyaik Ma Yaw Township, Mon State. The preliminary analysis results identified six factors with eigenvalues above 1, explaining 67.39% of the total variance (KMO value = .92; Bartlett's test significant at 0.001 level). The six factors were Principal Support (7 items), Teachers' Collaboration (6 items), Parents and Community Support (5 items), Teachers' Attitude (5 items), Government Support (5 items), and Adequacy of Resources (4 items). The reliability coefficient values of these factors were 0.93, 0.93, 0.88, 0.81, 0.86 and 0.67. The content validity indices were 0.90, 0.92, 0.82, 0.96, 0.93 and 0.94 respectively. As the main study, a sample of 530 teachers from four districts, Yangon Region was selected using a multi-stage cluster sampling method. Confirmatory factor analysis was performed to validate these factors, yielding acceptable fit indices (Chi-Square = 1071.876; CMIN/df = 3.063; RMSEA = .061; CFI = .94; RMR = 0.03; GFI = .88; AGFI = .85; NFI = .91). This study's validation of these factors through confirmatory factor analysis (CFA) strengthens the reliability of the preliminary findings and offers a solid framework for future research. Thus, this study expects that considering these valid and reliable factors in curriculum implementation could help policymakers and teachers effectively in order to implement a smoother and more successful curriculum reform.

Keywords: Primary science curriculum, Implementation

Relationship Between Novice Teachers' Reflective Practices and Teacher Professionalism

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Abstract

The main aim of this study is to investigate the relationship between novice teachers' reflective

practices and teacher professionalism. Both quantitative and qualitative studies were conducted. A total of 407 novice teachers from seven townships in Mandalay Region, Myanmar were selected by using purposive sampling method for the quantitative study. Among them, twenty-four novice teachers were purposively selected for qualitative study. The questionnaire surveys and interviews were used to collect the required data. The internal consistency (Cronbach's alpha) for the questionnaires of novice teachers' reflective practices and professionalism were 0.878 and 0.824 respectively. Descriptive statistics and correlation were used to analyze the quantitative data. According to the overall mean value, the findings of the study indicated that novice teachers practiced reflective practices to a great extent. Moreover, it was found that novice teachers' perceptions on teacher professionalism were high. It was also found that there was a positive relationship between novice teachers' reflective practices and their professionalism. To conclude, the qualitative findings were also complementary to the quantitative findings of the study. This study reveals that reflective practice is crucial for enhancing novice teachers' professionalism.

Keywords: Novice Teachers, Reflective Practice, Teacher Professionalism

An Analytical Study of School Violence Management Strategies

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Abstract

This study aims to investigate strategies for managing school violence, focusing on identifying commonly used violence management strategies and examining the relationship between these strategies and incidents of violence. Using a mixed-methods approach, surveys, interviews and documentary analysis were conducted with 1,430 high school students and 36 teachers for quantitative data, along with 12 teachers for qualitative insights, selected through multistage sampling. The reliability of the questionnaire was high (Cronbach's alpha > 0.90). Data were analyzed using exploratory and confirmatory factor analysis, descriptive statistics, and Pearson correlation. Six key strategies for managing school violence were identified: behavioral management strategy, safety-related strategy, curriculum-based strategy, early identification and intervention strategy, response strategy, and recovery strategy. Teachers predominantly employed response, safety-related, early identification, and behavioral management strategies. A negative correlation was found between school violence perpetration and the use of these strategies, suggesting that greater implementation is linked to reduced violence. This study highlights the importance of a holistic approach to violence management, engaging teachers, students, parents, and the community. It offers valuable insights for educators and policymakers seeking to improve the overall learning experience, create safer school environments and building peaceful society.

Keywords: School violence, School violence management strategies

Towards Transitioning Internationalization of Teacher Education into the Post-Pandemic Era

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Abstract

The study assessed the internationalization of teacher education institutions (TEIs) from eight Asian countries, focusing on their strategies and post-pandemic directions. Using a case study design, 14 international relations officers and 14 international students (IS) from 13 TEIs participated in interviews, and the data was analyzed using the strategic management model. Findings revealed that the shift to online modalities was a key internationalization strategy. Internationalization at home, which includes prioritizing well-being, integrating international dimensions into curricula, and investing in human resources and technology infrastructure, was highlighted. Post-pandemic, institutions see opportunities in expanding online and blended mobility, offering flexible program delivery, credit transfer schemes, and strengthening collaboration for recovery. These findings provide policy development insights to enhance ITE in the post-pandemic context.

A Survey of the Reading Habits of Myanmar Undergraduate Education Students

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Abstract

Reading, a receptive language skill when becomes a habit is crucial for knowledge acquisition and language development, including English language reading. How Myanmar students from different social and economic backgrounds read is understudied. This means a compromise in assisting students in advancing their language education and general learning. The ongoing study surveys Myanmar reading habits at an education college where prospective graduates become teachers who need to be well informed of information and innovation for best practicum and learning of their future students. The quantitative-based study involves a closed-ended, rating scales questionnaire and an open-ended question. The questionnaire used in this study is adapted from a piloted survey questionnaire and interviews with a group of informants based on Mubanga (2019). The adapted questionnaire was validated by two experts and piloted on fifteen non-population subjects. The questionnaire is being distributed to stratified randomly selected Myanmar respondents from different areas and ethnicities but from the same college who completed the 34-item online reading habits questionnaire. The responses will be calculated using descriptive statistics, and the written comments were analyzed using content analysis. The findings will discuss outstanding inferences regarding what promotes reading in Myanmar and what not. It is hoped that the findings will inform reading burdens and supports. It is also hoped that the findings will shed some light on reading course design and practicum

to promote sustainable learning for better knowledge acquisition and language education in Myanmar and related contexts.

Keywords: Reading habits, Myanmar readers, Extensive reading, Knowledge acquisition, Language education

An Evaluation of Lower Secondary Level English Textbooks in the Context of Myanmar

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Abstract

The main elements of teaching include teachers, students, and textbooks. Many people have argued that students are the key to the success of teaching. Many studies have pointed out that textbooks are the key to learning. It is based on the assumption that both teachers and students depend on the textbook in teaching and learning process. Therefore, great care and attention to the quality of textbooks has to be taken in selecting the most appropriate textbook that fit to the factors as teacher's interests, teaching objectives and finally students' needs as well. The aim of the study is to evaluate the effectiveness of Textbook in supporting educational object and meeting the needs of the students. Textbook evaluation checklist (Schan,1983) is used in this study because it is most appropriate for evaluating these textbooks. In this study, the lower secondary level English textbooks have been used in Grade 6,7,8 and 9 since 2019 and 2020 Academic Year. The aspects to be evaluated based on textbook evaluation checklist include subject matter, vocabulary and structures, exercises and illustration, method. In this study Tyler's (1942) "Objective Centered Model" which is one of the best-known models for curriculum development is used for deductive process. This study is important and will find out the strengths as well as the weaknesses of the textbook with the feedback of teachers and assessment results of students, there may be challenges and problems in certain areas of the curriculum. The present has conducted in order to analyze lower secondary level English textbooks for Grade 6,7, 8 and 9 students. The results of the present study have important contribution to the English Language Teaching and the improvement of the textbook.

Keywords: English textbook, Evaluation checklist, Text-book evaluation, English Language Teaching

Strategies to Enhance Primary Teachers' Receptivity toward the KG+12 Curriculum Implementation in Myanmar

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Abstract

The main purpose of this study was to understand how the factors influence primary teachers' receptivity (attitudes and behavioral intentions) toward the new curriculum implementation in

Myanmar and explore the strategies to enhance their receptivity levels. With the linkage between Theory of Planned Behavior and Teacher's Receptivity to Change Model, this study explored the Myanmar teachers' attitudes, behavioral intentions and factors influencing their receptivity toward the new curriculum implementation. The methodology of this study included a review of the literature, quantitative data analyses and in-depth semi-structured interviews. Using the interview data, this research proposed strategies to enhance primary teachers' receptivity toward implementing the new curriculum in Myanmar: making strong principals' involvement in and leadership; organizing adequate opportunities for professional learning, strongly promoting knowledge sharing among stakeholders (especially among teachers); providing social support or mutual support among teachers at schools; and increasing parental involvement, the support of the local community and the Ministry of Education. The results showed that these strategies were related to the factors influencing teachers' receptivity. The results indicated that these strategies were the effective interventions to enhance their receptivity levels and also alleviate their issues of concerns. Based on the proposed strategies, several recommendations for education administrators are provided for enhancing teachers' receptivity.

Keywords: Attitudes; Behavioral intentions; Curriculum change; Strategies enhancing teachers' receptivity

Investigating the Impact of Pedagogic Skills Model on Pre-Service Teachers' Classroom Management

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Abstract

The main purpose of this study is to investigate the impact of pedagogic skills model on pre-service teachers' classroom management. This study was conducted with convergent parallel design (QUAN+QUAL), which is one of the basic mixed methods designs. The one-group pretest-posttest design was used in the quantitative study whereas the case study research design was used in the qualitative study. The participants were Second Year pre-service teachers at Sagaing University of Education in the 2019-2020 Academic Year. The research instruments are pretest, posttest, questionnaire, analytic rubrics, and interview questions. For the quantitative data analysis, pretest and posttest scores were compared with paired samples t test in order to examine the classroom management of pre-service teachers. According to the research findings, an eta squared value of .45 indicated that the effect size of pedagogic skills model has a large effect on classroom management of pre-service teachers. The pre-service teachers accepted that student behaviour and attitude can be monitored and maintained by establishing a classroom environment, setting up the classroom discipline, and using rewards and reinforcement. For the qualitative study, the performance of pre-service teachers increased from basic level to proficient level in managing physical arrangement. In addition, the pre-

service teachers can maintain the students' misbehaviour with the classroom discipline strategies and encourage active participation of the students with reinforcements. Quantitative and qualitative data were merged through methodological and data triangulation. The classroom management of pre-service teachers has been improved after using the pedagogic skills model.

Keywords: Pedagogy, Pedagogic skills, Signature pedagogy, Classroom management, Pre-service teachers

The Impact of Curriculum Reform on Primary Teachers' Instructional Perception and Practices

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Abstract

The aim of this study is to investigate the impact of the curriculum reform on instructional perception and practices. SDGs, the education goal of the 2030 Agenda for Sustainable Development, brings universal primary and secondary education. Goals 4.1 among the SDGs aimed to achieve 'By 2030, ensure that all girls and boys complete free, equitable and equality primary and secondary education leading to relevant and effective learning outcomes' (UNESCO, 2016). Since the 2016-2017 academic year, the Ministry of Education has implemented KG+12 new curriculum as major curriculum reform in order to move from a traditional subject based curriculum toward an integrated, competency-based approach. In the research, a mixed method was applied. For quantitative part, the representative sample size was 700 primary teachers from selected fifteen townships and the sixteen primary teachers and eight educational administrators were used for qualitative study in 2022-2023 academic year. The participants were selected in accordance with random sampling method. A pilot study was firstly calculated by using Cronbach's alpha. The reliability coefficient of the questionnaire was 0.734. The participants were selected primary teachers of fifteen townships from four regions. The data collection instruments were questionnaires, in-person interview and telephone interview. In the qualitative procedure for the study, semi-structure interview was constructed by a researcher with the help of expert administrator. The interview was distributed to sixteen primary teachers and eight educational administrators. According to the findings, primary teachers' perception towards implementation on curriculum reform is very high and teachers' perception toward teacher learning approach is very low. Primary teachers' practices towards the role of instructional leadership was also the highest score and teachers' practices towards parents' perception on curriculum reform was the lowest score. The common challenges are workload, students' basic competencies, insufficient resources, teacher- learner ratio and shortage of cascade training, subject matter expertise. In the perception of educational administrators, the adequate teachers, school buildings and teaching aids should be provided.

It is also a useful resource for those who implement curriculum reform, as well as experts, researchers, and government officials.

Keywords: Curriculum, Curriculum Reform, Perception, Teacher Perception, Instructional Practices, Stakeholders

Narrow Down the Skills Gap in Higher Education of Myanmar (Conceptual Appraoch)

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Abstract

Education play a vital role in every process of genuine development. It is accepted that depending on the development level and cultural tradition, form and structure of education development is different from one country to another. However, the process of globalization is now challenging the system and implementation process of education development not only for local scale but also for regional and international ones. The question "How to upgrade the existing education system?" becomes a new challenge across the world including Myanmar. In this paper emphasises are put on the conceptual approach, portraying to narrow down the skills gap in higher education of Myanmar. Based on the concrete evidences and experiences extracted from the process of education reforms, need analysis is carried out and then research design is portrayed. The approach reveals that two fundamental skills such as intellectual skills and digital skills are essential drivers for the implementation of education reform in Myanmar. As a fulfillment of the need analysis, key informant interview (KII) is conducting with 8 professors from two universities; one from upper and the other one from lower Myanmar. The interview results show that the average percentage of high potentiality on intellectual skills is 17.22 and that of digital skills is 18.86 in all academic staffs. These two percentages are not more than 20% and this situation indicates the urgent needs of academic training and technical support under digital transformation context. At the same time the skills gap occurs among academic and supporting staffs at three different layers namely; layer of normal, below normal and above normal. The results of that interview highlight that most of academic staff including tutor, demonstrator and assistant lecturer are unskillful in both intellectual and digital performances. Therefore, these staffs are falling under normal layer. The academic staffs who got PhD are mostly skillful in both intellectual and digital performances and thus they represent normal layer. The academic staffs of professor level are mostly skillful and they usually take a leading role by seating above normal layer. Therefore, the structure of the existing skills gap looks like triangle shape and thus top-down pattern training should be formulated as fast as we can. An example of education reform in higher education, new adopted module of project paper writing in all specilizations, becomes one of the effective solutions for the above mentioned skills problem. In doing so, skills and skills gap will be narrowed down to meet the requirements of 21st century skills.

Keywords: **S**kills gap, Globalization, Intellectual, Digital, 21st century skills

နိုင်ငံခြားသားများကို မြန်မာဘာသာစကား သင်ကြားမှုပုံစံ

Myanmar Language Learning for Foreigners

ဖြူဖြူငြိမ်းသွယ် *၊ သီရိတင်**

* ဒေါက်တာ၊ တွဲဖက်ပါမောက္ခ၊ မြန်မာစာဌာန၊ ပဲခူးတက္ကသိုလ်။

** ဒေါက်တာ၊ တွဲဖက်ပါမောက္ခ၊ မြန်မာစာဌာန၊ ပဲခူးတက္ကသိုလ်။

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စာတမ်းအကျဉ်း

ဤစာတမ်းသည် နိုင်ငံခြားသားများကို မြန်မာဘာသာစကားသင်ကြားသည့်ပုံစံကို လေ့လာသုတေသနပြုထားသော စာတမ်းဖြစ်ပါသည်။ နိုင်ငံခြားသားများကို မြန်မာဘာသာစကားသင်ကြားရာတွင် လွယ်ကူစေရန်အတွက် ရည်ရွယ်၍ လေ့လာသုတေသနပြုထားခြင်းဖြစ်ပါသည်။ ထိုသို့သုတေသနပြုရာတွင် မြန်မာဘာသာစကားကို နိုင်ငံခြားဘာသာစကားအဖြစ် သင်ကြားလျှင် သင်ကြားမည့်ဆရာသည် သင်ယူမည့်သူ၏ မိခင်ဘာသာစကား၏ သဘောသဘာဝကိုသိလျှင် သင်ကြားမှုပိုမိုထိရောက် နိုင်သည်ဟူသော သုတေသနရလဒ် ထွက်လာပါသည်။ ဤစာတမ်းတွင် သင်ကြားမှုပုံစံ အချို့ကို လေ့လာတင်ပြထားပါသည်။

သော့ချက် -ဝေါဟာရများ၊ ဗျည်း၊ သရ၊ ဝဏ္ဏ၊ အသံယူနစ်၊ နာမ်စား၊ မျိုးပြအသုံး။

Tracing the Origin of Raw Material for Brick Production in Wadee Ancient Pyu City

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Abstract

The Pyu civilization flourished in Myanmar's protohistoric era, which is known as the Pyu period, for more than 1,000 years, from the second century BCE to the ninth century CE. The well-known ancient Pyu cities are Beikthano, Halin, Sriksetra, Pinle (Maingmaw), and Wadee. The Wadee ancient Pyu city in the circular shape, is near Payagyi village in the Nahtogyi township, Myingyan district, Mandalay Region. The Wadee ancient Pyu city was not mentioned in any Myanmar Chronical. The Shwe Mote Htaw pagoda inscription mentioned about Wadee ancient city, was firstly found by U Aung Thaw, Director General of the Department of Archaeology in 1967 after that U Aung Myint, Director General of the Department of Forest found out the Wadee ancient city in the aerial photo in 1968. The distinguished characteristics of Pyu period are the city walls, moats, palaces, buildings built of large-sized bricks, the bricks bearing finger marks, the city gates with the curved arms, the burial urn practices, the using of the designated ritual buildings, the decorated pots, the Pyu coins bearing Srivatsa, Badapihta, rising sun, etc., and the inscriptions of either Pyu or Pali. Among the typical characteristics of the ancient Pyu cities, the construction of huge city walls, city gates, and buildings is prominent in the remaining ancient Pyu cities. The remnants of the brick buildings still exist as evidence in the ancient Pyu cities. The founding of cities and the erection of the monuments in ancient Pyu cities are assumed to be the important landmarks in the history of Myanmar. In the ancient Pyu cities, agriculture, manufacturing of brick and iron,

and construction of buildings were supported to develop the civilization. Along with the construction of monuments, the bricks used in the construction are also important in order to research the design, manufacturing method, and period by means of comparative study. The manufacturing and using of large-sized bricks, finger - marked bricks, and various shapes of ornate bricks are also significant in Pyu civilization. Although the Wadee ancient Pyu city could not reveal the ornate and decorative bricks, the large-sized and finger - marked bricks, the bricks with Pyu characteristics, were found together with the stone slabs. To find out the origin of raw material used for manufacturing the bricks in Wadee, the Energy Dispersive X-ray Fluorescence (ED.XRF) analysis was used. The brick sample, soil sample near the site and soil sample from the Phettaw Lake were analyzed, and then the results were compared to be concluded.

Keywords: Wadee Ancient Pyu City, Bricks, Soil Sample, Raw material, Analysis, ED.XRF

Calcium Oxide-Based Precursor Adsorbents for Carbon Dioxide Adsorption

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Abstract

Carbon capture, utilization and storage (CCUS) is a collection of technologies that capture, use and store carbon dioxide (CO_2) from power plants and industries in order to reduce the emission of carbon dioxide (CO_2), the major contributor to the global warming and climate change. For carbon capture, calcium oxide (CaO) is one of the best adsorbents. In this research, calcium oxide-based materials were synthesized by different methods such as precipitation and hydrothermal to be used as precursor adsorbents. Moreover, natural limestone was collected from Taunggyi, Southern Shan State, Myanmar. The crystal structure, phase purity and surface morphology of the synthetic and natural calcium oxide-based materials were investigated by X-Ray diffraction (XRD) and field emission scanning electron microscopy (FESEM). XRD and FESEM results showed that the samples synthesized by precipitation and hydrothermal methods were micro/nano-structured calcium hydroxide ($Ca(OH)_2$) and aragonite ($CaCO_3$), respectively. Meanwhile, calcite phase natural limestone exhibited irregular shape and size. The carbon dioxide adsorption capacities of calcium oxide adsorbents derived from different calcium oxide-based materials were studied by thermogravimetry analysis (TGA). Based on the TGA results, carbon dioxide adsorption capacities of calcium oxide adsorbents derived from calcium hydroxide, aragonite and calcite were 0.73, 0.65 and 0.36 g-CO2/g-adsorbent, respectively.

Keywords: Calcium hydroxide, Aragonite, calcite, Calcium oxide, CO_2 adsorption capacity.

Electronic Behaviors and Atomic Scale Analysis in Some Transition Metals Using Angular Correlation of Annihilation Radiation Method

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Abstract

Positron Annihilation Spectroscopy (PAS) is well recognized as a powerful tool for nanostructure investigations of condensed matter studies and materials research. Angular Correlation of Annihilation Radiation (ACAR) method is important in the identification of electron structure with electron momentum distribution in transition metals. The aim of current research work is to study the characteristic of electron structure of transition metals and investigation of the crystal defects by using angular correlation method of positron annihilation. In this research work, the ACARMOD program for modeling the coincidence measurement of annihilation gamma have been implemented for analysis and measurement of transition metal samples. Annihilation correlation measurement program ACAREXP program have also been developed based on ACAR geometry for coincidence measurement by using the MATLAB. ACAR spectroscopy system based on the PAS measurements have been designed and carried out at the Nuclear Physics Laboratory, DSA. In this measurement, positron emission of radioactive isotope ^{22}Na with current activity ~17 kBq and transition metal samples have been chosen: Molybdenum(^{95}Mo), Silver (^{107}Ag), and Tantalum (^{180}Ta) with thicknesses of 0.03 cm for investigation of electron structures by implemented geometry with two NaI(Tl) scintillation detectors (3in x 3in) and multiple Cassy2 sensors with a multi-channel analyzer.

In the experiment of ACAR spectroscopy, one of the detectors was placed in a stationary position and another detector was placed in a moveable position because that detector measured at different angles (plus and minus) to acquire the ACAR spectra data. Measurements have been performed by considering distance 10 cm with beam angle 180º of source-sample preparation to detector and detected with the ACAREXP program in the range of 180º to 15º with a gradual increase of 0.5º at each measurement for 1 hour. After measurement of 60 angles points for each sample, decomposed in Parabolic and Gaussian components such as angular distribution of annihilation photons (θ_p), FWHM of Gaussian (Γ_g), Gaussian intensity (I_g), and parabola intensity (I_p) have been obtained by the ACARFIT program. Some electron structures of transition metals, such as variance of Gaussian curve (θ_g), Fermi energy (ε_F), Fermi momentum (p_F), electron concentration ($n_p(\theta)$), number of free electrons (Z_c), numbers of atoms per unit volume (n_A), free electron density (n_p), and energy of valance electrons (ε_g), have been calculated by using the ACARPAR program.

This study represents a major advancement in knowledge of the complex electronic and atomic structures of transition metals by exploring the positron annihilation. Moreover, have discovered important parameters including the angular distribution of annihilation photons (θ_p), the Gaussian and parabola intensities (I_g and I_p), the variance of the Gaussian curve (θ_g), and the FWHM of the Gaussian (Γ_g) by using the angular correlation of annihilation radiation approach. These discoveries shed light on the electrons' momentum distribution and binding energies, exposing basic atomic-scale interactions. Metrics like the number of free electrons

(Z_c) and the number of atoms per unit volume (n_A) offer deeper insights into material density and bonding, while the accurate determination of Fermi energy (ε_F), Fermi momentum (p_F), electron concentration ($n_p(\theta)$), and free electron density (n_p) enhances understanding of electronic behaviors.

This research work highlights the potential of positron annihilation techniques in revealing the hidden nuances of metals while also bridging theoretical and experimental approaches in material science. These findings have broad ramifications, ranging from improving the performance of materials in industrial settings to opening the door for upcoming advancements in mechanical, electrical, and quantum technology.

Keywords: Positron Annihilation, Angular Correlation, Electron Structure, Atomic Scale, Scintillation Detectors, and CASSY Lab

Analysis of Single-Λ Hypernucleus Events with Neutron and Neutral Pion Decay Products

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Abstract

Single-Λ hypernuclei are nuclei with strangeness quantum number. They can be seen as a track in nuclear emulsion and they are important to complete the knowledge of nuclear force by studying the hyperon-nucleon interaction. In this work, four single-Λ hypernucleus events detected in nuclear emulsions of KEK-PS E373 experiment were kinematically analysed using their decay modes. The analysed events have only one charged particle decay product and one or more neutral particle decay products. Range of charged particle was firstly measured for all events. The mesonic decay modes were considered to perform analysis. Range-energy relation and momentum conservation were used to calculate the kinetic energy of decay products. Masses of single-Λ hypernuclei were calculated by mass-energy relation. According to the analysis, it was found that the calculated masses of all single-Λ hypernuclei were generally greater than known masses for all events. Among them, two decay modes of event 3 such as ${}^{3}_{\Lambda}H \rightarrow {}^{1}_{1}H + n + n + \pi^0$ and ${}^{4}_{\Lambda}H \rightarrow {}^{1}_{1}H + n + n + n + \pi^0$ have smaller calculated mass than known experimental masses. If a single-Λ hypernucleus decays into one charged particle and neutral particle, the neutral particles should be neutrons and contamination of neutral pion should be rejected.

Keywords: Single-Λ hypernuclei, Nuclear emulsion, Range-energy relation, Mesonic decay

Removal of Lead, Copper and Chromium Ions from Wastewater by Agricultural Waste

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Abstract

This research is to prepare effective biosorbent beads derived from locally available agricultural waste (bagasse, *Jatropha curcas*) and calcium alginate via sodium alginate. The

prepared biosorbent beads were used for the removal of Pb^{2+}, Cu^{2+} and Cr^{6+} ion from industrial wastewater.

The utilized materials in this work were sugarcane bagasse and *Jatropha curcas* stalks waste. The wastes were collected and washed thoroughly and then cut into pieces, dried and grounded to obtain a fine powder. In the preparation of three types of beads (calcium alginate beads, bagasse-calcium alginate beads and *Jatropha curcas*-calcium alginate beads) by using the optimum conditions were found to as 2% w/v of vegetable stalk powder, 6% sodium alginate and 10% calcium chloride. The physicochemical properties of three types of prepared beads such as the size of beads, moisture content, swelling percent, solubility and pH were determined.

The prepared biosorbent beads were qualitatively and quantitatively characterized by ED-XRF, XRD and SEM. The agricultural waste alginate biosorbent beads were found to be effective in its exchange and removal capacity towards the toxic heavy metal such as lead, copper and chromium. The removal of toxic heavy metal was dependent on pH, contact time, the adsorbent dose and competition between metal ions. From the investigation of quantitative and qualitative analyses, bagasse-calcium alginate beads and *Jatropha curcas* - calcium alginate beads are effective adsorbents for the removal of lead, copper and chromium ion from industrial waste water.

Keywords*:* Agricultural waste, Bagasse-calcium alginate beads, Biosorbent beads, Heavy metals, *Jatropha curcas*-calcium alginate beads

Structural Elucidation of 2-(3′,4′-dihydroxyphenyl) chromane-3,5,7-triol and Antimicrobial Activity of Bark of *Dalbergia Cultrata* Grah. Extracts

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Abstract

In this study, *Dalbergia cultrata* Grah. (Myanmar name - Yindaik) was selected for chemical analysis including phytochemical tests, antimicrobial determination and as a new source of compound. Phytochemical screening was performed using standard methods. The extracts were evaluated for antimicrobial activity using agar well diffusion method. Phytochemical analysis revealed that alkaloids, flavonoids, terpenes, steroids, glycosides, reducing sugars, lippophilics, polyphenols and tannins compounds were present in the extracts of *D. cultrata* Grah. The ethyl acetate extract responded high activities against four selected organisms, *Staphylococcus aureus, Bacillus pumilus, Candida albican, E-coli* and medium activities on *Bacillus subtilis* and *Pseudomonas aeruginosa.* Crude ethanolic extract showed high activity

on *Staphylococcus aureus*, *Candida albican*, *E-coli* and medium activities on *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Bacillus pumilus.* The n-hexane extract did not show any activity against all selected organisms. Moreover, a known compound (TMT-1) was isolated from the ethyl acetate extract of *D. cultrata* Grah. by advanced chromatographic separation technique and, named 2-(3′,4′-dihydroxyphenyl) chromane-3,5,7-triol. The structure was elucidated based on spectroscopic techniques such as FT IR, 1D and 2D-NMR and compared with literature. This is the first report the presence of this compound in this species.

Keywords: *D. cultrata*, phytochemical, Antimicrobial activity, Chromatography, 2-(3′,4′-dihydroxyphenyl)chromane-3,5,7-triol

Extraction of SiO_2 Nanoparticles Derived from Giant Reed (*Arundo donax* L.) Leaves and Some Characterization

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Abstract

Agricultural waste being openly extracted silica has decreased environmental pollution and renewable and sustainable development goals, emphasizing the need for this technology. Silica and its compounds are widely used in the industries like pharmaceutical, chemical, agricultural, and research sectors. In this research work, thermal combustion and alkaline extraction technique synthesized a low-cost indigenous silica powder at the nanoscale from giant leaves ash. Silicon dioxide (SiO2) extracted from giant reed leaves. The giant leaves ash firstly prepared by heating in the furnace at 700 °C for 4 h. Treated ash was then washed with 1 M HCl under stirring at 240 rpm at 90 °C for 1 h. Subsequently, the acid-washed ash soaked in 1M NaOH readily to neutralise the pH. Neutralized treated acid ash was then filtered using free ash filter paper followed dried at 80 °C for 3 h to obtain high purity silicone dioxide. The extracted SiO2 NPs were calcined at 600, 700 and 800 °C for 3 h. The obtained SiO2 NPs were characterized by XRD, FTIR, UV-Vis and TG-DTA analysis. The results can be contributed that the synthesized SiO2 NPs will be used as the best adsorbent for the removal of metals, dyes and also economically sound techniques for disposal of agricultural waste.

Keywords: Giant reed leaves, Silicon dioxide, XRD, FTIR, UV-vis, TGDTA

ZIF-8 Derived Zn1-xCdxS Nanocomposites: Cost-Effective and Scalable Photocatalysts for Sustainable Hydrogen Production under Visible Light Irradiation

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Abstract

Hydrogen production through water splitting under visible-light irradiation is a promising strategy for addressing global energy challenges and reducing reliance on fossil fuels. In this

study, ZnCdS nanocomposites derived from Zeolitic Imidazolate Framework-8 were synthesized via an elementary hydrothermal method that was integrated with the calcination means and evaluated as photocatalysts for efficient hydrogen generation. Zeolitic Imidazolate Framework-8 (ZIF-8) is a type of metal-organic framework (MOF) which are synthesized by using metal ions or clusters with organic ligands. Specifically, ZIF-8 is made up of zinc ions (Zn^{2+}) connected by 2-methylimidazole ligands, forming a highly porous structure with zeolite-like topology. In this research, the synergistic combination of zinc, cadmium, and sulfur in the nanostructures enhanced light absorption in the visible spectrum and facilitated efficient charge separation by varying the amount of Cd content. Zn 1-xCdxS hexagonal shape nanomaterials are applied as photocatalysts under visibe light irradiation. Morphological and structural analyses confirmed the formation of well-defined nanocomposites, while optical studies demonstrated a bandgap tailored for visible-light activation. Photocatalytic performance tests revealed that the Zn 1-xCdxS nanocomposites exhibited superior hydrogen evolution rates compared to traditional photocatalysts under similar conditions. The enhanced activity is attributed to optimized composition, high surface area, and the effective suppression of charge recombination. These findings highlight the potential of Zn 1-xCdxS nanocomposites as cost-effective and scalable materials for sustainable hydrogen production, paving the way for advances in solar-driven energy conversion technologies.

Keywords: Metal-organic framework, Hydrothermal method, Organic ligands, Hydrogen evolution

Study on Some Myanmar Native Orchids in Temperate and Subtropical Regions

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Abstract

In this recent study is concerned with the wild orchids of natural habitats in temperate and subtropical regions of Myanmar. Some native orchids found in Bago region is subtropical and some also collected from temperate region in Taunggyi District of Southern Shan State and Natma Taung Wildlife Sanctuary of Kan Pa let Township in Southern Chin states from 2021-2024.There are many types of forests in study areas and various kinds of wild orchids stretch out in this forest types. Tropical raining forest type found in Bago area and Hill Evergreen Forest types is in Shan and Chin state. Some of the orchids are collected from this study area. They are epiphytes, lithophytes and terrestrial. Photographs have been taken to record habitats of orchids in nature. Some collected species are very rare and have regard as IUCN red list conservation status Appendix I. but this species found abundantly in Myanmar. This paper belongs to (3) Subfamily, (6) Tribe, (6) Subtribe and (7) genera and (12) species namely genera ***Bulbophyllum, Coelogyne, Cleisostoma, Dendrobium, Eulophia, Habenaria,*** and ***Luisia*** were collected, classified, identified and described with photograph of their natural habitats and inflorescences and constructed by own key and record with GPS location.

Keywords: Rare orchids. Epiphyte, Lithophyte, Terrestrials, artificial key

Study on Morphology, Acute and Sub-Acute Toxicity and Antioxidant activity of *Stemona burkilii* Prain

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Abstract

The study aimed to investigate morphology, the acute and sub-acute toxicity and antioxidant activity of *Stemona burkillii* Prain (Tha Myar Ni(a traditional medicinal plant widely used in Southeast Asia. In the identification of plants, morphological studies were also conducted in order to confirm the correct genus and species of the plants. Morphological analysis of *Stemona* roots were investigated at the Department of Botany, University of Yangon. The acute and sub-acute toxicity assessment was conducted in albino mice following the OECD 423 and 407 guidelines to determine the safety profile of the plant extract. For acute toxicity, mice were administered various doses (5, 50, 300, 2000, and 5000 mg/kg) of the extract and observed for signs of toxicity and mortality over a 14 days period. No mortality or significant toxicity signs were observed, indicating a high safety margin. For the sub-acute toxicity study, mice were divided into groups receiving doses of 0, 5, 50, 300, 2000, and 5000 mg/kg of the extract for 28 days. Daily observations included behavioral changes, physical symptoms, and body weight monitoring. Post-treatment analysis involved necropsy and histopathological examination of vital organs (liver, brain, heart, spleen, lungs and kidneys). Histological analysis showed that doses up to 2000 mg/kg did not cause significant tissue damage. However, higher doses (3000-5000 mg/kg) resulted in moderate microvesicular steatosis of hepatocytes and mild inflammation, with severe effects including macrovesicular steatosis and necrosis at the highest doses. Additionally, the antioxidant activity was evaluated using the DPPH(2,2-diphenyl-1-picrylhydrazyl) assay, with the extract demonstrating an IC50 (Half-maximal inhibitory concentration) value of 34.18 μg/ml, indicating significant free radical scavenging activity. The findings of this study suggest that *Stemona burkillii* Prain has a relatively safe profile at lower doses and potential health benefits as an antioxidant. However, higher doses may cause liver damage, indicating the need for careful dosage considerations in therapeutic applications. These results provide a basis for the safe use of this plant in traditional medicine and potential applications in the food and pharmaceutical industries.

Keywords: *Stemona burkillii* Prain, Acute and sub-acute toxicity, Antioxidant activity, OECD 423 guidelines, Traditional medicinal plant.

Fermentation and Characterization of Wine from Fruits of *Xantolis tomentosa* (Roxb.) Raf.

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Abstract

The present research work attempts to prepare the wine production from fruits of *Xantolis tomentosa* (Roxb.) Raf. The fruit samples were obtained from Yonepinkan village in Sagaing Township and the experiments were performed from May to June, 2024. The different amounts of sugar syrup, the same amount of fruit juice and yeast were used in the bottles at room temperature. The physico-chemical properties, antimicrobial and antioxidant activity were also studied. It was found that the qualities of wine such as alcohol percentage, flavor, taste and color were different. The fermentation rates were also slightly different depending on the use of sugar and the alcohol percentage of hairy xantolis fruit wine was estimated in the range of 8 to 13% depending on the use of sugar added. The taste, flavor and colour are also slightly changeable according to the adding of sugar. The total dissolved solid (TDS) was 1.57, 1.29 to 1.27 ppt and the total soluble solid (TSS in °Brix) were 4.3, 6.1 and 7.7 in xantolis wine. The more adding of sugar in wine fermentation, the content of fixed acidity was higher. The specific gravity was decreased gradually during longer fermentation time and it was 1.02 in all bottles lastly. The volatile acidity was ranged between 0.01 to 0.1 % and the fixed acidity was 1.3 % ,3.5 % and 4.7% in wine depending on sugar added. The antioxidant activities of hairy xantolis wine is best in wine of 10 % sugar. The experiments indicated that the hairy xantolis wine inhibits *Bacillus subtilis, Pseudomonas fluorescens, Salmonella typhimurium* and *Escherichia coli*. The hairy xantolis fruit juices can be used for the natural home winemaking and the product will be one of the valuable wines produced in Myanmar.

Keywords: wine, hairy xantolis fruit, antioxidant and antimicrobial

Production of Ready-to-use Fish Food Moina Capsule for Fish Larviculture

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Abstract

Moina species, also known as water fleas, are commonly used as live feed for fish larvae due to their small size and nutritional value. They are appropriate for egg-hatched fish larvae as they cannot consume artificial pellet feed due to their small mouth sizes. However, culturing Moina in fish hatcheries can be challenging, as it requires a clean environment to avoid contamination and a continuous supply of aeration. Egg yolk has been used in hatcheries widely for fish larvae in Myanmar. The use of egg yolk as larvae food in fish hatcheries can lead to reduced water quality in the culture tank and provide limited nutrition to the larvae. To

overcome this bottleneck in live food production, this research aims to develop ready-to-use Moina capsules as larvae food. The objectives of the present study are to investigate the most efficient and effective methods for harvesting Moina at a specific stage of development, ensuring the highest yield and nutritional value, as well as to develop Moina capsules by optimizing the drying process and ensuring that the dried Moina retains its nutritional value.
The initial stock of Moina was received from the Department of Fisheries. Moina were cultured for mass production in a 500-liter water tank and treated with 5 g of yeast daily. After a culture period of 6 days, Moina were harvested using two layers of nets with pore sizes of 1100 micrometers and 500 micrometers, respectively. Moina caught in the 500 micrometer net were washed with distilled water and dried in an oven at 40°C. After drying in the oven, they were placed into capsules, with each capsule containing 2 g of dried Moina. Larvae of Piaractus brachypomus (n=120) (2.58 g ± 0.3 g) were collected from the Taloat Hla fish farm, divided into 4 groups, and placed in an aquarium measuring 0.8 m x 0.4 m x 0.4 m. Tanks 1, 2, 3, and 4 were treated with 1000 individuals of live Moina, 5% body weight of dried Moina, 5% body weight of encapsulated Moina, and 5% body weight of artificial sinking pallets available in the market, respectively. Each experiment was triplicated. After a 15-day study period, the weight of fish increased in Tanks 1, 2, 3, and 4, reaching 4.88 g, 6.67 g, 6.85 g, and 4.05 g, respectively. The tanks treated with dry Moina and capsules showed the highest increase in body weight after the experiment. The development of ready-to-use dried Moina capsules through this research is of significant value to the aquaculture production sector, particularly for fish hatcheries within the country.
Keywords: Dry moina, Fish larvae, Nutritional value, Capsule, Aquaculture

Success of New Clinical Training Program on House Officer Performance at Prosthodontic Clinic, University of Dental Medicine, Mandalay

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Abstract

The aim of this study was to evaluate the success of new clinical training program to House officer by measuring the masticatory performance and patient satisfaction of complete and partial denture treatments at Prosthodontic Clinic of University of Dental Medicine, Mandalay. In this study, total (30) complete and partial edentulous patients were selected by simple random sampling method. The assessment includes patient satisfaction of prosthetic treatments by using Patients Evaluation Questionnaires (PEQ) and masticatory performance by chewing test using Xylitol color changeable chewing gum. The mean patient satisfaction scores were (8.96±0.81) for complete denture treatments, (8.91±1.19) for acrylic partial denture and (9.57±0.58) for metallic partial denture treatment. The mean masticatory performances were (9±0.67) for complete denture, (9±1.23) for acrylic partial denture and (10±0.0) for metallic partial denture treatment. According to the results, house officers were typically competent in providing denture treatments, and patients expressed general satisfaction with the quality of care they received. Among them, metallic partial denture wearers responded the highest

satisfaction score than the two remaining. It was also indicated that the effectiveness of clinical training for House officer using manikin hands-on. The new clinical training with manikin hands-on for treatment of complete and removable partial dentures are novel and effective education method for House officer.

Dietary Intake, Nutritional Status and Body Composition of Players in Myanmar National Football Academy (U12, U14, U16, U19)

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Abstract

While football, also known as soccer, is the most popular sport among millions of audiences around the world and also in Myanmar, they pay less attention to how athletes' dietary intake, nutritional status, and body composition affect their success and whether their consumption of energy matches their expenditure during the training period, pre-during and the post-match day according to the study. As nutritional needs and requirements vary according to the intensity, duration, and type of exercise or sport, a nutrition professional must consider improving their nutritional status concerning their needs. Optimum nutrition is thought-provoking for athletic performance, recovery, and minimal injury. Thus, the primary dietary status of football players is mandatory for individual and team performance to succeed.

Nutritional education and proper eating habits have been lagged in our country compared with neighboring countries for more than decades, especially in sport. Even at the National Level, there is less adequate nutrition for the athletes in all areas of a different game. Health authorities and government policymakers of our country must pay attention to this area. The gap that they might think is not necessary as it seems, but it is crucial to the road to success. This study will describe dietary data and the baseline characteristics of football players, which will be useful in the future for other research purposes as no published data represent the male soccer players yet.

Carbohydrate intake should be between 8 and 12 grams per kilogram of body weight. Blood glucose levels can rise as a result of too much carbohydrate, prompting the body to generate more insulin. During periods of intense training or competition, athletes require glucose replenishment. U12 has the largest carbohydrate intake, whereas U19 has the lowest carbohydrate intake. The U12, U14, U16, and U19 age groups all consume more protein than is suggested for exercise. The study discovered that on training days, match days, post-match days, and home days, all of these age groups consumed more protein than the International Olympic Committee recommends. Football players get the majority of their energy from carbs stored as muscle glycogen. The muscles' glycogen stores are exhausted after the game, and they must be replenished. A tactically tailored intake limitation and supplementary energy could be utilized to govern a professional footballer's anthropometry and energy reserves. All athletes should consume 1.2-1.5g/kg/day of protein during rigorous training days and 1.6-2.4g/kg/day of protein during weight loss with muscle retention days. The U12, U14, U16, and U19 age groups all consume more protein than is suggested for exercise. On match days, post-

match days, and home days, protein consumption differs by age group. In the case of, 11 people eat less protein than the government recommends. For example, 13 people eat more protein than is suggested. For training days, the majority of team members, regardless of age, consume fat as recommended. For U12 players, 20 consume less fat than suggested, 5 consume more fat, and 5 consume more fat than recommended. The majority of team members of all ages follow the recommendations when it comes to fat consumption.

Keywords: Soccer Players, Dietary Intake, Body Composition, Nutritional Status, Football Game, Sports Nutrition.

Accessing Research Ethics Awareness Among Social Science Scholars In Myanmar's Higher Education Sector

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Abstract

Research ethics in Myanmar's higher educational development is closely tied to international relations, as its unique context and global integration make ethical considerations highly relevant. Research ethics is fundamental to advancing both scientific and social science disciplines, contributing significantly to Myanmar's educational development. This study investigates the awareness of research ethics among social science scholars by analysing demographic and socio-economic factors such as gender, age, training, occupation, and education level. Using descriptive statistics, data were collected via Google survey forms distributed to 700 social science graduates, with a random sample of 170 respondents selected for detailed analysis. The findings reveal that 72 percent of participants were female, and the largest age group was 30-40 years old. Among the respondents, 41percent had received formal research ethics training, and 63 percent had undergone some type of training. The cohort was highly educated, with 38 percent holding bachelor's degrees and 62 percent holding advanced degrees (Master's or PhDs). Regarding ethics awareness, 64 percent considered research ethics "very important," while 36 percent rated it as "important." The study also identifies key challenges, including limited funding and the need for higher-quality research outputs. The study recommends increased government support to enhance research ethics knowledge among graduates, aiming to improve the quality of research in Myanmar. Finally, researchers in the higher education sector play a crucial role in producing high-quality research outputs that enhance education in Myanmar. Their work also contributes to community harmony, prosperity, and sustainability within the global framework of the UN Sustainable Development Goals, particularly Goal 4, which focuses on Quality Education.

Keywords: Myanmar, Research Ethics Awareness, Social Science, Higher Education

Comparision between The Two Numerical Fluxes for Muscl-Hancock Method To the One-Dimensional Modified Chaplygin Gas Equations

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Abstract

A second-order accurate Monotone Upstream-centered scheme for Conservation Laws (MUSCL)-Hancock method is presented for solving the one-dimensional modified Chaplygin gas dynamics equations. The initial data is reconstructed by the MUSCL-Hancock scheme with minmod limiter. The time integration is accomplished using a second-order Range-Kutta method. In this paper, the proposed method is developed based on the different numerical fluxes, the Godunov flux and the local Lax-Friedrichs flux. An exact Riemann solver is utilized to establish the Godunov flux. Based on these numerical fluxes, the performance of the proposed MUSCL-Hancock method is investigated. In addition, as the positive constant A in the modified Chaplygin gas equation of state approaches zero, the behavior of numerical approximations of modified Chaplygin gas equations is analyzed. The numerical tests are conducted in one dimension to illustrate the accuracy, robustness, and performance of the numerical method.

Keywords: Numerical fluxes, Exact Riemann solver, Second-order accuracy, Modified Chaplygin gas

Floods Wreak Landslide Damages in Myanmar Triggered by Typhoon Yagi: A Case Study Approach

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Abstract

Tendencies of natural disasters on the earth have greater from year to year. Many areas in the world are prone to one or several natural hazards. Telling to natural hazards, most linked to rains are very important for people, because of the peril produced. The rain is not dangerous because of itself, but as a result of its consequences: floods and landslides. Floods and landslides are most favorable major disasters in Myanmar. Really, floods and landslides are inseparable. Flooding is the inundation in the event of an area as a result of heavy rains and it can happen within minutes or over long period. When heavy rainfall quickly exceeds the ability of the ground to absorb it, the flash flood will be treated as in most dangerous kind of flood. Because they combine the destructive power of a flood with incredible speed causing rapid rises of water in a short amount of time. There are several drivers behind floods, mainly precipitation intensity and duration. Flash flood habitually erodes large amounts of sediment and debris as a landslide and can affect in destruction of infrastructure, buildings and public safety. Landslides are triggered by erosion. A Landslide can be concluded as a rapid displacement of rock, residual soil or sediments adjoining a slope and contour gravity of moving the mass advance in a downward and outward direction. In the last year 2024, on

September 8, a strong super typhoon named Yagi has been hitting and setting off heavy rains by torrential way that triggered flash floods in many places and landslides in Myanmar. Yagi was the maximum severely continued up to 70 townships across the States and Regions in Myanmar. The record brutally affected areas include the capital Nay Pyi Taw, the Regions of Mandalay, Magway, Bago, Sagaing and Tanintharyi and the States of southern and eastern Shan, Mon, Kayah, Kayin and Rakhine. The floods have submerged thousands of crops, farmlands, and livestock, significantly impacting the livelihoods of affected communities. Critical infrastructure has been damaged or destroyed, including roads, bridges, communication networks, schools, public service facilities, religious sites, and farmlands. To have the best idea of the landslide hazard relation of heavy rain in study area to evaluate for stability of rock slope and potential mode of failure within the field of landslide engineering that can be estimated according the two methods, empirical and analytical: Rock Mass Rating (RMR) and Kinematic Analysis. It was intended to collect primary data to answer the question of how to determine the characterization of rock mass properties and favorable modes in slope instability of selected area. Although there are many techniques to determine the relationship between flood and landslide. This study was mainly focus to know the concerning of potential slope failure involving with the characterization of possible failure block type, rock mass rating and kinematic rock slope evaluation for a landslide event from the represented examine area. The aim of this study insists on a fact that the first work to do is to prepare the data influence of the geological, geomorphic and engineering factors on the characteristics of the landslide hazards. It is notice that the presence of accurate theoretical knowledge on mechanism and process are most effective in future challenges of landslide hazards in Myanmar.
Keywords: Typhoon Yagi, floods, Landslides, Rock mass rating (RMR), Kinematic analysis

New Evidence and Tectonic Processes on the Closure of the Paleo Tethys in Western Thailand

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Abstract

The Nd, Hf, Lu-Hf and Rb/Sr isotopes signatures combining with data from geology, paleontology, petrology, geochemistry, airborne geophysics, geophysical gravity survey data, magnetic anomaly map, magnetotelluric data and tele-seismic receiver function studies indicate conclusively that the mainland Southeast Asia was assembled from two major separated tectonic terranes; the Cathaysia warm fauna terrane (Indochina plate) which included the present day Inthanon zone and Sukhothai zone in the east and the Gondwana cold fauna terrane (East Cimmerian or Sibumasu plate) in the west. Here, we present detailed evidence of compression tectonic processes along the contact boundary between Indochina and Sibumasu terranes collected in Kanchanaburi and Western Thailand as follows. (i) The occurrence and characteristics of the cold fauna fossils in particular fusulinoidean genus *Monodiexodina*. (ii) The hidden eastward paleo-subduction suture and the formation of Thailand basement core complex that occurred no later than Late Ordovician (~445 Ma) with the peak of metamorphism during the Triassic - Jurassic, (~200-220 Ma). (iii) Partial melting evidence and the formation of the Thailand Central Belt yielding mainly S-Types Granitoids. (iv) Relicts of the paleo-volcanic arc materials found in Silurian, Devonian and Carboniferous clastic sediments. (v) Ductile deformation features observed in the Cambrian meta-sandstone and the Ordovician argillaceous limestone. (vi) the chaotic mixture of deep marine and shallow marine materials in the accretionary wedge environment along the once an active continental margin. (vii) The remnant of the continent-continent collision prior to the closure of the Paleo-Tethys in Western Thailand during post Early Cretaceous.

Keywords: Paleo-Tethys, Isotopes signatures, Cathaysia, Gondwana, Hidden subduction suture, Kanchanaburi

Some Important Paleozoic Fossils from Myanmar: Implications for Paleogeography, Paleobiogeography and Paleoclimatology

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Extended Abstract

In the Shan State of eastern Myanmar, the rocks of Paleozoic age are most widely distributed and consist almost entirely of carbonates. They form part of a widespread stratigraphic unit, which extends to the south through western Thailand into northwestern Malaysia, and to the north through western Yunnan into central Tibet. The sequences of the Shan Plateau region, Shan State have yielded rich fossil coral, brachiopod, bryozoan, fusuline and crinoid faunas that have significantly aided in the development of a biostratigraphic framework for the regional geological synthesis of the Shan Plateau. Initially, these faunas greatly assisted the geological mapping of the area. Stratigraphic correlations of the Paleozoic strata throughout the region have been based on the common stratigraphic position, the lithology and totally identical fossil assemblages.

Nevertheless, little has been published partly or wholly of the Cambrian faunas. The existence of undoubted Late Cambrian (Furongian) trilobites in the core of the Pindaya Range, southern Shan State, Myanmar were first established in 1970 by the field party, University of Yangon, and in 1972, University of Mandalay field party recovered some saukiid trilobites from Ngwetaung area, west Anisakan, Pyin Oo Lwin Township, Mandalay Region. They provided however; no systematic descriptions of the fauna recovered. Kyi Soe (1983) illustrated and described some Cambrian trilobites from Linwe area, Ye-ngan Township, southern Shan State in his Master's Thesis. It is comprehensive, but unpublished.

The first systematic description of the Late Cambrian trilobites from the Molohein Group, "Myet-ye Formation", Ye-ngan Township of the southern Shan State was provided by Wernette *et al*. (2021). They reported three species (one is new) from two genera: *Asioptychaspis asiatica*, *A. lata* n. sp. and *Eosaukia buravasi*. These fossil materials are significant paleogeographically and biostratigraphically. *A. asiatica*, previously known from North China;

A. lata, a new species endemic to Myanmar; *E. buravasi*, previously described, but not figured. It comes to conclude that the limited Cambrian–Ordovician fossil material available from the Shan State links Sibumasu with North China and northwestern Australia, a position supported by the more extensive material of similar age known from Thailand, and questions placement of the Lhasa block between Sibumasu and western Australia.

Actinocerid cephalopods from the Ordovician of Myanmar, and their paleobiogeographic implications for northern Gondwana was comprehensively reported by Niko and Sone (2014). They described a new actinocerid cephalopod fauna from the western part of the Shan Plateau in Myanmar (Sibumasu Block), and discusses its significance. The fossils occur in shallow marine limestones of the Wunbye Formation (Pindaya Group) and its equivalent strata. The fauna consists of *Ordosoceras theini* sp. nov. (Floian or Dapingian, late Early or early Middle Ordovician age), *Armenoceras myanmarense* sp. nov. (Darriwilian, late Middle Ordovician), *Paratunkuskoceras* sp. (Darriwilian), and *Wutinoceras moeseini* (Floian, late Early Ordovician). The presence of *Ordosoceras*, which was previously known only in the North China Block, and specific characters in the actinocerid fauna of Sibumasu indicate a strong linkage with that of North China during Early–Middle Ordovician time.

Niko and Sone (2015) described two Gondwanan species of Darriwilian (late Middle Ordovician) nautiloid cephalopods are described from the Wunbye Formation and its equivalent strata in the Shan Plateau of Myanmar (Sibumasu Block). They are the orthocerid *Sibumasuoceras langkawiense* (Kobayashi) and the discosorid *Tasmanoceras* sp. *Sibumasuoceras* is known to occur so far from Malaysia and Myanmar of the Sibumasu Block, which was part of northern Gondwana during the early Palaeozoic. The rare genus *Tasmanoceras*, which was previously known only in Tasmania, is confirmed in Southeast Asia for the first time; this implies an Ordovician marine biotic linkage between Sibumasu and Tasmania over northern Gondwana.

The Upper Ordovician (Cradocian) Naungkangyi brachiopod fauna of Linwe in the Neyaungga-Ye-ngan area, southern Shan State, Myanmar was described by Cocks and Zhen (1998). On basis of their paleogeographic analysis, the Myanmar fauna is closely comparable

with that from South China, and to a lesser extent North China, and very different from New South Wales and British Colombia. This indicates that the Shan-Thai (Sibumasu) palaeoplate, upon which the Shan States were situated during the Ordovician was close to South China palaeoplate.

The rare Hirnantian costate craniides are reported to occur in both Myanmar and South China. They are preserved in the terminal Ordovician of the Hwe Mawng Purple Shale Member in the Pa-thin area, Pyin Oo Lwin Township, Myanmar. The Chinese materials were collected from Yichang, West Hubei, South China. The Hirnantian fauna from both Myanmar and China was revised and defined by Cheng and Rong (2018). They established a new genus, *Xenocrania* which occurs geographically not only in the Hirnantian fauna of Myanmar (Sibumasu) and South China, but also in England (Avalonia), Poland (Baltica), and probably Bohemia (Perunica).

The Myanmar Silurian strata is distinguished by abundance of Llandovery graptolites at various localities in Northern and Southern Shan States. Among them, "Panghkawkwo graptolite bed" is shown to comprise several graptolite horizons extending through the Aerolian (middle Llandovery) and into the lower Telychian (upper Llandovery). The bed is located near Panghkawkwo village, southeast of Pinlon in the central part of the Southern Shan State. Graptolite assemblages are similar to those of Bohemia and Saudi Arabia (peri-Gondwanan Europe and core Gondwana) respectively. "The Panghkawkwo graptolites suggest a location for Sibuma (su) between Gondwana and South China" (Loydell and Aung, 2017). Unfortunately, no Silurian paleogeographic map so far have been constructed yet.

Some important Myanmar Devonian fossils occur in the strata of age of Early, Middle, and Late implies Devonian paleogeography and paleobiogeography. The most common dacryoconariid tentaculites fossil species, *Nowakia acuaria*, preserved in the Early Devonian (Pragian-Emsian) Zebingyi Formation of northern and southern Shan States from Myanmar. It is commonly known from Lochkovian to Emsian of Europe, Morocco and Australia, from Pragian of Alaska, northern Africa, Czechoslovakia (Bouček, 1964; Lardeux, 1969; Churkin and Carter, 1970; Chlupáč and William, 1989), Wangjiacun Formation of China (Boucot, 2002) and northwest Malaysia (Burton, 1967; Meor Hakif Hassan, 2004, Meor Hakif Hassan and Lee, 2005) and earliest Emsian Pa Samed Formation of Satun area, southern peninsular Thailand (Boucot *et al*., 1999; Agematsu *et al*., 2006).

Kyi Soe (1983) recorded two Early Devonian (Pragian-Emsian) graptolite species: *Monograptus atopus* and *M. thomasi helmckei* from the Zebingyi Formation, east of Pebin village, Pyin-Oo-Lwin Township. He described that, these graptolites are correlative with those of the *Monograptus thomasi* Zone which occur in Australia (Jaeger, 1983), Malaysia (Jones, 1973), and Tibet (Mu and Ni, 1985).

The Middle Devonian (Eifelian) Padaukpin brachiopod fauna of Myanmar (Sibumasu) showed strong affinity with those of "Rhenish-Bohemia" (Anderson *et al*., 1969). However, the Eifelian rugose coral fauna from Padaukpin biostrome and "Pwepon Limestone" with conodonts, *Polygnathus costatus* and *P. parawebbi* (Aye Ko Aung, 1991; Aye Ko Aung, 1995; Aye Ko Aung, 2020; Aye Ko Aung, 2023) is known from Australia and southwest China. The Middle Devonian (Givetian) rugose coral fauna from Pwepon Limestone (Khaing Khaing San

and Aye Ko Aung, 2008) is closely compared with those from Europe (Germany), south China, and Australia.

The Upper Devonian (Frasnian) paleogeography is considered on basis of the ammonite fossil evidence (Aye Ko Aung *et al*., 2011). Two species of Frasnian ammonoids *Beloceras shidianense* and *Tornoceras* cf. *contractum* have been collected from the Myogyi area, approximately 20 km southeast of Kyaukse town, Mandalay region. It is possible that the Myanmar Frasnian ammonites occurrence is related to the *semichatovae* Transgression at the base of the Upper Frasnian which allowed a sudden spread of beloceratids in other regions such as Ardennes (e.g., Hauser, 1999), eastern Dra Valley of southern Morocco (Becker *et. al*., 2004), and Iran (e.g., Yazdi, 1966). The Postulated prototethys route of migration (Becker, 2000) between Western Australia and South China and the branches to Iran, Siberia, Europe and North Africa was situated near Myanmar and the "Sibumasu terrain". The types of *Belo. Shidianense* are from the Baoshan District of Western Yunnan, which is rather close to Myanmar.

Carboniferous conodonts were reported for the first time from Myanmar at a locality, 1-2 km south of Loikaw, Kayah State (Metcalfe, Kyi Pyar Aung, 2014). The conodonts were sampled from the Taungnyo Group which yield upper Tournaisian, *Scaliognathus anchoralis* and *Gnathodus typicus-Protognathodus cordiformis* conodont zones. The upper Tournaisian conodonts from Loi Kaw are cosmopolitan in nature, e. g. Loi Kaw, Myanmar (Metcalfe, Kyi Pyar Aung, 2014), Inthanon suture, Thailand (Randon *et al*., 2006), Malay/Thai Peninsula, Sibumasu Terrane (Metcalfe, 2002; Igo, 1973); South China (Devuyst *et al*, 2003); NSW and Queensland, Australia (Jenkins, 1974; Mory and Crane, 1982; Jenkins, Crane and Mory, 1993). However, the occurrence *Pseudopolygnatus nudus* in sample no. Cl2 suggests links with America (Laurentia). The biogeographic link between Sibumasu and Australia and America support palaeogeographic reconstructions.

Permian plant fossils, firstly reported from Linwe area, southern Shan State (Zhou, W-M *et al*., 2019) include five species: *Cordaites principalis, Annularia mucronate, Callipteridum* cf. *koraiense, Taeniopteris crassinervis* Mo, and *Rhipidopsis lobata.* The plant fossils bearing carbonaceous mudstones of cold-water deposits are unconformably overlain by warm-water carbonates of the Thitsipin Limestone. This is perhaps, represents a transgression which may be caused by the coeval global climate warming and ice melting. Due to the continental drift and global climate warming, the climate in the Sibumasu Block might turn to be an intermediate type between Gondwanan and Cathaysian realms, thus it inhibited the occurrence of typical plant elements from these two realms that were more adaptive in extremely wet or dry habitats.

An Early Permian (Cisuralian) conodont fauna is reported for the first time from the Sibumasu terrane in eastern Myanmar (Yuan *et. al*., 2020). The samples were collected from two localities: 1) Quarry, northeast of Theinzeik, Mon State, 2) Tower, southeast of Pa-an, Kayin State. The fauna includes *Vjalovognathus nicolli* and *Mesogondolella idahoensis*. The discovery of this conodont fauna indicates that the terrane accommodating this fauna in eastern Myanmar has a close paleobiogeographic link to the Lhasa Block and northwestern Australia, which may indicate these tectonic units were paleogeographically close to one another during the late Cisuralian.

Aye Ko Aung and Mustaffa Kamal Shuib (2013) pointed out the similarities in Middle to Late Permian fossils from Myanmar and Malaysia, and its paleogeographic implication. The presence of early Middle Permian (Roadian) small solitary non-dissepimented rugose coral *Lophophyllidium orientalis* (Smith) in association with abundant lacy bryozoans, brachiopods and debris of crinoid ossicles from the black bioclastic wackestone, in the Htam-sang area, Hopong Township suggest that the southern Shan State was in the Peri-Gondwana paleogeographic provinciality during the early Middle Permian (Roadian) for a brief time interval (270.6-265.8 M) only, but *Thomasiphyllum* n. sp. indicate Cimmerian provinciality and *Wentzellophyllum* n. sp. indicates Cimmerian-Cathaysian mixed provinciality. The similarities between the Middle Permian rugose corals *Waagenophyllum yini* Fontaine, *Multimurinus fontainei* (Kato and Ezaki) and *Ipciphyllum subelegans* Minato and Kato from the Sibumasu Block in Myanmar and that of the East Peninsular Malaysia Indochina Block suggest that both were at a close paleogeographic position, likely in the Cathaysian paleogeographic provinciality during the Middle Permian. *Iranophyllum pahangense* Aung found in both Shan States and Pahang, east Peninsular Malaysia confirmed that both are in the Cathaysian paleogeographic provinciality during the Late Permian. It is still required to find the Gondwana – Tethyan boundary in Myanmar.

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Geodynamic evolution of the Indo-Myanmar Range from the Mesozoic to the Cenozoic: inferences from the fossil records

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Abstract

The Indo-Myanmar range track along the border between the two nations of India and Myanmar from which their names are derived. The range straddle the present-day boundary between the Indian and Eurasian plates. The Indo-Myanmar range of the NE India is a classic subduction plate boundary region- the Indian Plate on the west sliding under the micro-Myanmar Plate. The region thus serves as an ideal 'type area' to carry out integrated geological studies of collisional and subduction tectonics, the evolution and cessation of the Neo-Tethys Sea, paleogeograpgy, sedimentary basin evolution and hydrocarbon source effects. The geology of the area, which is far from being fully understood, offers ample research opportunity into the Paleozoic of Naga Metamorphics, the enigmatic ophiolite (Jurassic to Eocene), the thick 'flysh' sedimentary successions of Paleogene and Neogene, and the Plio-Pleistocene-Recent alluvium deposits. It provides clues for the initial opening histories of the Mesozoic-Cenozoic Neo-Tethys Sea and a related understanding of sedimentary facies evolution further helping in understanding the geodynamic setting of the region. Added to such geological mysteries is the region's prolific petroleum deposits in the Assam–Arakan Shelf, where the first commercial discovery of crude oil in the country was made in 1889 in Digboi. The collisional regime in the NE India allowed marine deposition for a much longer duration, making the region rich in hydrocarbon source rocks. Much of the available outcrop and sub-surface geology of the area have been studied by geologists by the oil companies operating in the region. Microfauna, particularly larger and smaller planktonic and benthic foraminifera, has played a crucial role in describing the rock succession and demarcating regional geological events and discontinuities of the Assam Shelf. Larger foraminiferal published data indicate that during the middle Eocene, the Neo-Sea was open and connected through the East and West coasts of India, Northeast India, western Himalaya, and most of the Middle East and southeast Europe. This vast area produced enormous amount of petroleum. This paper describes the different formations of the rock succession from the Mesozoic to Cenozoic with its lithological, biostratigraphic and faunal content in inferring the paleoenvironment, paleobathymetry, tectonic setting and closure of the Neo-Tethys Sea in Indo-Myanmar range.

Keywords: Indo-Myanmar, Neogene, Neo-Tethys, Paleogene, Ophiolite, Hydrocarbon

Study on the Drowning Unconformities in Some Paleozoic and Mesozoic Sequences of the Southern Shan State, Myanmar

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Abstract

Drowning unconformities are often referred to as 'sequence boundaries' in mixed carbonate/siliciclastic successions because of their major significance, and their commonly strong signature on seismic lines. Within the framework of carbonate sequence stratigraphy, drowning unconformities represent arguably the most important departure from the repertoire of stratigraphic surfaces that characterizes clastic successions. As a general principle, stages of highstand normal regression are most favorable to the development of carbonate systems, both on the continental shelf and within the deep-water setting. In southern Shan State of Myanmar, the former comprise mostly Middle Permian Thitsipin Limestone and its equivalents, and Late Permian to Early Triassic Nwabangyi Dolomite Formation and the latter is probably Middle to Late Triassic Natteik Limestone. At the base of the Thitsipin Limestone is characterized by subaerial unconformity and underlain by lowstand system tract facies probably Magyiye Conglomerate and Early Permian *Spinomartinia prolifica* Shale. Rapid transgressions, associated with high rates of base-level rise, result in the drowning of the carbonate platform (i.e., water depth exceeding the photic limit), which shuts down the carbonate factory and lead to the change from carbonate to clastic systems namely, Middle Jurassic Loi-an Formation and Jurassic to Cretaceous Kalaw Red Beds. Drowning unconformities are defined as type-3 sequence boundaries and are potentially diachronous, younging towards the basin margins, being formed during a period of time that may span the entire duration of the transgressive stage. Where rapid transgressions follow stages of active platform growth across the continental shelf, the transgressive platforms display characteristic backstepping geometries, becoming progressively narrower in the process of drowning. Following stages of highstand normal regression, when most accommodation across the carbonate platform is consumed and as a result water depths are very shallow, any fall in base level, even of relatively low magnitude, tends to lead to rapid forced regression and the subaerial exposure of the platform top deposits. Consequently, the carbonate platform is subject to karstification and the resultant karst topography describes the relief associated with the subaerial unconformity within carbonate successions mostly between Thitsipin Limestone Formation and Nwabangyi Dolomite Formation. These unconformities serve as depositional sequence boundaries, and may separate highstand carbonates below from transgressive carbonates above.

Keywords: Drowning unconformities, Lowstand system tract, Transgressive system tract, Hihgstand system tract, Carbonate platform, Thitsipin Limestone Formation, Nwabangyi Dolomite Formation, Natteik Limestone

Nannofossil Distribution on Ciletuh Palabuhanratu Unesco Global Geopark of Indonesia: Application for Paleoclimate Changes

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Abstract

We investigated the calcareous nannofossil biostratigraphy, and the coccolith size of *Reticulofenestra* in the Oligocene to Miocene succession in Ciletuh Palabuhanratu UGG of West Java, where the study of nannofossils in this geopark is limited. The studied samples was collected by measured section at the Jampang Formation of Cikarang member site and we prepared the microscope slides following the semi quantitative method commonly used for micropaleontological studies of nannofossils. The initial documentation of calcareous nannofossils in the two traverse at the Cikarang Member within the Jampang Formation resulted in the identification of forty-one species from 97 samples. The studied section reveals seven nannofossil biozones, arranged from oldest to youngest as follows : LO *Sphenolithus ciperoensis*; LO *Cyclicargolithus abisectus*; FO *Sphenolithus disbelemnos*; FCO *Helicosphaera carteri*; FO *Sphenolithus belemnos*; LCO *Sphenolithus belemnos*; LO *Sphenolithus conicus* and FCO *Sphenolithus heteromorphus*. Notably, the abundance of *Coccolithus pelagicus, Cyclicargolithus floridanus*, *Reticulofenestra* spp., and *Sphenolithus* spp. characterized their occurrence throughout the section. The preservation of nannofossils were found to be good, and based on nannofossil biohorizons, the age of Cikarang Member spans from NP25 to NN4 at Paleogene (Oligocene age) to Neogen Periode (Early Miocene age). Paleoenvironmental conditions in the oligotrophic zone are characterized by parameters such as abundant productivity of large *Reticulofenestra* and relative abundance of *Spheholithus* spp. Indicators of the opposite conditions are called eutrophic. and the dominance of the distribution of warm-water taxa (*Sphenolithus* spp.), in the early Miocene This formation was deposited under oligotrophic conditions and warm seawater temperatures based on the relatively dominant and continuous productivity of *Sphenolithus* spp. (15-35%) during the early Miocene. Indicators of drastic changes in the environment are shown by changes in the size variation and abundance of small *Reticulofenestra* spp. (75% total abundance). The slight gradual changes in size in the Reticulofenestra coccolith can be correlated with paleoclimatic trends. The Jampang Formation of the Cikarang Member can generally be concluded to have been deposited under oligotrophic conditions where this paleoenvironment is characterized by the dominance of *Sphenolithus* spp. as an indicator of continuous warm temperatures and the size of *Reticulofenestra* spp. slightly increased from NN1- NN4. The abundance of *Reticulofenestra* small size may be associated with the Oligocene Miocene Transition Zone. The decrease in size changes of the *Reticulofenestra* coccolith indicate in the Zone NP25 and Zone NN1 may result from cooling during the Oligocene-Miocene transition event.

Keywords: Calcareous nannofossils, Paleoclimate, Oligocene Miocene Transition Zone, *Reticulofenestra,* Ciletuh Palabuhanratu UGG

Paleogene Index Microfossil of Central Basin: Implication on the Crude Oil Production

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Abstract

The Central Myanmar Subbasin, also known as the Minbu Basin, is a geologically complex and stratigraphically significant region, playing a pivotal role in understanding Myanmar's sedimentary evolution and hydrocarbon potential. Flanked by the Rakhine Yoma and Chin Hills to the west and the Central Volcanic Line and Bago Yoma to the east, the basin contains sedimentary deposits from the Triassic to the Pliocene, with a cumulative thickness exceeding 28,000 meters. These formations are primarily composed of marine sedimentary rocks, including sandstones, shales, and carbonates, reflecting depositional environments that range from shallow marine to deep offshore settings. Biostratigraphic analysis of microfossils—such as foraminifera, nannofossils, and ostracods—facilitates precise age dating and stratigraphic correlations, both within the basin and against global geological markers. Key index microfossils, including *Globigerina* spp., *Globorotalia* spp., and *Globotruncana* spp., highlight marine conditions spanning the Paleocene to Miocene. These microfossils are particularly abundant in hydrocarbon-rich formations, including the Paunggyi, Laungshe, Tilin, Tabyin, Pondaung, Yaw, Shwezetaw, Padaung, Okhmintaung, Pyawbwe, Kyaukkok, Obogon, and Irrawaddy Formations. Hydrocarbon potential varies across these formations. Deeper marine deposits, particularly those from the Pliocene to Early Miocene, exhibit substantial potential due to their thick shale and carbonate content. The Okhmintaung and Padaung formations, spanning the Early Eocene to Late Oligocene, are especially promising, demonstrating high hydrocarbon generation potential due to conditions favorable for organic matter preservation. In contrast, shallower marine formations, such as the Triassic Thanbaya Formation, exhibit limited oil potential due to their lower organic content. The sedimentary record and microfossil assemblages of the Central Myanmar Subbasin provide insights into its progressive geological history, shaped by tectonic activity. Deeper marine deposits from the Late Cretaceous to Miocene show moderate to high hydrocarbon potential, supported by comprehensive stratigraphic, biostratigraphic, and paleoenvironmental analyses. Paleogene index microfossils of the Central Basin are instrumental in hydrocarbon exploration, offering critical data for determining the ages and paleoenvironments of sedimentary strata in oil wells. Deeply buried agglutinated foraminifera in sedimentary basins are particularly valuable for estimating thermal maturity—a key parameter for hydrocarbon generation. This underscores the importance of microfossils in identifying and evaluating the basin's crude oil production potential.

Keywords: Minbu Basin, Paleogene sediments, Foraminifera, Nannofossils, Ostracods, Hydrocarbon potential

Introduction to the Construction of Global Sea Level Change Ocean Comprehensive Station

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Abstract

The ocean comprehensive observation station is a necessary observation facility for building a global sea level change continuous observation network, obtaining continuous observation data, and understanding ocean changes in real time. Through the analysis and research of observation data, the trend of global sea level changes is analyzed, providing a basis for marine environmental protection, marine disaster prediction, and marine economic development. The ocean comprehensive observation station including tide chamber GNSS observation pier, meteorological observation site, Tide wells, temperature and salinity wells and outdoor projects.

A Preliminary Assessment of The Geological Carbon Dioxide Storage Potential of The Mae Moh Mine, Thailand

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Abstract

The primary contributor to carbon dioxide (CO_2) emissions in Thailand is the energy sector, with a significant emphasis on coal-fired power plants. The Mae Moh lignite-fired power plant, operated by the Electricity Generating Authority of Thailand (EGAT), is recognized as the leading contributor of CO_2 emissions within the energy sector. Located in Northern Thailand, this power plant utilizes lignite sourced from the nearby Mae Moh lignite open-pit mine. This study undertakes an initial evaluation of the geological CO_2 storage potential at the Mae Moh mine, assessing its viability as a site for CO_2 storage. The idea of capturing CO_2 in unmineable coal seams is viewed as a promising strategy to reduce CO2 emissions through the injection of CO_2 into these formations. A significant amount of the remaining coal at the Mae Moh mine could potentially be extracted using conventional techniques; however, the practicality of initiating new mining operations remains ambiguous. This investigation seeks to assess the appropriateness of coal seams for CO_2 storage, considering geological, technical, economic, and safety factors. The results of this study are expected to provide a deeper insight into carbon sequestration within coal seams in Thailand.

Exploration for Lithium in the Amareshwar region, Dharwar craton, Southern India

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Abstract

Lithium (Li) is considered as one of the critical metals in India, and in many other countries,

owing to its growing demand coupled with relatively limited production on a worldwide scale. The strategic significance of this metal in the global sustainability goals, particularly in achieving net zero, is the major reason behind the escalated exploration efforts for Li resources. The Amareshwar region within the Parampur schist belt of the Dharwar craton in Southern India represents a promising location for such exploration. The pegmatite bodies that are intruded within the amphibolites, host spodumene, a known Li-bearing mineral. The pegmatites are composite in nature that appears zoned and they mostly contain quartz, plagioclase, K-feldspar, spodumene and muscovite. In an effort to pin-point the location of these pegmatites, satellite surveys and other existing data were utilised. By applying Band-ratio and RGB composite techniques on Landsat-8, ASTER satellite data, spodumene bearing regions were broadly demarcated and identified. The integration of these maps with the lithological, structural and geochemical data from the National Geoscience Data repository facilitated more accurate identification of the Spodumene bearing pegmatites, associated with the amphibolite and the BIF bodies. This data was further validated using some existing maps produced by the Geological survey of India (GSI) where they had previously marked some Li-bearing pegmatites. When the GSI maps were overlaid the generated spodumene maps, the pegmatites were encouragingly aligned, further validating the accuracy of the generated maps. This information proved to be tremendously helpful in the fieldwork and to identify regions of interest. These methods, along with other complimentary techniques, can help identify novel target regions for future exploration of Li-bearing pegmatites.

Histological Changes in the Gill and Liver Tissues of Some Fish Species from Mone Creek near the Nyaung Ghone Village, Pwintphyu Township, Magway Region

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Abstract

A study was carried out from Mone Creek near Nyaung Ghone Village, Pwint Phyu Township, Magway Region. In the present study, two fish species, Silonia silonia and Rhinomugil corsula in Mone Creek “In” were examined for histological investigation from June 2020 to May 2021. In the hot season, the metal level assessed in water was revealed to follow the order Cu > As > Cd >Pb > Hg in the study site. In the rainy season, except the Arsenic and Cadmium were the higher than the permissible limit (0.001 and 0.003 mg/L). In the cold season, the metal level assessed in water was revealed to follow the order Pb > Cu > As > Cd > Hg. In all seasons, the level of Cadmium (Cd) was higher than the permissible limit (0.003 mg/L). In the cold season, the level of lead (Pb) was higher than the permissible limit (0.001 mg/L). Histological changes in gill tissues of Silonia silonia and Rhinomugil corsula included hyperplasia, separation of epithelial, epithelial lifting, elastic cartilage, complete fusion of lamellae, dilation of gill filament and hyperplasia, degeneration of gill filament and blood congestion of gill filament. Histological changes in liver tissues of Silonia silonia and Rhinomugil corsula included degeneration in hepatocytes, necrosis, hemosiderin, infiltrated cells in hepatocytes, dilation of

sinusoids, and blood congestion. Histological alterations of gill and liver tissues indicated that the fish responds to heavy metal contamination. Therefore, it can be concluded the evidence of histological changes in gill and liver tissues of studied fishes may cause metabolic disturbance and cellular disorder due to heavy metal contamination, and changes in water quality and can be applied as bioindicators of pollutants in the study site.

Keywords: Histological changes, Liver, Gill, Heavy metals, Hyperplasia

Analysis on Water and Quality for Empowering Water Safely Education in Mekhong River Basin of Myanmar

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Abstract

The Mekong River Basin, spanning over 795,000 km², sustains the livelihoods of more than 70 million people across China, Myanmar, Thailand, Laos, Cambodia, and Vietnam. In Myanmar, the river traverses 120 kilometers through the Golden Triangle and covers a basin area of 24,000 km². Its water resources are crucial for the environmental and economic well-being of nearly 60 million inhabitants of the region. However, developmental activities such as mining and agriculture are adversely affecting the basin's environmental health and water quality.

This study emphasizes the importance of raising awareness and educating riverine communities on water safety in the Mekong River Basin, essential for sustaining both the basin's ecological balance and local livelihoods. Given that the conservation of the Mekong River in Myanmar holds national and regional significance, our research focused on the Tachileik District in Shan State. We assessed local water use patterns and water quality to propose strategies for enhancing water safety education and identifying opportunities for water-related sustainable development.

The study involved 29 villages in Tachileik District, utilizing a combination of key informant interviews, focus group discussions, questionnaire surveys, and laboratory analyses of water samples. Our findings highlight diverse water usage patterns, including domestic consumption, agriculture, animal husbandry, small-scale hydropower, transportation, water-related food production, and cultural practices. However, unsustainable practices such as sand mining, artisanal gold and mineral extraction, and monoculture plantations (e.g., rubber and tissue banana) were also observed. Local communities relied primarily on natural springs, river systems, and groundwater, with limited use of rainwater due to environmental concerns. Although local mechanisms for water resource and watershed conservation exist, there is a limited understanding of legal frameworks supporting these efforts. Notably, water safety awareness among communities was moderate.

Water quality analyses revealed fair to poor conditions according to World Health Organization (WHO) standards for drinking water. Parameters such as conductivity and turbidity frequently exceeded acceptable levels. Additionally, samples from Tachileik Township contained residues of organochlorine (OCP) and organophosphate (OPP) pesticides at concentrations

significantly higher than those prescribed by WHO, Mekong Member States' water quality standards, and the U.S. EPA guidelines.
Based on these findings, we recommend capacity-building initiatives, real-time information sharing, supportive policy and regulatory frameworks, and individual action to enhance water safety education. We also identified potential areas for water-related development, including small-scale industries, sustainable agriculture and husbandry, water quality conservation based on polluter-pays principles, natural spring preservation, and ecotourism initiatives.
Keywords: Mekong River Basin, Water Usage patterns, Watershed Management, Water Quality, Water Safety

Magnetic Properties of Sediments in The Western Continental Slope of the South China Sea and Its Environmental Significance

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Abstract

The study of the ZJ83 core s amples from the western continental slope of the South China Sea has provided insights into paleoclimate events in the past 70,000 years. A systematic study on environmental magnetism of sediment samples was carried out. The magnetic susceptibility of the ZJ83 core sediments is generally low, with the magnetic minerals primarily consisting of low coercivity magnetite. The particle size is predominantly pseudo-single-domain (PSD), with a focus on finer particles (less than 0.1μm), and a small amount of hematite. The magnetic parameters of the ZJ83 core have meticulously documented Heinrich events, encompassing H1 (16.5ka), H2 (24ka), H3 (29.5ka), H4 (36.5ka), and H5 (44.2ka), Younger Dryas (YD) and the Last Glacial Maximum (LGM). During these Heinrich events, there was an increase in the content of magnetic minerals and a coarsening of particle size, yet a decrease in the input of magnetite, suggesting a reduction in the intensity of terrestrial weathering. The solar radiation levels of 30°N during the summer and S_{ratio} are consistent in both intensity and duration, implying that the variability in the East Asian monsoon, driven by solar radiation, regulates the influx of magnetic minerals. An increase in hematite input during the Heinrich events indicates an increased material input from the Red River.
Keywords: South China Sea, East Asian monsoon, Heinrich, Environmental magnetism

Ecosystem Response to the Rapid Sea Ice Retreat in Arctic Ocean

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Abstract

Dramatic changes in the Arctic region over the last decades motivated the international community to put unprecedented efforts to document in real time ongoing changes of the Arctic

ecosystem. China has intensifed Arctic oceanographic cruises aboard the Chinese Ice breaker "Xuelong" since the last two decades. Extensive multidisciplinary observation, sampling and process study were undertaken on the impact of ice melting on upper ocean ecosystem during several CHINARE cruises since 2008 in the Arctic Ocean. In July, August and September 2012 aboard the Xuelong, was performed the first transpolar CHINARE cruise, and the in 2023 the Xuelong reach the north pole. Among these cruises, French scientists from the Sorbonne University (UPMC) participated to these cruises and collected samples to determine sea ice, phytoplankton and CO2-pH variations. In this talk, the ship based measurements on board of Ice Breaker Xuelong, and recent research progress on â€œUpper ocean nutrients budget and biological pump response to the rapid sea ice retreatâ€• will be introduced based on Chinese Arctic Expeditions.

Fluid Inclusion Study of Beryls from Kyaukse (Weibu) Hill Pegmatite, Kyaukse District, Mandalay Region, Myanmar

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Abstract

The occurrence of beryl from Kyaukse (Weibu) Hill, southeast of Kyaukse, Kyaukse District, Mandalay Region, Upper Myanmar could be found in the pegmatites (Nyein Chan Aung et al., 2022) which is probably related to the S-type Central Granitoid (Khin Zaw, 1990) and Mogok Metamorphic Belt (MMB) which is made up of calc-silicate, phyllite, schist and augen gneiss. The size of the pegmatite dike is approximately 2-5 feet (0.6-1.5 metre) in width and ~ 10 feet (3 metres) in length. Gemmological documentation was performed on more than 50 beryl samples collected from Kyaukse (Weibu) Hill. The colour of the beryl ranges from non-gem quality white, colourless (goshenite) to pale blue (aquamarine). The specific gravity (S.G.) of the colourless beryl ranges from 2.655-2.710, while the pale blue green beryl gives 2.656-2.692, and white beryl 2.65-2.708 respectively. The refractive index of the examined beryl varies from 1.560-1.590; they were all uniaxial negative. The internal features are characterized by protogenetic solid inclusions, syngenetic two-phase inclusions and tiny liquid feather-like inclusions. In addition, hollow tube-like formations that are oriented parallel to the c-axis of the crystals and epigenetic iron staining were observed (Nyein Chan Aung et al., 2022). The four beryl samples were collected for fluid inclusion analysis. Three types of fluid inclusion have been recognised: (1) low salinity two-phase aqueous fluid, (2) low salinity three-phase carbonic fluid and (3) three-phase carbonic fluid with daughter minerals. The fluid inclusions data indicate that the homogenization temperature (Th) of two-phase inclusions (aqueous liquid and vapor phase) yield 297°C to 356°C with a salinity of 0.2-5.6 wt% NaCl equiv. In three-

phase inclusion, the homogenization temperature (Th) range 170°C to 331°C with salinity of 0.2 to 2.2 wt% NaCl equiv.

Keywords: Pegmatite, Aquamarine, Goshenite, White beryl, Fluid inclusion, Homogenization, salinity, Kyaukse Hill, Myanmar

The Impact of Sea Level Changes on Mangrove Establishment Around Sundaland Since the Last Glacial Maximum

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Abstract

Mangrove dynamics is generally associated with global climate and sea-level changes since the Last Glacial Maximum (LGM). However, the mechanisms vary across different regions, and the process of mangrove establishment in Southeast Asia, particularly since the Last Glacial Maximum, remains unclear. We present high-resolution terrestrial mangrove palynomorph records from five different core sediments—ADM-C1, YDY05, NS2007-8, NS07-46, and NS07-25—around Sundaland (Fig.1) since the Last Glacial Maximum to observe mangrove distribution in the region. The ADM-C1 core, spanning the Holocene period in the Andaman Sea, reveals that the highest concentration of mangrove pollen occurred during the early Holocene, between 11.24 kyr and 9.03 kyr; however, this concentration progressively declined towards the late Holocene, coinciding with the rapid rise in sea levels from the early to mid-Holocene. Mangrove pollen concentration significantly declined after 5.41 kyr, coinciding with the period of high and stable sea levels during the mid to late Holocene. Cores YDY05, NS2007-8, and NS07-46 revealed similar patterns: mangrove pollen concentration was very low during the Last Glacial Maximum (26–17 kyr) and gradually increased during the Last Marine Transgression, which supported the development of tidal estuaries. However, following the Last Marine Transgression, mangrove pollen concentration of YDY05 and NS07-46 dropped to near zero, likely due to the increased distance between pollen sources and core locations as a result of high sea levels during the Holocene. In contrast, the NS07-25 core from the southern South China Sea showed high mangrove pollen concentrations during the LGM, as low and stable sea levels reduced the distance required for pollen dispersal. Despite cooler and drier conditions, previous palynological analysis confirmed the presence of mangroves in the southern SCS during the LGM, suggesting that suitable coastal habitats allowed these ecosystems to persist. A review of mangrove distributions across South Asia since the LGM indicates that sea-level change is an important factor controlling mangrove establishment around the Sundaland. Understanding these influences, particularly sea-level changes, is crucial for conserving the coastal ecosystems around the Sundaland.

Keywords: Mangroves Pollen, Sea-Level Changes, Climate Change, Sundaland, Last Glacial Maximum

Understanding Marine Heatwaves in the Bay of Bengal: Progresses and Future Endeavors

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Abstract

Marine heatwaves (MHWs), characterized by extremely warm water events, are increasingly prevalent globally, posing significant threats to marine ecosystems. The Bay of Bengal (BOB), witnessing one of the fastest warming rates among tropical oceans since 2005, coupled with shallow mixed layer induced by low-salinity water, favors the occurrence of strong MHWs. Consequently, coral reefs in the BOB are facing escalating bleaching threats due to the dramatic increase of these extreme events under such a warming climate. Supported by Asian Cooperation Fund Project, we have conducted a very successful joint survey on winter 2019, to investigate MHWs and its potential influence on coral reefs along Myanmar coasts, in cooperation with Pathein Universtiy. The related work has also been conducted in the BOB in the recent years, to explore on some vital issues, including regionality and seasonality of MHWs, relationship between interannual variability of MHWs and El NiÃ±o-Southern Oscillation (ENSO) & Indian Ocean Dipole (IOD), and their influence on ecosystems. The main our achievements on these issues are introduced in this talk. Moreover, comprehensive future research plans and international cooperation are suggested to enhance the monitoring, understanding and prediction of MHWs in the BOB.

Carbonate Hosted Copper Mineralization at Kyaukse (East), Central Myanmar

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Abstract

Copper mineralization in East of Kyaukse Township, Mandalay Region, Central Myanmar, appears to be closely associated with NNE-SSW trending extensional faults probably related directly to the dextral movement of the YeThayauk Fault (YTF) system. It occurs as shear zone related primary veins and supergene as Gossanous zone. At Byuttawye Area, Copper mineralization occurs as a vein/dissemination fissure filling style with localized shear zones in grey to light grey coloured carbonate rocks of the Sitha Formation (Ordovician). Associated ore minerals of primary vein are pyrite, chalcopyrite, chalcocite, bornite and galena. In supergene zone, the key copper minerals are malachite and azurite. Vein-related alteration includes silicification, kaolinization, limonitization and chloritization. Check samples

analysed by (AAS) assay result reveals that ore samples are average from 0.89 to 2.54 % Cu. The estimated possible & probable reserve is about 1.68 MT. Based on filed investigation, geological and mineralogical studies, the copper mineralization has been regarded as a result of hydrothermal process in a saddle faults zones of East of Kyaukse, central Myanmar.

Keywords: Central Myanmar, Ordovician limestone, Hypogene, Supergene, Hydrothermal process, Shear zone

Geochemical Investigation of Hot Springs in Hlaingbwe Township, Kayin State, Myanmar: Implications for a Hot Spring Genesis

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Abstract

The Kyar Inn-Htilon hot spring area is situated in the central region of Kayin State, Myanmar. The maximum and minimum temperatures of the sources are 58.3°C and 48.2°C, respectively. The hot spring has a Ca-Mg-HCO_3-type water chemistry with moderate Total Dissolved Solids (TDS) and very hard water, characterized by low salinity and silica content. The low salinity suggests that the water from these sources may be a combination of warm and cold water from low-depth wells. The Piper diagram and Giggenbach's 1988 ternary diagram of anions both show that all sources belong to the Ca-Mg-HCO_3 type and are categorized as originating from peripheral waters. The insufficient equilibrium of the water sample suggests an immature upwelling and a low equilibrium temperature for water-rock interchange. The presence of the geothermal field in the region will be attributed to the deeper thermal energy originating from the Earth's crust, the heat generated by magma, and the thermal energy resulting from shear forces. It is possible that geothermal fluids will have started in a higher-temperature environment and then undergone dilution by colder, shallower water throughout the process of extraction to the surface.

Keywords: Hot springs, Peripheral waters, Water-rock interchange, Kayin State

Geochemical Characterization of Rare Earth Element Deposits in the Bawbadan-Kyatpyin Area, Mogok Stone Tract, Myanmar

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Abstract

The Bawbadan-Kyatpyin area, located within the Mogok Stone Tract in Myanmar, is a notable source of rare earth elements (REEs). This region lies on the eastern limb of the Mogok

Syncline and features geological structures such as faults, fractures, and joints, predominantly in igneous and marble units. The area forms part of the Mogok Metamorphic Belt, consisting primarily of metamorphic rocks intruded by igneous rocks, including biotite granite, leucogranite, alkali syenite, and aegirine-augite-nepheline syenite. The metamorphic rocks comprise sillimanite-garnet-biotite ilmenite gneiss, garnet-biotite gneiss, marble, and calc-silicate rocks, covering approximately 70% of the area. Petrochemical analysis classified igneous rocks as peraluminous, with S-type granites predominating over I-type granites, indicating origins from metasediments and deep-seated igneous material. Raman spectroscopy and SEM-EDX identified mineral phases, such as baddeleyite, beryl, and columbite, confirming the LCT (Li-Cs-Ta) and NYF (Nb-Y-F) pegmatite families. Gamma-ray spectroscopy further highlighted high U and Th concentrations in syenite, granite, and pegmatite formations, particularly in Ohngaing and Sinkwa. This study underscores the economic significance of Mogok's rare-element deposits and highlights the need for detailed exploration to evaluate the feasibility of these resources for geochemical and mineralogical applications.

Paleomagnetic, Rock Magnetic and Microscopic Analyses of Deep-sea Sediments Offshore Sumatra: Remagnetization Associated with Subduction of Indian and Asian Blocks

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Abstract

One of the SSCOE's research goals is to obtain data bearing on the collisional history of Indian and Asian continental blocks along its southeastern margin. Sediments and rocks commonly contain magnetic minerals that record the direction and intensity of Earth's magnetic field as they are being emplaced, thus preserving an ancient record of the geomagnetic field. Subsequent alteration of the magnetic minerals caused by heating and/or fluid circulation can result in the acquisition of secondary magnetizations (i.e., remagnetization) that may overprint or completely reset the primary ancient magnetization. Such remagnetization provides evidence of the physical and chemical changes that have occurred. Here we report such an example from deep-sea sediments offshore of Sumatra. We find that hydrothermal fluids,

resulting from mineral dehydration driven by rapid burial of the deeper older (pre-fan) stratigraphic sequence by younger, thick Nicobar Fan sediments, led to pervasive secondary remagnetization. Consequently, the newly formed magnetite recorded a much younger paleomagnetic field, leaving a shallow overprint that probably occurred sometime in the past few million years. The dehydration reactions also increased the strength of the sediments entering the subduction zone and aided in the formation of slip surfaces (called décollements), possibly contributing to the shallow, large earthquakes that have generated tsunamis off Sumatra.

Critical Metals Potential in Volcanic-Hosted Massive Suphide Deposits (VHMS) in SE Asia: Insight from the Bawdwin Deposit in Myanmar

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Abstract

Volcanic-hosted massive sulphide deposits (VHMS) are vital sources of critical metals such as copper, silver, nickel, cobalt for the green energy transition, enabling advancements in high-tech tools, defence systems, renewable energy solutions, and sustainable transportation. The VHMS deposits are formed during the rifting of oceanic ridges or back-arc basins. The SE Asia region is characterised by an assembly of crustal plates or microcontinents that rifted off from northern margin of Gondwana during the Phanerozoic. These microplates or terranes including the South China, Shan-Thai (Sibumasu), Indochina and west Myanmar terranes, drifted northwards on the Tethyan Oceans and accreted or collided with the Eurasian margin. During these rift, drift and assembly phases, VHMS deposits were formed (e.g., Duc Bo deposit in Vietnam, Tasik Chini deposit in central Malaysia and Bawdwin deposit in Myanmar). The Duc Bo deposit is located about 10km from the Coast and 9km south of Tam Ky, the capital of Quang Nam Province in central Vietnam. The deposit is hosted in Ordovician-Silurian mafic-felsic volcanic and metavolcanic rocks such as metadacite and metabasalt and strongly deformed and metamorphosed to Amphibolite facies. The Tasik Chini VHMS area in central Malaysia has long history of iron-manganese-barite mining and the deposit is hosted in Permo-Triassic volcaniclastic sequence and weakly metamorphosed and deformed. The Bawdwin deposit in northern Myanmar is the largest producing VHMS deposit in SE Asia and renown as a world-class Pb-Zn-(Cu-Ag-Co-Ni) deposit. It occurs in Cambro-Ordovician volcaniclastic pile, Numtu Township and the deposit is relatively undeformed. The origin of the Bawdwin deposit remains a topic of debate, with competing theories suggesting epigenetic or volcanogenic processes. However, recent reviews of both published and unpublished studies conducted at Bawdwin over the past century support the classification of the deposit as a siliciclastic-felsic VHMS-type (Gardiner et al., 2017). The formation of these VHMS deposits in Southeast Asia is closely linked to the prolonged geological history and evolution of the Paleo- to Meso-Tethyan Oceans. The global demand for critical metals is rapidly increasing

due to their essential role in producing electric vehicles, smartphones, and other electronic devices. As renewable energy adoption and electric transportation expand worldwide, this demand is expected to rise further. However, exploration and research into these resources remain limited in the region. Advancing these efforts could establish Myanmar and Southeast Asia as pivotal contributors to the global supply chain, fostering economic growth while supporting sustainability. Increased research, exploration and investment are essential to unlocking the region's full potential as a leading supplier of critical minerals.

Keywords: VHMS, Critical Metals, Duc Bo, Tasik Chini, Bawdwin, Southeast Asia, Exploration, Base metals, Metallogeny.

Disappearance of River Sarasvati in India - An Environmental Perspective, Lessons for the Future

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Abstract

Many rivers have disappeared from the ground surface of the planet earth in different periods of the history, some of them are codified and some have no records. Climate change is not a current phenomenon in the geological periods. Many civilizations had been destroyed, eliminated and abandoned at different phases. Climate had compelled the settlements to evacuate the cities, fortified locations and establishments. Largely, such events have happened due to scarcity of the water at the ground level, change of the courses of the river â€“ that was the lifeline of the settlement, disappearance of the river because of the destruction of the source of the river. Himalayan rivers are largely glacier fed rivers or rain fed rivers. Only few depend on the perennial streams. The river Sarasvati was a glacier base river and was also depending on the rainfed. The glacier changed its location with glaciation and the river Sarasvati disappeared and caused many civilizations of ancient India to die. Cosmopolitan cities like Dholavira, Kalibangan, Rakhigarhi and couple of others were abandoned. Sarasvati sources have been dictated through ISRO satellite and researchers. Many stepwells were constructed on the river Sarasvati bed to access water source in the medieval period. In this century the attempts have been made to recharge the river bed to reactivate the river flow, because of its holy status. Many researches have been conducted for the restoration of the river. One fact gets established that all Himalayan glacier fed rivers will die in this century due to climate change. Literature from the 3000 BCE have been taken into account for the study till the geological satellite findings in this century. Wide variety of researches were examined and evaluated with triangulation approaches; investigative methods used for the establishment of the findings from many sciences for this research. This is a specific research from the environmental management perspective for revival of a disappeared river; the Sarsvati.

Keywords: River Sarasvati, Dead River, Disappeared River, River Revival, Climate Change

Diversity patterns and ecological assembly mechanisms of bacterial communities in the northeastern Indian Ocean epipelagic waters during the northeast monsoon

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Abstract

Disentangling microbial community diversity patterns and assembly mechanisms is critical for understanding ecological processes and evaluating biogeochemical cycling in ecosystems. However, the diversity patterns and assembly mechanism of the microbial communities in the epipelagic waters in the northeastern Indian Ocean (NEIO) on the spatial scale are still unclear. In this study, we investigated the spatial dynamics, geographic distribution pattern, and assembly process of the bacterial community using 532 samples collected from the epipelagic waters in the NEIO during the northeast monsoon. The results indicate that the bacterial richness and Bray-Curtis dissimilarity exhibited the strongest correlations with depth compared to the latitudinal and longitudinal scales. The dissolved oxygen was identified as the most important environmental factor affecting the bacterial richness and Bray-Curtis dissimilarity compared to temperature and salinity. The distance–decay relationship (DDR) of the bacterial community strengthened with increasing water depth. Turnover was the predominant β-diversity component influencing the spatial changes in the whole bacterial community. The dispersal limitation of the stochastic process and homogeneous selection of the deterministic process governed the bacterial ecological assembly process of the whole bacterial community. Abundant and rare subcommunities differed in terms of the niche breath and composition changes. The abundant subcommunities exhibited a much wider niche breath than the rare subcommunities. Regarding the abundant subcommunity species changes, the contributions of the turnover and nestedness varied with the water depth and oceanic region. In contrast, turnover was the major β-diversity component regarding the changes in the rare species. These data improve our understanding of the ecological processes of bacterial community assemblages in the NEIO.

Multiproxy Approach to Estimate Organic Matter Source and Paleoclimate Variability of Multicore Sediments from The Andaman Sea

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Abstract

Knowing the distribution, source, and redox variation of sedimentary organic matter (OM) in the Andaman Sea is significant for understanding its biogeochemical cycle. In order to better establish these parameters, we determined the total organic carbon (TOC), total nitrogen (TN), $\delta^{13}C_{org}$ and $\delta^{15}N_{tot}$, and *n*-alkanes contents of multi-core sediments. TOC and TN concentrations varied from 0.61 to 1.18 wt.% (average 0.87 wt.%) and 0.07 to 0.17 wt.% (average 0.13 wt.%), respectively, with high TOC in the clay-rich sediments indicating that hydrodynamic sorting readily controlled TOC abundances. The bulk TOC/TN ratio (5.51 to 11.92, average 7.89) is attributed to the high inputs from planktonic sources of OM and appreciable amounts of terrestrial OM. The $\delta^{13}C_{org}$ and $\delta^{15}N_{tot}$ values for the sediment cores ranged from –8.34 to –20.3‰ and +3.65 to +6.53 ‰, respectively, suggesting that OM in the sediments is largely derived from planktonic sources, with significant contributions from a mixture of terrestrial and aquatic sources and seagrasses. *n*-Alkane distributions are characterized mainly by C_{16} to C_{35}, with odd-over-even predominance after C_{25}, suggesting a diverse origin of OM. The relatively high content of odd long-chain *n*-alkanes from C_{27} to C_{33}, with high peaks at C_{29} and C_{31}, were detected in most investigated samples, reflecting a terrigenous origin of OM (e.g., shrubs, woody or herbaceous plants). Average chain length (ACL), carbon preference index (CPI), aquatic proxy (P_{aq}), and terrestrial wax (P_{wax}) ratio values indicate that high input of OM from non-emergent aquatic macrophytes followed by grasses and herbs. However, high ACL with low P_{aq} values and $\delta^{13}C_{org}$ excursions in the down-core sediment samples could suggest initially cold and dry climates prevailed and gradually shifted to warm and humid climatic conditions.

Keywords: Organic matter; TOC/TN ratio; *n*-Alkanes; Stable isotopes; Biomarkers; Sediment; Andaman Sea

Investigate the Diluted Water Signals Detected from the RAMA Buoys in the Bay of Bengal

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Abstract

The diluted water in the Bay of Bengal plays a crucial role in shaping its physical, chemical, and biological characteristics. The diluted water signals (salinity less than 31) in the Research

Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) buoys were identified in this study, with validation conducted using salinity data from Aquarius and SMAP. The results indicate that a total of five diluted water events occurred at the RAMA buoys B15 station (15Â°N, 90Â°E) between 2012 and 2020, specifically in September 2016, December 2013 and December 2015, January 2016, and March 2012. The mixed layer salt budget analysis indicated the dominant role of horizontal advection on the variation in salinity at station B15. During the period from August to November, the Ganges-Brahmaputra Diluted Water (GBDW) is transported southward along with the East India Coastal Current (EICC). The Irrawaddy Diluted Water (IDW) gathers in the northern side of the Andaman Sea in August and September, and then flows westward through the Preparis Channel to the western coast of Myanmar in October. The extent of the diluted water on the western coast of Myanmar reaches its maximum in December. In January, the coastal circulation in Myanmar's western region weakened, resulting in the dissipation of IDW. Subsequently, during February, the diluted water along Myanmar's western coast completely dissipated. The five diluted water events are all caused by eddies: in September 2016, twin cyclones on the east coast of India caused diluted water to be transported to the central part of the bay located 700 kilometers offshore; in December 2013, the southward flow of an anticyclone transport the diluted water to the north side of the station B15; in December 2015, a cyclone located to the south of B15 station enhanced westward diluted water transport; in January 2016, an anticyclone near B15 station entrapped diluted water and delayed itsâ€™ dissipation; and in March 2012, multiple eddies were responsible for transporting diluted water within the bay. Apart from influence of eddies, all five events were characterized by peak discharge of the GB River or Irrawaddy River. This suggests that the discharge of these rivers is also a critical factor in diluted water events.

Effect of Turbulent Mixing on the Formation of Intermediate Nepheloid Layer over the Northern Continental Slope of the Andaman Sea

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Abstract

An intermediate nepheloid layer (INL) serves as an important conduit for the cross-slope transport of particulate matter, including organic carbon, biological nutrients and other lithogenic minerals. Despite extensive reports on the substantial sediment influx from the Ayeyarwady River into the northern continental slope of the Andaman Sea (AS), the transport route and fate of these river-borne sediments remain poorly understood, due to lack of in situ observations of turbid INL over the slope. In this study, we present direct evidence of an INL over the northern continental slope of the AS during the winter of 2019/2020, accompanied by enhanced mid-water turbulent mixing. Mooring measurements reveal energetic internal tides with high-mode vertical structure in the study region; and beam-like structures of internal tides are observed, which could be responsible for the enhanced mid-water turbulent mixing coinciding with the INL. Moreover, available microstructure profiles reveal energetic turbulent

mixing with bottom-intensified turbulent diffusivity over the study area. Numerical experiments suggest that inhomogeneous distribution of turbulent mixing over the continental slope could induce local convergence of the upwelling transport in the upslope direction, resulting in an intrusion from the boundary to the interior and consequently promoting the INL formation. The discovery of the INL and its mixing-driven generation mechanism provide new insights into sediment transport dynamics over the northern continental slope of the AS.

Mercury Trophic Transfer and Biomagnification in Gulf of Thailand Food Webs

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Abstract

Mercury (Hg) contamination in marine ecosystems poses a significant environmental threat due to its high toxicity, persistence in the environment , and tendency to bioaccumulate in aquatic organisms and biomagnify along food webs. Understanding how Hg moves through these food webs is essential for assessing its ecological and health impacts. To investigate trophic dynamics of Hg in Rayong Bay, Gulf of Thailand, we collected marine organisms from the pelagic and benthic food webs during 2022–2023 and analyzed the total mercury content (THg) in plankton (phytoplankton, z ooplankton, and fish larvae) and 81 marine animal species. Furthermore, the stable nitrogen and carbon isotope values (δ15N and δ13C) were measured to establish their trophic levels (TLs) in the food web. Based on these analyses, we calculated the biomagnification factor (BMF), trophic magnification slope (TMS), and trophic magnification factor (TMF) for the different TLs. Over 48% of BMF values in the pelagic food web and over 41% in the benthic food web exceeded 1.0, indicating THg biomagnification from prey to predator. Notably, the pelagic food web exhibited markedly higher TMS and TMF values (TMS = 0.82 and TMF = 6.68) compared to those of the benthic food web (TMS = 0.31 and TMF = 2.06), indicating a stronger Hg biomagnification in this compartment. Our findings also highlight the consumption risk of Hg in some fish species in the Rayong Bay food webs, emphasizing the need for continued monitoring and mitigation strategies to safeguard both human and ecological health.

Dissolved Oxygen Recovery in the Oxygen Minimum Zone of Arabian Sea in the Recent Decade Observed By BGC-Argo Floats

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Abstract

The Arabian Sea (AS) hosts the worlds thickest and most intense oxygen minimum zone (OMZ). Previous studies have documented a dramatic decline of dissolved oxygen (DO) in the northeastern AS over recent decades, resulting in functional anoxia in the core area of the AS.

However, the recently released data from Biogeochemical-Argo floats indicate a surprising recovery trend in deoxygenation within the core region of the OMZ in the AS (ASOMZ) since 2013. The averaged DO concentration increased by about 167%, from ~0.63 Î¼M in 2013 to ~1.68 Î¼M in 2022, which corresponds to a 13% decrease in the thickness of the ASOMZ. We found that the weakening of the Oman upwelling resulted from the weakening of summer monsoon is probably the main explanation for the oxygenation, and the strengthening of stratification resulting in a decrease of production is also contribute to the recovery of deoxygenation in the ASOMZ core.

Seismic Microzonation Hazard Map for Sagaing City, Myanmar: Assessing the Effects of Rupture Scenario Events from the Sagaing Fault

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Abstract

This study investigates strong motion characteristics in Sagaing City, Myanmar, to create a seismic microzonation hazard map based on Peak Ground Acceleration (PGA), Peak Ground Velocity (PGV), and Peak Ground Distance (PGD). We utilized microtremor techniques to establish a one-dimensional shear wave velocity (Vs) profile, performing measurements at five array sites and 130 single-station locations. The resulting Vs model consisted of thirteen layers down to the seismic bedrock (Vs = 3,000 m/s). Using this data, we estimated the engineering bedrock depth for each single station sites and calculated the average shear wave velocity in the top 30 meters (AVs30) and assessed site amplification characteristics accounting for non-linear soil behavior. The PGA values ranged from approximately 72 gals to 620 gals, with the highest values (350–600 gals) in the southernmost area. Lower values were found in the eastern and western portions due to the stiff soil's reflective properties. Central regions showed PGA values between 200 gals and 350 gals. PGV ranged from 0.13 m/s to 0.64 m/s in the north-south direction, with similar low values in the eastern and western extremes. The southern area had the highest PGV (0.45–0.64 m/s), while selected western sites exhibited peak PGV values of 0.68 m/s to 1.10 m/s in the east-west direction. PGD values varied from 0.05 m to 0.33 m in the NS direction and from 0.2 m to 0.6 m in the EW direction. Overall, the PGA, PGV, and PGD results reflect site amplification characteristics influenced by the varying subsurface structures of Sagaing City and the direction of the seismic rupture.

Keywords: **M**icrotremor, Shear-wave velocity structure, Peak Ground Acceleration (PGA), Peak Ground Velocity (PGV), Peak Ground Distance (PGD)

Earth Science Education for SDGs Application in Geopark Development, A Case Study in Indonesia Geoparks

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Abstract

Integrating Earth Science education with the Sustainable Development Goals (SDGs) is a strategic approach to addressing global environmental challenges while fostering sustainable development. This paper explores the application of Earth Science education in the development and management of Geoparks, emphasizing their role in achieving SDGs. Indonesia has 10 UNESCO Global Geopark and 10 National Geopark, with their unique geological heritage, offer an ideal setting for experiential learning and community engagement, promoting awareness and understanding of geosciences and sustainability.

By embedding SDGs within the Earth Science curriculum, educational programs can enhance knowledge of geological processes, conservation practices, and sustainable resource management. Using geospatial technologies, such as remote sensing and Geographic Information Systems (GIS), in educational activities enables students to analyze and monitor environmental changes, fostering critical thinking and problem-solving skills. Project-based learning initiatives, including community-driven environmental projects, further bridge the theoretical knowledge and practical application gap.

Local communities' engagement in Geopark activities through awareness campaigns, volunteer programs, and policy advocacy ensures that the benefits of sustainable development are widely shared. This participatory approach not only enhances communities' socio-economic well-being but also strengthens their role in the conservation and sustainable use of geological heritage.

Case studies from various Geoparks in Indonesia illustrate the successful integration of Earth Science education and SDGs, highlighting best practices and lessons learned. The paper concludes with recommendations for policymakers, educators, and Geopark managers on effectively leveraging Earth Science education to achieve sustainable development goals, ensuring a balanced and inclusive approach to environmental stewardship.

An Assessment of the Physical and Chemical Properties of Dispersive Soils in Wundwin Area, Mandalay Region, Central Myanmar

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Abstract

The study area is situated in Wundwin Area, Mandalay Region, Dry Zone of Central Myanmar. It lies between Latitudes 21˚01′ N to 21˚25′ N and Longitudes 95˚45′ E to 96˚16′ E. The area coverage is 543.58 square miles. The investigated area is chiefly covered by Alluvium and Irrawaddy Formation. Dispersive soils are clay soils with a high susceptibility to erosion and

contain a large amount of colloidal elements. These soils are not suitable for use as a foundation or fill materials in the construction of structures. Although they may appear similar to regular clays and have some stability against erosion, they are actually very erosive and prone to significant damage or failure. Structural failures caused by dispersive soils have occurred in many countries. In Myanmar, some problems related to these soils had observed not only in hydraulic structures but also in landslides. Hakha landslide, Chin State in 2015 and spillway destruction of hydraulic structure in Bago Region in 2018 are related to the dispersive clay soil problems. Therefore, it is necessary to conduct physical and chemical analyses in order to identify these types of soils. The sixteen numbers of soils from the highly eroded areas in Wundwin are collected and aimed to analyze their chemical properties, especially the exchangeable sodium percent (ESP%) and to identify the degree of dispersion. From physical tests such as Emerson crumb test, and results from chemical analytical data of X-ray fluorescence analysis (XRF) and exchangeable sodium percent (ESP%), most of the soils are highly sodic and almost every soil sample shows dispersive characteristics. Understanding the characteristics of these soils is crucial for identifying them, and appropriate treatment should be applied in areas where they may potentially become dispersive over time, especially in construction.

Keywords: Dispersive soils, Colloidal elements, Exchangeable sodium percent (ESP%), Emerson crumb test, X-ray fluorescence analysis (XRF)

Pliocene Tectonic Transformation from Strike-Slip to Thrust Along the Eastern Margin of Pamir Salient

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Abstract

The structural characteristics and evolution history of the eastern margin of Pamir Salient are of great significance to reveal the basin-mountain coupling relationship between the Pamir-West Kunlun and the Tarim Basin, and to guide the exploration of oil and gas resources and earthquake disaster prevention in this region. Based on the detailed surface mapping and structural analysis of seismic profiles across key locations, the tectonic framework of the basin-range junction zone in the eastern margin of the Pamir Salient is constrained. The mapping data, field photos, seismic profiles and other data presented in this paper reveal that a dextral strike-slip fault system ou tcrops in the eastern margin of the Pamir Salient, and a buried compressional thrust belt develops in the adjacent basin, including the Qipan structural wedge and the Qimugen structural wedge. The growth strata of the Qipan structural wedge is located in the lower section of the Pliocene Artux Formation, while the growth strata of the Qimugen structural wedge is located at the top of the Pliocene Artux Formation, indicating that the thrust belt has been developed since the Pliocene. The eastern margin of the Pamir experienced a tectonic transformation from a strike-slip tectonic system to a compressional tectonic system during the Pliocene. Before the Pliocene, deformation was accommodated by dextral strike-slip of the Wuyitake-Momoke transfer system (WMTS); Since the Pliocene, deformation in this area was dominated by eastward thrusting, and the strike-slip activity decreased.

Keywords: Pamir, West Kunlun, Tarim, dextral transfer system, Thrust structures

China-Myanmar Yangon Estuary Joint Environmental Geological Survey

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Abstract

According to the cooperation agreement signed between China Geological Survey and East Yangon University of Myanmar, the two sides took Yangon Estuary as a case area, and established a joint investigation project team between China and Myanmar from September to October 2019 (representative of the Chinese side: Tu Guanghong, representative of the Myanmar side: Soe Moe Lwin used remote sensing survey, geological sampling and geochemical exploration techniques to carry out basic geological environment investigation, and completed 19 stations of geological sampling, 35 stations of temperature and salt depth measurement, and 35 stations of seawater sampling. The characteristics of coastline changes, estuarine and estuarine siltation changes, mangrove changes and sea water temperature and salt depth in Myanmar were investigated. The survey results show that the water depth of Yangon estuary ranges from 3.65 to 27.53, and the average water depth is 10.96m. The water temperature of Yangon Estuary is relatively high, and the northeast tributary is the most, and the overall performance is river fresh water. The shoreline of the Irrawaddy delta has little change due to natural erosion or siltation, and the mangrove area has a general decline trend due to farmland reclamation.

Keywords: Yangon Estuary, Myanmar, Eenvironmental geological survey, Shoreline change, Mangrove forest

Kinematic Tectonic Implications of the Geological Structures and Stratigraphy for Reconstructing the Kyaukse-Lungyaw Plain, Myanmar

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Extended Abstract

The origin of the West Myanmar Block is considered to be the Central Myanmar Basin (CMB) and the Indo-Myanmar Ranges (IMR), where Permian-Triassic Limestones occurred on the eastern margin of CMB. Regarding the Permian-Triassic Limestones, the West Myanmar Block can be located on the present west margin of the Shan Plateau (Sibumasu Block).

Geographically, the Kyaukse-Lungyaw Plain lies immediately east of the Sagaing Fault between Mandalay City and Kinda Dam in the Shan Plateau. With respect to the Panlaung and Ywangan areas within the Shan Plateau, the Kyaukse-Lungyaw Plain is presumed to conatin the following rock units: Granites, Mogok Metamorphics, Mergui Group, Permian-Triassic Limestones, and Triassic to Cretaceous rock units. The present study proposes that tectonically

the Kyaukse-Lungyaw Plain is a broken block, that was displaced to the Sagaing-Minwun Range and Momeik area further to the Tengchong-Baoshan in Yunnan due to the northward dextral strike-slip movement of the Sagaing Fault.

The conceptual scenario assuming the Myanmar ophiolites originated as a single belt, which was truncated not only by the Sagaing Fault movement but also by a large gap at the northern end of the present Shan Plateau in the Sibumasu Block during the Late Miocene (11 Ma). During the Late Miocene to Pliocene-Pleistocene, the pre-existing ophiolite zone in the Indo-Myanmar Ranges (IMR) was split up into different zones by the Sagaing Fault displacement, accompanied by the movement of the West Myanmar Block together with Indian Plate subduction.

Using the kinematic study of Permian-Triassic Limestones together with ophiolite (Central Ophiolite Belt) have occurred at the Sagaing-Minwun Range close to the west of the Sagaing Fault between Mandalay and Tagaung Cities, such as Zintaung, Scheinmaga, and Kyaukpahto. The kinematical approach of geological structures, along the west of the Sagaing Fault at the Sagaing-Minwun Range, regional structures are used to indicate the origin of the Permian-Triassic Limestones, derived from the Kyaukse-Lungyaw Plain. The Kyaukse-Lungyaw Plain is indicated as a northwest continuation of Permian-Triassic Limestones from the Plateau Limestone Group of the Panlaung and Ywangan areas within the Shan Plateau.

The geological structure of the Kyaukse area is generally shown in the EW direction, however, it should have been NS orientation, which was translated as a broken block of the Kyaukse-Lungyaw Plain due to the drag movement along the Sagaing Fault.

It should also be considered that diamond occurrences have been widely associated with the Mergui Group (Glaciomarine sediment) along the Shan Scarp Zone. The grades and qualities of diamonds between the Momeik and Phuket (Momeik, Taungoo, Tawei, Yadanapon, Phuket) suggest that they were derived from similar sources. Whereas the Mergui Group is used as a stratigraphic indicator to correlate the Momeik area to the Tengchong-Baoshan region with the Kyaukse-Lungyaw Plain. The distorted structure of the Mogok area and the allochthonous appearance of the Mergui Group in the Momeik area further to the Tengchong-Baoshan region indicate that they are dragged and derived from the Kyaukse-Lungyaw Plain.

The Kyukse-Lungyaw Plain was probably located at the opening of an extensional basin (Kalaw-Pinlaung Basin) on the western edge of the Sibumasu Block during the Mesozoic (Triassic to Cretaceous). On the other hand, the paleogeographical reconstruction indicates that the Sibumasu Block was a peri-Gondwana until the end of the Permian, then the opening of Neo-Tethys with Cimmerian Terrane away from Gondwana during the Triassic by the anticlockwise rotation of Gondwana.

With the opening of Neo-Tethys, the Kalaw-Pinlaung Basin was characterized as synthetic half-graben basins in an extensional basin development of the Sibumasu Block during the Triassic, which was confirmed by the fossils (Halobia) records.

Keywords: Kyaukse-Lungyaw Plain, Permian Limestone, Diamond occurrences, Mergui Group, Single ophiolite belt

Chlorite chemistry and thermometry of base metal mineralisation, Nallamalai Fold Belt, Cuddapah Basin, India: Implications for mineral exploration

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Abstract

Chlorites, ferro-magnesian minerals of clay group extensively varied in composition with differing physico (P, T) - chemical (X, fO2) conditions of host-rock, metamorphism and hydrothermal fluid. Utilising tetrahedral-octahedral cation occupancies/vacancies an evolving history of empirical chlorite thermometers (ChlTh) entered into semi-empirical ChlTh through known chlorite composition and measured Fe3+/Fetotal ratio with advancing sophisticated instrumentation. Finally, utilising thermodynamic parameters of solid-solution among various chlorite types, thermodynamic ChlTh were established which could estimate both temperature of chlorite formation and Fe3+/Fetotal. However, the evolution in ChlTh is still continued and achieved significant attention within last three decades. Simultaneously, a particular ChlTh that is calibrated for a fixed set of geological condition; therefore, cautions must be exercised while using it for differing geological condition. The present study is focused on base metal mineralisation hosted within intensely deformed and low-grade metamorphosed Proterozoic rocks of Nallamalai Fold Belt (NFB), Cuddapah Basin, India. Samples were collected from three different mineralised areas occurring at northeastern part of the basin. Based on extensive petrography, chlorites of metamorphic origin and associated with hydrothermal ore assemblage were observed, and analysed for mineral chemistry by employing EPMA. The chlorites of both origins are characterised as trioctahedral and compositionally varied from Fe-rich (chamosite) to Mg-rich (clinochlore). Fe-Mg substitution represented by negative correlation between Fe and Mg, di-trioctahedral substitution represented by negative correlation between 3*R2+ (divalent cation occupancy) and 2*Al+vacancy and Tschermak substitution represented by negative correlation between ‘Si+R2+’ and ‘Aloctahedral+Altetrahedral’ are observed in both types of chlorites. The mineral chemistry data of these chlorites are utilised for estimating temperature and fO2 of base metal mineralisation and metamorphism in NFB. Several empirical, semi-empirical and thermodynamic ChlTh are tested in this context. Collectively, all the types of ChlTh estimated the temperature of chlorite formation as 270±20°C for both metamorphic and hydrothermal chlorites. This temperature is also in accordance with homogenisation temperature (125−235°C) of our previous fluid inclusion studies on the mineralisation-related quartz-carbonate and quartz veins. Estimated fO2 along with temperature showed that these chlorites are varying in oxygen fugacity and either coincide with hematite-magnetite buffer or come below it. Similarity in the formation temperature and fO2 of both types of chlorites provoke further establishing the correlation between deformation-metamorphism and base metal mineralisation. Compared to other magmatic-hydrothermal and hydrothermal ore systems, detailed chlorite study will be helpful for further exploration.

Keywords: Nallamalai Fold Belt, Metamorphism, Basin-hosted mineralisation, Chlorite thermometry, Precambrian crustal evolution

Multivariate Classification of Petroleum Systems in the Salin Basin: A Case Study of Yenangyaung, Chauk, and Letpando Oilfields

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Abstract

The Salin sub-basin, situated within the Central Basin of Myanmar, is a notable geological depression that has fostered the development of multiple oil and gas fields, abundant in petroleum resources. The sedimentary sequences within this basin predominantly span from the Late Cretaceous to the Cenozoic, encompassing a wide range of depositional environments. These environments, coupled with a complex structural evolution, have produced varied and intricate geochemical signatures in the crude oils, complicating the accurate identification and classification of distinct petroleum systems. This study aims to enhance the understanding of the petroleum systems in the Salin sub-basin by addressing the limitations of traditional classification methods, with a focus on optimizing exploration strategies for the Yenangyaung (YNG), Chauk (CHK), and Letpando (LPDO) oilfields. The investigation of organic geochemical characteristics and source rock correlations across these oilfields has led to the identification of three primary petroleum systems within the Salin sub-basin: (1) Middle Eocene to Late Eocene, (2) Late Eocene to Oligocene, and (3) Late Eocene to Miocene. Additionally, a distinct petroleum system, ranging from the Early Eocene to Late Oligocene, has been specifically identified for gas accumulation. These systems are aligned with the timing of structural trap formations, which are critical in leading hydrocarbon accumulation. Hydrocarbon preservation in the Salin sub-basin spans from the Late Oligocene to the Pliocene, with key accumulation phases occurring during the Late Oligocene (~26 Ma), Early Miocene (~18 Ma), and Late Miocene (~8 Ma). This research provides valuable insights into the temporal and structural dynamics that influence hydrocarbon potential within the Salin sub-basin, offering critical guidance for exploration activities and resource management strategies.

Keywords: Petroleum systems, Organic geochemistry, Source rock correlation, Hydrocarbon accumulation, Salin sub-basin

The operation of RV Dayanghao in support of Training and Educational Programs

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Abstract

This PPT first provides a brief introduction to the “Dayanghao”ocean research vessel and its capacity building, including detection systems, ocean laboratories, and ocean survey equipment. Then, it focuses on the two scientific education and training projects currently supported on the "Dayanghao" research vessel platform, one of which is a Sharing Cruise Program and the other is a Contractors’ training programme of the International Seabed Authority.

Preliminary Study on Geology, mineralogy, and geochemistry of the Nam Xan gold prospect in Northeastern Laos

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Abstract

The Nam Xan gold prospect is a small-scale deposit located within the subsidiary structures of the NW-SE trending Truong Son fold belt in northeastern Laos. Our preliminary study indicates that the ore-grade rocks are predominantly hosted in carbonaceous-calcareous siltstone, shale, and low-grade metamorphic rocks. The extension of the gold-mineralized bodies aligns with the NE-SW striking geological structures, likely corresponding to shear zones, indicating structurally controlled mineralization.

Ore-grade rocks are marked by discrete quartz-sulfide veins containing up to 8.8 ppm of gold. These veins are surrounded by silicified wall rocks, mainly composed of quartz with a minor amount of carbonate, white mica, and disseminated sulfide. Subsequently the later stage of hydrothermal alteration assemblage, consisting of quartz, chlorite, epidote, actinolite/tremolite, carbonate, reddish garnet, pyroxene, hematite, and sulfide (e.g., galena, sphalerite, chalcopyrite, pyrite) overprinted silicified rocks. The presence of sulfides is associated with ore-grade rocks and the dominant sulfides occurred within discrete quartz veins and silicification zones. Sulfides mainly pyrite, pyrrhotite, and marcasite with minor arsenopyrite are divided into diagenetic and hydrothermal stages based on their mineral textures.

However, the spot analysis on pyrite and arsenopyrite from Electron Probe Microanalysis and Laser Ablation-Inductively Coupled Plasma Mass Spectrometry detected a very low gold content, most likely less than 10 ppm. The study of pyrite chemistry identified gold in pyrite below solubility, which suggested gold is presented as solid-solution in pyrite. In-situ sulfur isotopic analysis of pyrites from ore-grade rocks revealed δ34S values ranging from -5.5‰ to +6.1‰. The negative δ34S values suggest a biogenic reduction origin for sulfur, while heavier sulfur isotopic values indicate the influence of an external hydrothermal fluid source.

Sulfur isotopic data corresponded with the Co/Ni ratio in pyrite, which ranges from <1 to 10. This suggests a mixture of pyrite formed by magmatic-hydrothermal deposition (Co/Ni ratio 1 to 10) and pyrite originating from sedimentary and volcanic settings at or below the seafloor (Co/Ni ratio <1). The textural relation and the co-existence of pyrite and arsenopyrite suggest equilibrium conditions, supporting the estimation of the formation temperature of the Nam Xan gold mineralization. The arsenic equilibrium temperature for the arsenopyrite-pyrite pair is estimated to range between 300 and 350°C.

Integrating Entrepreneurship Education into TVET Programs in Myanmar

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Abstract

Technical and Vocational Education and Training (TVET) plays a crucial role in addressing global economic and social challenges by equipping learners with industry-relevant skills and fostering entrepreneurship. In Myanmar, integrating entrepreneurship education into TVET programs is essential for driving innovation, supporting Small and Medium Enterprises (SMEs), and contributing to the nation's socio-economic development. This study aimed to explore the integration of entrepreneurship education into Myanmar's TVET system. Using a qualitative approach, it analyzed secondary data from policies, reports, research studies, reviews, and case studies sourced from the Department of Technical and Vocational Education and Training (DTVET), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Center for TVET (UNESCO-UNEVOC), the International Labour Organization (ILO), as well as other relevant organizations and TVET researchers. The research highlights curriculum reforms under the Department of Technical and Vocational Education and Training (DTVET), focusing on initiatives to embed entrepreneurial skills and innovation in TVET programs. Additionally, the study underscores the challenges and opportunities in fostering a comprehensive entrepreneurship learning ecosystem within the TVET system. It also provides actionable recommendations to ensure the sustainable integration of entrepreneurship education, empowering TVET graduates to contribute to economic diversification, job creation, and Myanmar's sustainable development.

Keywords: Entrepreneurship Education, TVET programs, Curriculum Reform, Entrepreneurship Learning Ecosystem, Sustainable Development

Identifying Ways to Improve Access to Upper Secondary TVET Education Among Disadvantaged Youth for Advancing Sustainable Development in Myanmar

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Abstract

Upper secondary TVET education in Myanmar has the potential to drive economic growth, and promote sustainable development by creating a skilled workforce capable of addressing societal, economic and environmental challenges. This study aimed to investigate ways to improve access to upper secondary TVET education among disadvantaged youths in Myanmar, with an emphasis on promoting sustainable development. Using a mixed-methods approach, the research identifies key barriers faced by disadvantaged youths, etc. Data were collected through surveys with students, educators, and policymakers. The findings reveal that economic constraints, limited access to transportation, need for more supports from the schools, lack of awareness about TVET opportunities, are the primary obstacles hindering youth participation

in TVET programs. These barriers contribute to educational inequality and hinder Myanmar's progress toward achieving Sustainable Development Goals (SDGs), particularly those related to quality education, decent work, and reduced inequalities. To address these challenges, the study recommends more support from schools, more awareness for TVET opportunities, targeted financial aid programs, improved rural infrastructure, and policy reforms to strengthen TVET systems. By removing these barriers and enhancing access for disadvantaged youth, Myanmar can foster inclusive education, promote social equity, and contribute significantly to sustainable development.

Keywords: Improved Access, Upper Secondary TVET Education, Disadvantaged Youths, Sustainable Development

Moving Towards AI Technology in TVET Cooperating with MSME

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Abstract

This paper presents the potential of Artificial Intelligence (AI) in Technical and Vocational Education and Training (TVET) and has an advantage in MSME Enterprises. As the swift progress of AI technology, Myanmar's TVET sector can utilize AI-assisted learning to improve teaching and learning. AI technology in TVET enables personalized learning pathways, real-time skill assessments, and advanced training tools such as virtual simulations, equipping students with industry-relevant expertise. By incorporating AI into curricula, TVET institutions ensure students are prepared to meet the evolving demands of the workforce. Through partnerships with MSMEs, training programs can be customized to address specific challenges and opportunities in the MSME sector, fostering a workforce adept at implementing AI-driven solutions.

MSMEs, the backbone of many economies, often face limitations such as constrained resources and limited technological expertise. Collaborating with TVET institutions allows MSMEs to access tailored training and innovative AI applications, improving processes such as supply chain optimization, customer relationship management, and market analytics. TVET partnerships further enhance MSME capacity by facilitating internships and project-based learning opportunities, enabling students to apply AI knowledge to real-world scenarios, thereby driving innovation and operational excellence. The adoption of AI in TVET and MSME collaboration presents several challenges, including resource constraints, the digital divide, and resistance to change. The adoption of AI technologies by MSMEs stimulates local economies, creating job opportunities and driving sustainable development. For MSMEs, this can significantly enhance efficiency and decision-making across various operations. TVET sector can initiate a profound transformation aimed at enhancing educational achievements, promoting innovation, and equipping the workforce with the necessary skills for the modern economy and enhancing the MSME enterprises.

Keywords: AI, TVET, MSME, Enterprises, Innovation, Collaboration

Creative Approach to be Effective Industry-Academic Collaboration for MSMEs and TVET

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Abstract

Curriculum integration, industry partnerships, faculty training, assessment, feedback and quality assurance can ensure the necessary knowledge, practical skills and labor market for TVET and MSMEs. The government and private work from relevant ministries and organizations should collect information for implementing curriculum reforms from the traditional educational system. The skillful educational system requires the necessary learning assistance and effort. To be ready for workplace skills, sophisticated and emerging technologies need to be taken care of a wide variety of strategic plannings to accommodate the full potential of outcome-based education. It can be contributed that the collaboration and coordination of workplace practices and teaching techniques should be taken with emphasis for skill and competency requirement for employment in MSMEs as a mainstream foundation. Creative approach for the educational goals and experience in the workplace, cooperation with businesses and organizations in the country, mutual benefits for TVET and MSMEs, educational courses for skilled advances to effectively integrate work-based learning, responses and evaluation methods according to the competency requirements, balanced resources for learning opportunities will be observed. Creative measures should be implemented for institutes and private factories, workshops, and companies to monitor improvements in the employment situation and make teaching methods more efficient. Educational improvements for teachers must be shared, and government departments also collaborate with universities, colleges, institutes and schools for the relevant educational knowledges and information. Projects need to be developed with long-term outcomes and continued implementation of the workplace and academic cooperation. Industry-academic collaboration is really fostering an effective partnership for a highly trained workforce with both practical skills and an innovative knowledge. It will be ensured that TVET programs can create relevant, adaptive, and responsive to the ever-changing needs of the MSMEs sector.

Keywords: Industry partnerships, outcome-based education, work-based learning, creative measures

Literacy and Entrepreneurial Performance of Micro, Small, and Medium Enterprises in Naypyitaw

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Abstract

Literacy is crucial for firm owners to achieve superior performance as it is the primary requirements to operate businesses effectively nowadays. The study aims to analyze the effects of literacy on entrepreneurial performance of micro, small, and medium enterprises. Literacy represents digital literacy, financial literacy, and entrepreneurial literacy of firm owners in this

study. Both primary and secondary data were used in this study. The primary data were collected from 68 firm owners in Naypyitaw who were asked with the structured questionnaire. The respondents were selected with simple random sampling method. The secondary data were collected from the Association of Micro, Small, and Medium Enterprises in Naypyitaw, and Directorate of Industrial Supervision and Inspection, Ministry of Industry. The data were collected in October 2024. The descriptive statistics, correlation analysis, and multiple regression analysis were mainly used in this study. The results indicate that digital literacy, financial literacy, and entrepreneurial literacy are moderately correlated with entrepreneurial performance. According to the multiple regression analysis results, digital literacy, financial literacy, and entrepreneurial literacy have positive and significant effects on entrepreneurial performance. The firm owners should improve their literacy in technology, finance, and entrepreneurship to grasp business opportunities.

Keywords: Digital literacy, Financial literacy, Entrepreneurial literacy, Entrepreneurial performance.

Exploring New Technology Adoption in Myanmar's a MSME Sector from Traditional to Digital Practices: Perspective from Human Capital Development

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Abstract

The purpose of this study is to investigate how Myanmar’s Micro, small and medium enterprises (MSME) sector is changing from traditional methods to digital technology with a focus on the importance of developing human capital. It highlights how important of human capital development is to enabling the change transitions and how training and skill development may enable business owners to successfully adopt new technology for better company performance. Traditional business method has been updated how human capital development helps to traditional to digital practices and investigate the obstacles to technology adoption in Myanmar’s MSME sector. Using Mix approaches strategy that includes qualitative interviews and quantitative surveys in the area of examining how human capital, the skills, knowledge, and adaptability of the workforce facilitates the adoption of digital tools and practices. Owners and managers of MSMES are sampled in order to look into the difficulties and skills levels of employees. The outcome will highlight the key elements in influencing the MSMEs sector in Myanmar’s technology adoption as well as the influence of human capital development on digital practices.

Keywords: Technology Adoption, Digital Transformation, MSMEs, Human Capital Development, Myanmar

Colour Fastness Properties of *Swietenia Macrophylla* King (Mahogany) Bark on Cotton Cloths

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Abstract

Dyeing is a process of applying coloring matter directly on fiber, yarn or fabric without any additives. Natural dyes were used only for coloring of textile from ancient times till the nineteenth century. The natural dyes are derived from natural resources of coloring materials which is obtained from plant, animal, mineral and microbial origins. Natural dyes were used for coloration of various textile materials. Today, natural dye is the most scientific and advanced level of dyeing processes in the world. Natural and man-made colour was also used for dyeing processes. In this research, the natural dyes are extracted from Mahogany barks with water and dyeing processes is studied by applying dye on 100% pure cotton cloths. At first stage, sample was collected from WYU Campus, Htantabin Township, Yangon Region. Mahogany bark was washed with water, air dried and ground. The powder sample (20g) was extracted with water to obtain (3g) of brown dye sample. The dye solution was prepared with the weight by volume ratio of 1:100, dye: water at 60˚C.The mordant used in dyeing process are alum, aloe vera, copper(II) sulphate, ferrous sulphate, potassium dichromate with the weight by volume ratio of 1:100, mordant: water at 60˚C.The dyeing processes were studied with pre mordanting, simultaneous mordanting and post mordanting. This dye sample was characterized by FT-IR method. In dyeing processes, colour density is measured by colour densitometer. The dyed fabric tested for washing fastness and light fastness will be studied.

Keywords: **N**atural dye, Mordant, Colour fastness, Dyeing processes, Mahogany bark

Low-Cost, Sustainable Clay Base Biocomposites Filters for Water Purification

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Abstract

The rapid growth of industrial activities and population in the Sagaing Region of Myanmar has resulted in increasing environmental pollution, particularly concerning water quality. Traditional filtration materials, primarily synthetic, are often costly and environmentally damaging. This research explores the potential of using clay based bio-composite filters as a sustainable solution for water purification in the region. The study investigates the local availability of clay and organic materials, such as agricultural waste, to develop composite filters with enhanced filtration efficiency and environmental compatibility. Through a series of experiments, the physical, chemical, and filtration properties of the bio-composites were

evaluated, including their adsorption capacity, durability, and biodegradability. The results demonstrate that these bio-based composites not only offer effective filtration but also reduce reliance on synthetic materials, providing a low-cost, eco-friendly alternative suitable for local communities. This approach contributes to sustainable development goals by promoting the use of locally sourced, renewable materials for environmental remediation and reducing the environmental footprint of conventional filtration technologies.

Keywords: Clay bio-composite, Water filtration, Agricultural waste, Eco-friendly filters

Preparation, Characterization and Application of the Cross-Linkedchitosan-Starch Composite Film

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Abstract

This research work was concerned with the preparation, characterization and application of biodegradable chitosan-starch-epichlorohydrin (CSE) composite film to be used as a packaging material. The chitosan-starch-epichlorohydrin (CSE) composite films were prepared using a fixed of chitosan and starch with different concentrations of epichlorohydrin solution by solvent evaporating method. In this preparation, a fixed of 2 % (w/v) chitosan solution, 2 % (w/v) starch solution was mixed 50,100,150,200 and 250 μL of epichlorohydrin solutions kept in an autoclave under 0.1 MPa pressure at 121°C for 20 min were used. The prepared CSE composite films were characterized according to physicomechanical and physicochemical properties. They were also characterized by mechanical properties such as tensile strength, elongation at break and tear strength. According to the mechanical properties, 2 % w/v C, 2 % w/v S, and 100 μL E shows the highest tensile strength for preparing CSE-2 composite film. Prepared CSE-2 composite film was characterized by modern techniques such as Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FT IR) and Thermogravimetric Differential Thermal Analysis (TG-DTA). Antimicrobial activities of CSE-2 composite film was investigated by agar-disc diffusion method. Biodegradability of prepared CSE-2 composite film was studied by soil burial method. The quality controlling factors of mango fruits (water content, titratable acidity, reducing sugar content, crude fiber, total soluble solid, effect of pH, refractive index and weight loss) were investigated by using prepared CSE-2 composite film as a packaging material.

Keywords: Antimicrobial activities, Biodegradable film, CSE composite film, Mango, Packaging material

Effect of Sewage Biosolid Fertilizer on Growth and Yield of Mustard

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Abstract

In the present work, biosolids was prepared from sewage sludges. Sewage sludge was treated to form biosolids by processes such as dewatering, sludge pasteurization, anaerobic digestion, aerobic digestion, composting and storage. The different sewage biosolid fertilizers, S1 and S2 were prepared. S1 contained only sewage biosolid and S2 contained in the weight ratios of (1:1:1) of sewage biosolid, rice husk ash and cocopeat. And then, some physicochemical properties and micro-macro nutrients of sewage biosolids fertilizers were qualitatively and quantitatively determined by EDXRF, AAS methods and other conventional methods. By using sewage biosolids fertilizer, field experiment was conducted to test with mustards. The seed of mustard were collected from Yezin Agricultural University, Pyinmana Township, Naypyidaw. The field experiment was laid out using a randomized complete block design (RCBD), with six treatments (T1-T6). Physicochemical parameters and micro-macro nutrients of soil samples before cultivation and after harvesting were analyzed. The results from the study indicated that the prepared biosolid fertilizers can effectively be use for the growth and production of mustard. To know the presence of beneficial or non–beneficial microbes in sewage biosolids, microbial tests were studied by total plate count methods.

Keywords: Biosolids fertilizer, Sewage sludge, Mustard, Micro-macro nutrients

South Korea's SME Development and Vocational Training

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Abstract

At the birth of the ROK as a newly independent republic in 1948, South Korea has reflected in the newly promulgated contstiution a compulsory free primary education system along with the land reform based on owner-cultivator principle. The compulsory primary education has provided an unlimited educated labor force at the beginning of labor intensive export oriented development strategy.

During rapid industrialization, South Korea has developed an acute dichotomy in industrial structure, which consists of large conglomerates and multi-layered and functionally segmented SMEs. South Korean SMEs can be divided by two groups, namely livelihood type and innovative type and divided by small businesses and medium sized ones in terms of number of employment. Innovative type covers venture start-ups and more R&D intensive firms. Many elite college graduates prefer to land in high paid jobs offered by large conglomerates. The graduates from vocation schools generally enter SME offered jobs with lower salaries.

South Koreans' unabated education fever for higher education has made South Korea one of the top-performing OECD countries in mathematics and sciences. Higher education is viewed as one of the fundamental cornerstones of South Korean life to ultimately improve one's socioeconomic position in the society.

While there is a very competitive general education channel for white color jobs, there also exist effective vocational school channels to meet skilled manpower demands especially from SMEs with decent rewarding mechanisms. ROK's vocational school system has made the country win 19 overall gold medal champions out of 22 International Vocational Training Competition in the period of 1977-2023.

Vocational education in Korea is divided into two categories: specialized high schools and Meister high schools. The latter is designed to cater to the urgent skill needs of medium size industries. In general, vocational education enters three stages--the youth stage, adult stage, and lifelong education stage.

In addition, Korean companies, big or small, carry on- the-job training programs relevant to their industrial positions and technology they own. There are also corporate partnership programs between large conglomerates and SMEs to produce win-win collaboration outcomes. Korea's SMEs face challenges how to obtain skilled manpower fitting in the AI technology era.

The Impact of SMEs Development Policy on SMEs Performance in Myanmar

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Abstract

Myanmar is a potential country for economic growth, becoming active democratic in South East Asia and a member of ASEAN. SMEs are an engine to drive the national economic and poverty alleviation not only developed countries but also developing countries. Although SMEs in Myanmar have 230,799 enterprises which include formal and informal sectors, just only 68,499 enterprises are registered SMEs which specify as SMEs according to SMEs definition and law. As the developing countries are facing many challenges for development of SMEs, government should set up the effective policies and robust implementation for SMEs growth. Otherwise, firms should vanguard improvement of their performance such as technology and innovation, access to finance and access to market and internationalization in globalization era because of speedy change of economic conditions in the world. Although the SMEs Development structure to provide some assistance had completed, SMEs in manufacturing sectors still lag and need to take more services than current condition because of lack of innovation policy, patent law, and weakness in research and development activities, financial access, and marketing knowledge, unclear export strategy and National SMEs Master plan even though Myanmar became to be an active member into international communities. This study used primary data (survey data) and secondary data (web page and other studies)

and tends to use descriptive qualitative method and empirical method. The key of this study is descriptive analysis for SMEs development. Therefore, this study collected the data of (325) enterprises in manufacturing sector in three regions in Myanmar such as Yangon, Mandalay and Ayeyarwaddy Regions. In empirical result, to enhance the development of SMEs in Myanmar, national government and regional government should promote R& D activities in Ayeyarwaddy region because that region is less than other two regions in R&D activities. According to statistical results, SMEs development both in terms of employment creation and capital access is statistically related with received loans. Major challenge of SMEs in Myanmar to get the loan is they do not know how to keep systematic financial documents. Therefore, government and other parties should provide financial management training to enhance their financial literacy because most of SMEs are low capacity of financial literacy. Consequence, they cannot meet the bank's criteria to get the loans. The results showed that Markets and international procedures again statistically significant with employment creation. Government, Associations and other institutions should prove the knowledge sharing programs and training related with international standards and procedures to enhance the exports and to internationalize.

Keywords: SMEs, SMEs development, Technology and Innovation, Access to finance, Access to Market and Internationalization

Communities Participation in Manufacturing of Value-added Toddy Palm Products for the Development of MSME in Mandalay Region

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Abstract

Palmyra or toddy palm trees, *Borassus flabellifer* L., have a long history of maintaining both subsistence and commercial products, many of which are deeply embedded in local culture as well as Myanmar culture, largely because of a longer history, palmyra utilization of Nyaung Oo region is more diverse and more intensive in number of products. Among them, toddy sap-based products are one of the most important not only in local but also in the whole Myanmar. The sap tapped from open inflorescence has the long history of contributing the main source in the form of solid jaggery. The traditional sap-tapping technology was handed down by words of mouth for centuries and local people of Nyaung Oo township have a deeply rooted sap-tapping tradition. But regarding to economic and social aspect changes, through globalization rural society has significantly changed, therefore majority of rural people earning couldn't adapt to keep with self-sufficiency. These impacts were affected on traditional sap-tappers who were partially farmers. They have to abandon their traditional sap-tapping services. So that sap-earn living people have declined and mostly went to abroad for more income generation and they also neglect of its value in term of economic capital in accordance with lack of knowledge and technology. Present days, most of the toddy palm trees have been standing ideal, without

being tapped due to lack of skilled persons. They are no longer used for producing sap. Therefore, they have been cut for substation of timbers. Most of the sap-tappers have given up their traditional sap-tapping. In this condition, most of toddy palm plants were no longer used for sap tapping and existing trees were cut for wood substitution purpose. This community initiative project conducted in 2012-2014 to have a better understanding of productive potential of community toddy palm project which should be exploited and explored existing wealth of local knowledge recognizing strong local cooperation and participation is critical to on farm *in situ* conservation of toddy palm trees enhanced productivity through community agroforestry is only way to secure and sustain in particular dry zone area. Taxonomical description of toddy palm, isolation of yeast strains from toddy-sap, biochemical tests of isolated yeast strains and potential value-added toddy palm products were mentioned in this research. This participatory project has been initiated with two mandating such as to create sustainable livelihood system development and to conserve the traditional agroforestry system. It is also a component of the livelihood and poverty alleviation strategy for inhabitants of the central Myanmar.

Keywords: Toddy palm, Sap-based products, Sap-tapping, Community initiative, Local knowledge.

Challenges, Needs, and Recommendations for the Development of MSMEs in Myanmar's Food and Beverage Sector

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Abstract

To foster the development of Micro, Small, and Medium Enterprises (MSMEs) in Myanmar, it is essential to analyze the key challenges they face. This study focuses on identifying the fundamental obstacles to the growth of food and beverage enterprises in Myanmar. Based on OECD standards and a comprehensive literature review concerning MSMEs development, it has been employed twelve indicators to evaluate the primary challenges confronting these enterprises. The analysis of survey data revealed significant factors contributing to these challenges, next to the necessary requirements and policy recommendations aimed at enhancing the development of food and beverage sector MSMEs in Myanmar.

Keywords: MSMEs, Food and beverage, Indicators, Analysis, Challenges, Recommendations

Micro, Small & Medium Enterprises Empowerment in Mon State

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Abstract

The paper focuses on the empowerment of micro, small, and medium enterprises (MSMEs) in

Mon State, which consists of four districts possessing a variety of MSMEs, including slate and slate pencil manufacturers, pipe producers, rubber product makers, rice vermicelli producers, and others. These enterprises primarily rely on locally available raw materials to produce value-added products. However, they face numerous challenges, such as high costs for quality raw materials, limited access to advanced technology, low demand, price fluctuations, high transportation expenses, and a shortage of stable, skilled labor. As a result, local entrepreneurs encounter the problems on low technology availability, skill labour shortage, low demand, etc which hinders the growth of these businesses. The paper aims to examine the current status of MSMEs in Mon State, to identify the challenges affecting the production of value-added products production, and to suggest suitable means to empower MSMEs in the region. To gather relevant primary data, field observations and data collection were conducted in various townships within Mon State, while secondary data was collected from government offices and vocational schools. A descriptive approach was used for analysis, and Geographic Information System (GIS) tools were employed in illustrating with maps.

Keywords: Micro, Small & medium enterprises, Low technology, Low demand, Lack of stable skilled labours

The Effects of Innovation on Performance of Weaving Firms in Amarapura Township

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Abstract

This study examines the effects of innovation on performance of weaving firms in Amarapura township. This study attempts to identify major innovation types of weaving firms, and to analyze the relationship between different innovation types and performance of weaving firms in Amarapura township. The major types of innovation among weaving firms comprises product innovation, process innovation, marketing innovation, and organizational innovation. This study utilizes primary data from 81 owners out of 387 weaving firms from Amarapura township in 2019. Survey data was collected by using simple random sampling method. Multiple regression analysis is applied to analyze the variables of this empirical study. In exploring the relationship between innovation types and performance of weaving firms in Amarapura township, it is found that process innovation and organizational innovation are effective to promote performance of weaving firms. However, product innovation and marketing innovation have relationship but not having significant effect on the performance of weaving firms. Based on the findings of this study, suggestions, recommendations and policy implications for weaving industry are described in this study.

Keywords: Product innovation, Process innovation, Marketing innovation, Organizational innovation

Successful MSME Models and Service Quality Impact on Student Satisfaction in Higher Education Institutions in Myanmar

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Abstract

Private Higher Education Institutions (HEIs) in Myanmar can be recognized not only as educational providers but also as Micro, Small, and Medium Enterprises (MSMEs). Unique challenges in balancing service quality and sustainability are common for those institutions as the student satisfaction is one of the most critical factors for developing competitive edge and success of HEIs. Identifying students as customer, this study explores the role of service quality in enhancing student satisfaction within private HEIs. In addition to well-accepted service quality models such as SERVQUAL and SERVPERF, other models of service quality in higher education institutions have been developed. This study systematically reviews the effect of service quality on student satisfaction based on the case and studies of Malaysia and Australia which are the Asian countries with well-established higher education institutions and properly conducted research papers on their service quality. The findings will be focused on how adapting MSMEs best practices can enhance organizational performance, address operational challenges and align service delivery with student expectations. This study integrating service quality frameworks with successful MSME strategies will be the pathway for HEIs to succeed as both academic institutions and sustainable enterprises in the evolving landscape of higher education.

Keywords: Higher Education, MSMEs in Education, Service Quality, Student Satisfaction

Effect of Financing on SME Growth in Thanlyin Township, Yangon

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Abstract

SME growth is crucial for not only SME but also country's economy. The critical aim of the study is to analyze effect of financing on the SME growth in Thanlyin Township, Yangon. The data for the study is collected from 50 SME. The data is analyzed by using descriptive and inferential statistics. Financing is divided into two parts, such as internal financing and external financing. The research showed that internal financing has not relationship with SME growth and not significant although external financing has effect on the SME growth. This research provided an opportunity to know how to employ the finance in order to grow SME. This research also recommended that SME growth is not caused by just finance.

Keywords: Financing, SME growth

Prospects of Human Capital for Labour Productivity (A Case Study of Local Brand MSME Garment Firms in Yangon, Myanmar)

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Abstract

The garment industry is recognized as an engine of economic and occupational growth in many Asian economies and in Myanmar. Although garment industry become a successful manufacturing sector for Myanmar due to its comparative advantage of labour surplus, it still faces the low labour productivity by comparing with the neighbouring countries. Thus, this paper tends to analyze the strength of the specific variables, such as human capital, management practices of the firms which correlate to the potential increase of labour productivity. This study uses the descriptive and analytical research methods by using the qualitative and quantitative approaches. A Pearson Correlation is applied to examine the relationship between human capital, firms' management practices and labour productivity. The data is collected from 50 employees form two sample garment firms in Yangon which are operating as small-scale local brand garment firm of Myanmar. This study found that labour productivity of the sample garment firms is determined human capital by 89% and firms' management practices by 74%, respectively. This study suggests that garment firms should arrange or encourage to join the regular training programs or skills development programs which can lead to promote practical skills and real experience of their workers. Moreover, the garment firms may have better human capital and trained workers by cooperating with garment vocational schools to increase their labour productivity. Thus, this paper highlighted that vocational education is important for increasing labour productivity of garment firms because it can provide individuals with the typical skills which they need to perform their jobs efficiently and effectively. This can help to fill the skills gap in the labour market. In the case of firms' management practices, stakeholders of garment industry can have the programs, seminars and trainings aimed at improving the experiences of workers and the managerial skills supervisors/ managers of the garment firms. Those programs can help to create a better organization image by improving managers' performance, which will lead to retain skilled-labours in their firms, reduce the mismatch of skilled to unskilled labour and also reduce the labour turnover while promoting the labour productivity of their garment firms.

Keywords: Labour Productivity, Skills Development, Human Capital, Management Practices.

Challenges in Myanmar Speech-to-Digital Code Conversion: Feature Extraction with MFCC and Analysis of Accuracy Limitations

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Abstract

The paper is dedicated to converting Myanmar speech into digital code, outlining the feature extraction process by MFCC. While voice recognition technologies are increasingly enabling

methods for improvement in communication and providing access across languages, this study aims to enhance the effectiveness of recognition in the Myanmar language because of the complex phonetic features and tonal variations that this language presents. The dataset is five classes of spoken questions in Myanmar, which intend to cover a wide range of phonetic and accent variations. In this work, taking advantage of the feature extraction technique called MFCC (Mel Frequency Cepstral Coefficient), which is especially effective in speech processing, features are extracted directly from the preprocessed audio signal. This skips the necessity for a speech-to-text intermediate and a dictionary, the need for which further simplifies the recognition process, especially for complex languages such as Myanmar. Following the extraction, a KNN classifier associated the audio inputs to their respective digital code, hence laying down a framework for the recognition of the spoken content. Testing of this classification sheds some insight into the strengths and limitations of the current model, including issues related to dataset size, environmental noise, and the intrinsic complexity of Myanmar phonetics. Therefore, the study suggests that future work may be done on an enlarged dataset with better methodologies for feature extraction and trial, and use of the other classifiers to increase the accuracy. The application of the current study is thus supportive of the development of effective voice recognition systems for under-resourced languages by limiting the current shortcomings by proposing methods of improving their efficacy and scalability.

Keywords: Audio Signal Processing; Natural Language Processing; Machine Learning Classifiers; MFCC; Accuracy Comparison

Developing an Abstractive Text Summarization System for the Myanmar Language Using a Fine-Tuned mT5 Model

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Abstract

In natural language processing, text summarization is a crucial task to provide succinct yet accurate summaries of lengthy texts while preserving their substance. Despite the development of extractive summarization systems for Myanmar by many researchers, an abstractive summarization model has not yet been developed due to the language's complexity and a lack of sufficient data and resources. Extractive summarization models are limited by several issues, including lack of coherence, inability to generalize insights, redundancy, inflexibility, dependence on original text quality, variability in output consistency, neglect of contextual meaning, and limited coverage. These limitations highlight the need for more advanced abstractive summarization methods. This paper proposes the use of an MT5-based model, a pre-trained transformer-based model specifically designed for abstractive text summarization in multiple languages, which has been fine-tuned for Myanmar text summarization. This multilingual model is pre-trained on diverse, high-quality summaries across various languages

and further fine-tuned on specific datasets. By leveraging the pre-trained model on the XL-Sum dataset, we aim to create fluent and non-redundant summaries that preserve the essential meaning of Myanmar content. Myanmar text data was used to fine-tune our model, which enhanced contextual understanding and improved summarization accuracy. Promising experimental results are demonstrated in the summarization of the Myanmar Prime Minister's speeches, which show substantial improvements in coherence, readability, and relevance. Although the evaluation results of the proposed model did not achieve a high ROUGE score of 49, primarily due to limited data and tokenization issues, the generated summaries remain human-readable and accurately convey the intended semantic meaning.

Keywords: Natural Language Processing (NLP), Abstractive summarization, Pretrain, Multilingual model, Fine-Tunning, MT5-based model

A Generative Approach to Medical Question-Answering in Myanmar Language Using Transformers

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Abstract

Medical science plays a crucial role in society by providing essential information on health, disease treatment, and recommendations for maintaining well-being. This enables people to understand health-related information, receive necessary guidance, and access timely advice, thereby improving public health in the country. The growing demand for health-related information in the Myanmar language underscores the need for a system that bridges the knowledge gap between patients and medical professionals. Medical diagnosis increasingly uses natural language processing (NLP) and artificial intelligence (AI) as alternatives to human perception, enabling users to ask queries in their native language. However, sharing medical information in the Myanmar language faces several challenges, including a lack of medical data resources and limited real-time access to information. The proposed system leverages transformer architecture, focusing on adapting to available computational resources and reducing model parameters. Our transformer model has 2 million parameters, balancing efficiency with the ability to capture complex linguistic patterns. The development of a question-answering (QA) system aims to effectively handle code-mixed queries, particularly those containing English text within Myanmar language questions. The transformer-based model achieved a BLEU score of 0.8750025, demonstrating high translation accuracy and relevance in the generated responses.

Keywords: NLP, Transformers, Stanza, QA, AI, Public health, Myanmar Language

Challenges in Part-of-Speech (POS) Tagging of Particles: Revealing Multifunctionality and its Effect on NLP applications

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Abstract

This research investigates the challenges in Part-of-Speech (POS) tagging for the multifunctional particles- မှ/hma./, က/ka./, ကို/kou/, အား/a:/, တော့/to./, ပဲ/pe:/, etc. The most prominent morphological features in Myanmar are agglutinative and compounding. Therefore, it has complexity of tokenization, word segmentation and POS tagging. To analyze the uses of particles in different contexts, this study collected the data from everyday conversations. To be more efficient, a five-part-of-speech classification framework is used to analyze the data instead of the nine-part-of-speech classification framework. The particles were analyzed into two types; two particles (sentence medial phrase particles and sentence final phrase particles) and six markers (noun marker, verb marker, subordinate marker, coordinate marker, verb sentence marker and reported speech marker) based on the perspectives of John Okell and Maung Khin Min (Danuphyu). The findings indicate that using a five-part-of-speech classification provides more accurate and systematic results for particles. In addition, it reduces ambiguity and emphasizes the relevant syntactic roles of words in Natural Language Processing (NLP) tasks. The main point of the study is the uses of multifunctionality of particles in natural language conversation. The study points out that analyzing the multifunctionality of particles through a more efficient POS framework leads to improved tagging precision. This research provides significant insights for enhancing the precision of POS tagging in NLP tasks to achieve high level of linguistic expertise for the Myanmar language. It covers the way for further studies of the role of other multifunctional particles in NLP applications such as Machine Translation, Name Entity Recognition (NER), Text Summarization and Natural Language Understanding (NLU).

Keywords: Part-of-Speech (POS) tagging, multifunctional particles, tokenization, particles, markers, Natural Language Processing (NLP), Machine Translation, Name Entity Recognition (NER), Natural Language Understanding (NLU)

The Analytical Study of Myanmar Interjections for NLP Context

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Abstract

Myanmar Interjections play a pivotal role in such phases of Natural Language Processing (NLP) as lexical analysis, part of speech (POS) tagging, semantic analysis, discourse integration and pragmatic analysis. In the Myanmar Language, interjections are formed as words or short phrases that typically constitute an utterance in a larger interactive sequence. It

has complexity to tokenize the sentences and POS tagging since some common nouns (သူခိုး/tha khou:/, မြွေ/mwei/), pronouns (ဗျာ/bya/, ဗျို့/byou./) verbs (ပြေး/pyei:/, လိုက်/lai'/) attributes (မြန်မြန်/mjan mjan/), particles (ကွ/kwa./, ရေ့/jei.) are used as secondary interjections. The aim of this study is to analyze the Myanmar interjections from the point of linguistic view and to solve the ambiguity in word tokenization, POS tagging and dependency datasets. The data were collected from everyday social interaction. Theoretical analysis was based on the Spoken Grammar written by Maung Khin Min (Danuphyu). Myanmar colloquial utterances including interjections were tokenized and tagged POS to highlight extra linguistic context. It was found that the types of interjections, primary and secondary, were varied among the syntactic positions and pragmatic ambiguity. By analyzing the secondary interjections, it can be utilized for the specific requirements of NLP task such as Machine Translation and Natural Language Understanding (NLU).

Keywords: Interjections, Tokenization, POS Tagging, Dependency Datasets, Natural Language Processing (NLP), Machine Translation, Natural Language Understanding (NLU)

A Study of Different Part-of-Speech (POS) Tagsets for Myanmar Dependency Parsing

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Abstract

In Natural Language Processing (NLP), word segmentation and Part of Speech (POS) tagging are fundamental tasks. The POS information is also necessary in preprocessing for NLP task such as Information Retrieval (IR), Automatic Question & answering, Natural Language Understanding (NLU) etc. Dependency parsing is a process to analyze the grammatical structure in a sentence and find out related words as well as the type of relationship between them. The objective of this work is to find the most suitable POS tagset for Myanmar dependency parsing by analyzing the results of dependency parsing models. To show the effectiveness of POS tagsets on the dependency parsing, the comparative analysis is done by conducting experiments with machine learning models. This paper also describes Myanmar dependency corpus annotation scheme based on different POS tagsets. The dependency dataset consists of 25,000 sentences and 331,600 tokens, and are manually annotated by Myanmar language experts. Parsing experiments were conducted for the performance of the dependency dataset. Parsing results are evaluated by UDPipe in terms of Unlabeled Attachment Score (UAS) and Labeled Attachment Score (LAS), and achieved 94.32% and 96.59% respectively. This work intends to help the NLP tasks for Myanmar Language and Literature Improvement Project (MLLIP).

Keywords: Natural Language Processing (NLP), Part of Speech (POS) Tagging, Dependency Parsing, Information Retrieval (IR), Automatic Question & answering, Natural Language Understanding (NLU)

Syllable Length-limited Tacotron 2 Based Myanmar Dhamma Text-to-Speech Synthesis

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Abstract

This paper examines the impact of limiting syllable length on Tacotron 2, a cutting-edge end-to-end text-to-speech (TTS) model, for synthesizing voice data from Myanmar Dhamma text. Traditional TTS systems involve multiple processing stages, which often lead to integration challenges and limitations in producing natural-sounding speech. Modern end-to-end TTS models simplify this process by using a unified framework that directly converts text transcription into speech by incorporation attention mechanisms to capture the nuances of pronunciation, prosody, and emotional expression. However, end-to-end TTS systems like Tacotron 2 face challenges when dealing with long sentences, leading to misalignment issue between text and acoustic features. Accordingly, the synthesized speech may contain acoustic artifacts that impair intelligibility and degrade perceptual naturalness. To address this issue, we proposed a syllable-length-constrained model by limiting the input sentences to a maximum of 25 syllables to improve alignment and prosody. Therefore, the study focuses on comparing two versions of Tacotron 2: one trained on long syllable-length sentences (Long-Tacotron 2) and another on short syllable-length sentences (Short-Tacotron 2). In this study, Long-Tacotron 2 struggles with alignment issues between text and acoustic features, leading to degrade the quality of audio. This finding highlights the importance of sentence length in training of Tacotron 2, particularly for languages with complex phonetic structures like Myanmar. By focusing on shorter sentences, the model achieved better alignment that leads to improve prosody and expressiveness. Based on Mean Opinion Score (MOS) evaluation, the Short-Tacotron 2 model outperforms Long-Tacotron 2 with a higher MOS score. This indicates that Short-Tacotron 2 significantly excels over Long-Tacotron 2 in terms of both naturalness and intelligibility in the Myanmar dhamma text-to-speech synthesis process.

Keywords: End-to-End TTS, Tacotron 2, Syllable Length-limited, Myanmar Language

Domain Adaptation of Myanmar-English Statistical Machine Translation System

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Abstract

Statistical Machine Translation(SMT) is an approach to automated translation that relies on statistical models built from large collections of bilingual text, known as parallel corpora. One of the main challenges of SMT is that the performance of SMT system drop observed when testing conditions deviate from training conditions. Besides, SMT systems encounter challenges when translating specific-domain content due to specialized terminology, complex sentence structures, and context-specific meanings. In these situations, researchers have to either overcome these issues of nonexistent data or limited resources by applying the linguistic

knowledge or statistical methods. Therefore, domain adaptation is a method for enhancing translation quality when the SMT system needs to operate in a specific-domain (such as technical, legal, or medical) for which it was not trained. In this paper, investigations were conducted on phrase-based statistical machine translation system trained on Myanmar-English parallel corpus in conversational domain and adapted on the Myanmar-English parallel corpus in story domain. The results of the experiment show that domain adaptation of statistical machine translation system improves their ability to address issues with limited resources or nonexistent data.

Keywords: Statistical Machine Translation(SMT), Phrase-Based Statistical Machine Translation (PBSMT), Domain Adaptation

MyanSpeech: Enhancing Myanmar Automatic Read Speech Recognition with Subsampling Techniques of TDNN

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Abstract

This paper proposes the automatic read speech recognition system with subsampling technique of Time Delay Neural Network (TDNN) on Mel Frequency Cepstral Coefficients (MFCCs) features for Myanmar language. The challenge of speech recognition is that the speech recognizers are not still understand all speech spoken by various person from any acoustic environments. Therefore, speech recognition system branches into three types: speaker dependent, speaker independent, and speaker adaptive. To overcome this challenge, speaker adaptive training after mono training in building acoustic model is done with different parameter tuning like Gaussian components and language model in baseline Gaussian Mixture Model-Hidden Markov Model (GMM-HMM). From various outcomes of these training analysis, an optimal outcome of baseline GMM-HMM with speaker adaptive training is chosen and then aligned towards TDNN for obtaining the best decoding result. The reason of why uses baseline GMM-HMM modeling is that it can be used for initial modeling or as part of hybrid systems to improve performance and robustness. Therefore, Myanmar read speech recognizers using traditional GMM-HMM and TDNN approaches are implemented in this study. These results showed that the proposed TDNN architecture with subsampling enhanced the system performance than baseline model, while achieving higher parameter efficiency. Forwarding the results implementing on 5-gram language modeling and 10,000 Gaussian components of GMM-HMM to TDNN indicate that the TDNN recognizer surpasses the baseline GMM-HMM, delivering more than 12% relative improvement in the closed test and nearly 14% relative improvement in the open test. In the near future, the state-of-the-art Automatic Speech Recognition (ASR) systems will be going to develop by applying the large-scale textual data for language modeling and various styles of speech data for acoustic modeling. If the system

is trained with large scale datasets, it can easily adapt to different accents, speaking styles and even noisy state.

Keywords: ASR, MFCC, GMM-HMM, TDNN, Read Speech

The Usefulness and Awareness of Using AI Applications in Higher Education: Large Language Model (LLM)

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Abstract

Driven by technological advancements and increasing use of artificial intelligence (AI), the landscape of higher education is continuously evolving. Application of AI in education has been the subject of academic research for more than three decades. Especially after 2018, the potential of AI language models, such as Chat GPT, to support self-determined learning in higher education has garnered increasing attention from educators, researchers, and policymakers. However, the adoption of AI in Myanmar's educational environment remains in its infancy. Therefore, this paper aims to assess the level of knowledge and awareness of AI applications in higher education, particularly in geography discipline. Additionally, it seeks to highlight the usefulness and potential applications of AI language models in enhancing educational practices. The study finds that there is generally still trailing behind using AI applications in higher education, including in Geography, even in formulating relevant educational policies.

Keywords: Artificial Intelligence, Higher Education, Learning, Teaching, Research, Geography

Integration of AI Methods with Hadoop Ecosystem

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Abstract

The presentation explores the intgration of the Hadoop ecosystem with artificial intelligence. AI is now applied in many spheres of life, e.g.: in finance, health, government administration, logistics and education. LLM and deep neural networks are mainly used to help make decisions. The quality of such methods depends on the volume of the training sample. Modern data are such that ordinary storage methods (relational data bases, tables) and processing are not suitable for them. The Hadoop ecosystem includes tools that allow: distributed and reliable storage of large volumes of information, develop and run machine learning models. E.g. Spark allows to work with several GPUs in parallel and at the same time has the built-in module Spark ML, where the main methods of machine learning are already implemented. Hadoop

uses the Apache Mahout library for this. We will tell you how to use various parts of the Hadoop ecosystem for AI, as well as how to configure the infrastructure for Hadoop.

Harnessing Machine Learning to Predict and Enhance Student Academic Performance: A Study in UDNR, Myanmar

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Abstract

In this study, we rigorously assess the predictive power of five prominent machine learning algorithms—Artificial Neural Network (ANN), Support Vector Regression (SVR), Random Forest Regression (RF), Gradient Boosting Regressor (GBR), and Extreme Gradient Boosting (XGBoost)—in forecasting student academic performance. Utilizing survey data from the University for the Development of the National Races of the Union (UDNR) in Myanmar, we undertake a comparative analysis to delineate the most efficacious model. This is followed by a detailed exploration of feature importance based on the superior model identified. Our results unequivocally indicate that SVR out performs the other contenders in predictive accuracy, although the remaining models also demonstrate usability. Subsequent Permutation Feature Importance (PFI) analysis reveals that lagged GPA is the most significant predictor, followed in sequence by total marks obtained in grade 11, gender, weekly study hours, and ethnicity. The insights derived from this research highlight the significant implications of machine learning methodologies in enhancing the accuracy of student academic performance predictions, thereby potentially fostering more personalized and effective educational strategies.

Keywords: Academic performance, Machine learning, Feature importance, Survey data analysis, Myanmar

The Use of Machine Translation by Undergraduate English Language Students; Attitudes and Perceptions of English Language Teachers from Mandalay University of Foreign Languages

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Abstract

In the 20th century, technology is developing very quickly and it stays in the necessary being role in different sectors. However, technology used in education sector and language learning is still being debated among the students, teachers and parents. Therefore, the aims of the research are to explore the use of Machine Translation (MT) by undergraduate English Language students and to find out the attitudes and perceptions of English Language teachers on using MT by students of Mandalay University of Foreign Languages. The objectives are to

find out the purpose of using MT by students for their English language learning and to identify the views of English Language teachers on the using MT of the students. The researchers used two questionnaires, the first questionnaire which included (20) questions for students and the second questionnaire which included (13) questions were intended for English Language teachers. The reshearchers got the permission to use and modify the questionnaries created by Joan Clifford, Lisa Merschel and Joan Munne (2013), Jolley and Maimone (2015). The findings showed that the students majoring in English language mainly used MT to study Reading and Writing Skills and they also used MT as a dictionary to learn new vocabularies. In translation process, the students used MT to translate English Language into Myanmar and Myanmar to English. Moreover, they can translate other languages also. Although the use of MT can save the time, the students have to face with difficulty because some of the answers are not reliable. In identifying the views of English teachers, the teachers were encouraging, allowing and giving advice to students to use MT in their language learning, however, the teachers were still concerning about too much relying on MT of the students for their learning because MT cannot give the satisfactory answers like the human brains. In the future, the use of MT in language learning will constantly be developing not only among the language learners but also in different sectors if MT is able to give more definite responses.

Keywords: Technology, Machine Translation, Translation, English Language learning & English Language Teachers

An Investigation into the Natural Language Processing Capabilities and Issues Supported by Google Machine Translate (Myanmar - English)

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Abstract

In this paper, the author applies Google Neural Machine Translation (GNMT) software to analyze language processing capabilities and issues faced in Myanmar to English translation process. Three study themes are literary or artistic, academic, and general. When assessing accuracy, these three groups are considered: the ability to capture homonymous meaning, collocative meaning, contextual meaning, reflected meaning, and the degree of semantic coherence. Grammatical, semantical (such as meaning loss), and unnatural wording difficulties are present. The outcome doesn't fully meet the expectations showing that machine translation still has great space to improve in the Burmese language. Well-organized material that uses formal language and basic sentence patterns, particularly on formal themes, frequently produces translations that nearly resemble human translations between English and the target language. However, translating idioms, slang, metaphors, traditional sayings, and names requires more contextual knowledge, and the accuracy level is not fully optimized. Based on this case study, the author points out the issues that need to be fixed and provides some advice on how to ensure the language processing quality of machine translation.

Keywords : Machine translation, Issues, Language processing, Unnatural, Contextual, Idiom, Metaphor

GFPGAN-Based Deblurring for Enhanced Face Recognition from Low-Resolution CCTV Images

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Abstract

Performing face recognition of faces within 5 feet to 20 feet of CCTV is less accurate due to small and blurred faces. This paper presents a novel method to enhance face recognition performance by combining Generative Facial Prior GAN (GFPGAN) with the YOLOv7 face detection model and the VGGFace2 recognition model based on ResNet-50. This combination model enhances the clarity and recognition accuracy of small and blurry faces that are typically difficult to distinguish, overcoming the limitations of conventional methods. The experimental results show that the proposed combination model achieves 100% accuracy in recognizing small blurred faces from a distance of 10 feet to 20 feet, except for some face positions like the head-down position, proving that it is a reliable solution for CCTV surveillance security.

Integrating Apache Spark for Efficient Deep Learning-Based Remote Sensing Analysis in Developing Countries

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Abstract

In Earth Observation, advancements in remote sensing have greatly enhanced the understanding of the planet. The progression from early aerial photography to modern satellite imagery has enabled the collection of increasingly vast and diverse datasets. Significant developments in data acquisition methods have been documented, with remote sensing techniques being vital for applications like climate monitoring, disaster management, water resource assessment, forest analysis, and urban planning. Integrated with Geographic Information System (GIS) technology, these methods address environmental and infrastructural challenges at various scales. Despite these advancements, extending GIS-based mapping to remote or underrepresented regions remains challenging due to high demands for time, financial resources, and skilled labor. Artificial intelligence (AI), particularly in automated image analysis, has emerged as a tool to tackle these issues. AI-driven segmentation methods improve the efficiency and accuracy of geographic feature extraction from remote sensing imagery, enabling quicker and more cost-effective GIS data preparation. These advancements support timely decision-making for environmental and infrastructure-related challenges. Deep learning models, such as Convolutional Neural Networks (CNNs) and U-Net architectures, excel in tasks like image segmentation by classifying pixels within high-dimensional datasets. U-Net, originally designed for medical image segmentation, has proven highly effective for road segmentation in remote sensing, leveraging structural similarities

between vascular and road networks. However, the computational demands of these models often require advanced resources, posing a challenge for researchers in resource-constrained environments. To address these limitations, scalable frameworks like Apache Spark are employed. As a distributed computing framework, Spark facilitates efficient processing of large datasets, offering an alternative to GPU-intensive methods. By integrating U-Net with Apache Spark, researchers can train and deploy models for road segmentation without reliance on expensive hardware, making geospatial analysis more accessible in developing regions. Spark's parallel computation capabilities significantly reduce processing time compared to traditional CPU-based approaches. This study introduces a method for deploying deep learning models, such as U-Net, within the Apache Spark framework, targeting researchers with limited access to GPU resources. The approach enables efficient handling of large remote sensing datasets, contributing to environmental monitoring and GIS applications. By addressing computational challenges, this method supports advanced geospatial analysis in resource-constrained settings, promoting informed decision-making for global environmental and infrastructural development.

Keywords: Artificial Intelligence, Convolutional Neural Network, Deep Learning, Remote Sensing, Apache Spark, Image Segmentation, Loss Function

Enhancing Weather Forecast Accuracy for Nay Pyi Taw City Using Bi-Directional LSTM and Exponential Moving Averages

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Abstract

This research investigates the application of advanced machine learning techniques for short-term weather forecasting in Nay Pyi Daw City, Myanmar. The region's unique climatic variability presents a challenge for accurate predictions, which are crucial for agriculture, disaster preparedness, and urban planning. This research focuses on the use of Bi-Directional Long Short-Term Memory (Bi-LSTM) networks, a type of recurrent neural network well-suited for capturing temporal dependencies in sequential data. To improve the input data quality, we integrate Exponential Moving Averages (EMA) as a preprocessing step. EMA smoothens the temporal data series, reducing the noise and enhancing the signal clarity of key meteorological variables: temperature, humidity, wind speed, and pressure. The dataset includes historical weather data for Nay Pyi Daw City, structured into three-day input-output windows, where the model predicts the weather for the next three days based on the preceding three. The Bi-LSTM architecture employed in this study consists of multiple layers, including forward and backward LSTM units, designed to learn both past and future temporal dependencies. The model training process incorporates techniques like dropout regularization to prevent overfitting and the Adam optimizer to achieve efficient convergence. Performance is evaluated using metrics such as Root Mean Square Error (RMSE) and Mean Absolute Error (MAE), comparing Bi-LSTM with and without EMA preprocessing against traditional models

like ARIMA and unidirectional LSTM. Preliminary results demonstrate that the Bi-LSTM model with EMA preprocessing achieves superior accuracy, reducing RMSE by 15% on average compared to baseline methods. This highlights the efficacy of combining advanced neural network architectures with data preprocessing techniques for weather forecasting. Visualization of predictions reveals strong alignment with actual observed values, underscoring the model's potential for real-world deployment.

Keywords: Weather Forecast, Bi-Directional Long Short-Term Memory, Exponential Moving Averages, RMSE

A Comparative Analysis of Feature Fusion for End-to-end Named Entity Recognition from Myanmar Speech using Voice Activity Detection and Fusion Based Feature Extraction Methods

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Abstract

End-to-end Named Entity Recognition is a system that extracted and displayed named entities (such as names, locations, organizations, dates, other important information etc.) as texts, directly from the speech signal without depending on the automatic speech recognition system as an intermediate step to generate the transcribed texts. In the modern digital age, many individuals and organizations have many audio contents in the form of recorded meetings, interviews, lectures, news and more. Humans face difficulties in searching, retrieving, and sharing information from lengthy audio recordings. Manually transcribing this audio content and extracting the key information are a time-consuming and labor-intensive task. End-to-end Named Entity Recognition can automatically convert from the recorded speech audio into the key information as texts. Moreover, this system can also be used in many applications such as virtual assistants, call center speech analytics, Media and Journalism, Healthcare Applications, Surveillance systems and so on. This paper implements end-to-end named entity recognition using voice activity Detection which utilize short-time energy and Zero crossing rate, and proposed fusion technique which utilize Mel-frequency cepstral coefficients (MFCC) and Gammatone Frequency Cepstral Coefficients (GFCC), and Convolutional Gated Recurrent Unit (CGRU). In voice activity detection, the silence parts from the input signal that will be confusing for feature matching are removed and generate reconstructed signal. In proposed fusion technique, 13 MFCC features and 13 GFCC features are extracted from the reconstructed signal and these features are combined into the 26 features using proposed fusion technique. When the proposed fusion method is compared with the three other methods: one which combined Mel-frequency cepstral coefficients (MFCC) and Power Normalized Cepstral Coefficients (PNCC), the another one which combined Gammatone-frequency cepstral coefficients (GFCC) and Power Normalized Cepstral Coefficients (PNCC), and the last one which combined Mel-frequency cepstral coefficients (MFCC) and Gammatone-frequency

cepstral coefficients (GFCC), the performance of proposed method is better than the other methods. The performance of the proposed method is 5.03% error rate.

Keywords: Convolutional Gated Recurrent Unit, End-to-end Named Entity Recognition, Fusion, GFCC, MFCC, Voice Activity Detection

Different Tokenization Approaches for Optimizing Statistical Machine Translation in Myanmar Language

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Abstract

Nowadays, Machine Translation (MT) plays an important role in facilitating communication across different languages and breaking down language barriers in global communication. Statistical Machine Translation (SMT) systems have achieved significant milestones in language translation for rich-resource languages, but translating low-resource languages like Myanmar language remains challenging due to limited corpora, morphological complexity, and unique script structures. Additionally, Myanmar Language has no formal space boundary between words, as seen in other languages. Therefore, tokenization remains a challenge to overcome in data preprocessing process for Natural Language Processing (NLP) in Myanmar Language. Tokenization process plays a crucial role in Statistical Machine Translation (SMT) and can enhance the quality and efficiency of the translation process in Myanmar Language. This paper proposes optimized tokenization techniques for Myanmar SMT based on syllable-level and word-level tokenization approaches. Experimental results show that the performance evaluation for the syllable-level and word-level tokenization for English-Myanmar and Myanmar-English parallel translation with their respective BLEU scores. Finally, experiments show that the En-My translation gives the best BLEU score, 33.08% on syllable-level tokenization and My-En translation gives the best BLEU score 27.09% on word-level tokenization.

Keywords: Statistical Machine Translation (SMT), Myanmar Language, Tokenization Approaches, Phrase-Based Statistical Machine Translation (PBSMT)

Estimation of Distance between Vehicle and Webcam in Real-Time Using YOLOv8

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Abstract

Traffic accidents are among the most concerning issues in modern life, frequently caused by human operational faults like as inattention, distraction, and misbehaviour. Vehicle

identification and safe distance measurement can help to reduce these accidents. This study presents a method to estimate the measurement of distance between a camera sensor and a vehicle from an image using object detection and machine learning approaches. In this paper, the computational development was built on Convolutional Neural Networks (CNNs) and version 8 of the You Only Look Once (YOLO) algorithm to recognize vehicles from webcams and compute their distance in real time. The proposed method's performance was examined using metrics such as accuracy rate, frame per second (FPS), and mean average precision (mAP). According to the results, the YOLO v8 model had the highest accuracy (95.7%) and mAP (98.91%). This paper also estimates vehicle distance using images captured by the camera in real-time. The average estimated distance inaccuracy is around 6.4%.

Keywords: YOLOv8, object detection, distance measurement, mean average precision and machine learning.

Optimization For Administration Problem with The Use of E-Constraint Method

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Abstract

We introduce the concepts of multi-objective optimization problem with the amount of admin member and training cost for one-dimensional cutting stock problem where all objective functions are to be minimized synchronously. The minimum admin member and minimum training cost are obtained from the calculation of multi-objective with the use of integer programming method. The optimal solution of two objective functions are conflict and then ε-constraint method is introduced. The results of multi-objective optimization problem are presented according with ε values. ε-constraint method is used to obtain minimum admin member and minimum training cost of administration problem.

Keywords*:* Cutting Pattern, Cutting Stock Problem, Linear and Integer Programming Problem, One-Dimension, Trim Loss Problem, ε-Constraint Method.

Analysing Combat Potential Approach to the Battle Outcomes in Generalized Lanchester (n, 1) Model

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Abstract

The purpose of this paper is the currently occurring battle outcomes with (n, 1) model in

generalized Lanchester model. We present the generalized Lanchester equation by using substitution method with target allocation and the combat potential. In the current battle, we describe different combat potential for comparison of different result on time. We can observe that if the commanders truly apply the rules of combat potential (Force Strength, Operational Factors and Intangible Factors), we can defend the enemy with relieved time and reduced damage to X-force.

Keywords: Combat Potential, Generalized Lanchester Equations, (n, 1) Model, Substitution Method, Target Allocation

The Subfertility Journey: Voices of Women Undergoing Fertility Treatment

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Abstract

Parenthood can bring a sense of purpose, love, and connection, as well as personal growth. One of life's most satisfying experience is starting and raising a family, but unfortunately many couples struggle with subfertility. The number of couples seeking medical help for subfertility is increasing dramatically nowadays. Female factors have complained for about 60% in the subfertility and it accounts for about 10% of women in child bearing age. The ability to become pregnant and bear children is seen as central to a woman's identity in many societies. Reproductive treatments for subfertility have recently gained recognition as a feminist issue because women are the primary object of medical manipulation and control. As a result, women are more directly at risk for emotional and physical trauma induced by these fertility treatments. Therefore, women with subfertility problem become subordinate position that highlight the importance of feminist perspective. The aim of this study is to uncover the feelings and experiences of the women who are receiving fertility treatment and hence, to raise their conscious awareness for their subfertility journey through feminism concept. The study settings were No. (1) Defence Services Obstetric, Gynaecological and Children Hospital (300-Bedded), No. (2) Defence Services Obstetric, Gynaecological and Children Hospital (300-Bedded) and No. (2) Military Hospital (500-Bedded). Purposive sampling method was used to select the participants. The selection criteria included women of age 25-45 years with no child who had been undergoing fertility treatment within 5 years and who were willing to participate. In this study, 14 women and 6 key informants (3 fertility specialists and 3 husbands) were selected as participants from the study settings. Face-to-face in-depth interview using interview guided questions was done for forty-five minutes to one hour each time and subsequent interviews was conducted at least two to three times with each participant until no new data came out. Key informant interview was conducted for thirty to forty minutes each time and subsequent interviews for at least two times were also conducted. The field notes was taken to record the emotional responses of participants. In addition, focus group discussion as data collection

method will be used for consciousness raising action later. Inductive thematic analysis was used for data analysis in this study. As the findings, the following 19 potential themes were identified; childlessness of many reasons, being a barren woman, effects on marriage, feeling inferior, women as the one to be blamed, undergoing necessary tests, receiving fertility treatments with hope, alternative ways of treatment, successful treatment as a prove for their fertility, highlighting failure to conceive as a weakness, views of in-laws, sacrificing and taking risks, feeling incomplete, working women's challenges along treatment journey, treatment within their financial capacity, woman's sole duty, social impacts, personal thoughts over their inability to conceive, no guarantee of success. As the feminist research aims to disclose women's hidden and oppressed experience, it is hoped that the findings will fully disclose the experiences of women undergoing fertility treatment in order to provide more comprehensive and supportive care. Moreover, nursing profession assume to be grounded in feminist profession, nurses should use good feminism nature in daily nursing care practices especially for fertility nursing in future.

Keywords: Subfertility, Fertility treatments, Feminist qualitative study

Acquisition of Nurses' Professional Knowledge through Daily Nursing Care Practices in Pediatric Settings: A Grounded Theory Approach

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Abstract

Healthcare in the 21st century has become more complex and nurses play a crucial role to meet the health needs of modern society. Nurses must continuously update their knowledge and skills to provide advance care in medical services particularly in specialized fields like pediatric care. It is also important to understand which knowledge and skills are necessary and how nurses acquire those knowledge in daily practices. Therefore, to understand the process of nurses' acquisition of professional knowledge through daily nursing care practices in pediatric settings of military hospitals in Myanmar, this grounded theory study was conducted. Data was collected through in-depth interviews for initial purposive sampling, interviews with guided questions for theoretical sampling and field observations at the study settings. Thirty-two Military Nurses working at the pediatric settings involved as participants. Data was analyzed as guided by Corbin and Strauss's (2008) Grounded Theory analysis method. As a result of the study, the process of nurses' acquisition of professional knowledge through daily nursing care practices in pediatric settings can be understand with three stages with a core category "Synthesizing Knowledge for Professional Composure Development". These stages are striving, adapting and evolving. In the striving stage, novice nurses have to strive to acquire routine nursing knowledge and ward culture with their limited empirical and ethical knowledge. In the adapting stage, experienced nurses can handle routine tasks and able to adapt

working environment with necessary empirical and ethical knowledge. They also acquire personal knowledge through clinical environment. However, some kinds of experts' characteristics are necessary to evolve. After having enough experience, education and enthusiasm, nurses evolve as expert nurses and successfully develop professional composure by synthesizing empirical, ethical, personal and aesthetic knowledge in the clinical settings. At that stage, they can provide family-centered care and mentor junior nurses. The findings of this study shall provide extended knowledge about why some nurses like to satisfy their professional knowledge plateau. Recommendations from this study included providing orientation program for novice nurses, refresher courses for experienced nurses and mentoring program for experienced nurses and their mentees. In addition, appreciating nursing knowledge in clinical environment is also necessary to evolve expert nurses who can provide quality nursing care.

Keywords: Nursing Knowledge, Professional Composure, Grounded theory, Military Nurse, Pediatric Nursing

Nutritional value of some small indigenous fish paste in Igaloung Kyun, Hlaing River Segment, Taikkyi Township, Yangon Region

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Abstract

Small indigenous fish species (SIFS) are often rich sources of essential nutrients such as protein, vitamins (particularly vitamin A), minerals (including iron and calcium), and omega-3 fatty acids (Roos et al., 2014). Ka-pi-plaa is a traditional fermented fish paste has been widely consumed in Southern and Northeasthern in Thailand; an appetite-stimulating aroma, and also an excellent protein source. Fish paste has been an important industry as one of the largest income generators, especially for Phatthalung and Nakorn Si Thammarat provinces (Faithong et al., 2010). The study period lasted from June 2022 to April 2023 at Igaloung Kyun, Hlaing River segment, Taikkyi Township, Yangon Region. Fishery is the important for native people because it provides the income and healthy food source. As far as public health is concerned, it is necessary to know the proximate composition of the indigenous fish species from Igaloung Kyun villager which would be help to know their nutritive importance and to understand the condition of the fish. Some selected five small indigenous fish species were identified according to Fish base (2022). Some small indigenous fish species made into fish paste based on different processing methods and was triplicated. Three different processing methods were Yangon Division method, Ayeyawady Division method and Thailand method. Some small indigenous fish paste analyzed the nutritional value. In the present finding, the highest protein content of fish paste was Yangon method. The nutritional value of Myanmar

traditional method fish paste was differed with the Thai Method. The best quality of protein content fish paste was obtained from Myanmar method.

Keywords: Some small indigenous fish species, Small indigenous fish paste, Myanmar method

An Analysis of Illocutionary Speech Acts in the Utterances of the Main Character, Barbie Margot in the Movie *Barbie (2023)*

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Abstract

The present research aims to investigate the speech acts in the utterances of the main character, Barbie Margot, in the movie *Barbie (2023).* The objectives of this study are to analyze and categorize the different types of illocutionary speech acts from all the utterances of the main character, Barbie Margot in the movie *Barbie (2023)* and to investigate the pragmatic functions and intentions behind the speech acts, considering how they reflect thematic elements and character developments in the movie. In this research, Searle's speech act theory (1979) is used to collect and analyze the data. According to Searle, there are five kinds of illocutionary acts: *assertive, directive, commissive, expressive,* and *declarative.* The descriptive qualitative method is applied. After analyzing the speech acts in the movie, except *declaration*, four types of illocutionary acts: *assertive, directive, commissive,* and *expressive* are found. A*ssertive* is the most dominant utterance of the main character and *commissive* is the least one. Through the frequent use of assertive, the main character's beliefs, opinions, and personality are portrayed. Thus, the study of speech acts enhances the learners' language skills as well as their understanding on how the author portrays the characters.

Keywords: Movie, Speech act, Utterance, Illocutionary act

The Engagement of Teacher Educators' Continuous Professional Development in Education Degree Colleges

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Abstract

Teacher educators play a crucial role in shaping the future of education in Myanmar. This research explores the engagement of teacher educators' continuous professional development (CPD) in Education Degree Colleges in Myanmar. The study investigates the impact of professional development opportunities on teaching methods and perception of CPD. The present research aims to provide insights into the effectiveness of professional development initiatives on teaching practices in Myanmar. The research explored the challenges and barriers teacher educators face in engaging in continuous professional activities. It is essential to understand their needs and challenges to improve professional development initiatives. Engaging in professional development and collaboration also allows teacher educators to expand their professional networks, fostering new opportunities for growth and collaboration.

This can lead to the enhancement of teaching methods and improve students' learning outcomes. This study falls within the mixed-methods research paradigm. Simple quantitative analysis was used where the need was felt to highlight points of relevance. The respondents in this study are teacher educators from education degree colleges. The sample include a review of the role of the teacher educators' continuing professional development in EDCs. The data-gathering techniques include survey questionnaires, document analysis, and semi-structured interviews. After data collection, descriptive statistics, the independent sample *t*-test, and One-way ANOVA analysis was conducted using SPSS software version 22. Thus, it is expected to find out the effectiveness of different types of CPD activities in enhancing the knowledge, skills, and attitudes of teacher educators in education degree colleges. Furthermore, the research will examine the factors that influence teacher educators' engagement in CPD programmes in EDCs. It is expected that the results will indicate the areas of CPD that need to be developed. This research contributes to improving professional development initiatives and enhancing the quality of teacher education in Myanmar.

Keywords: Continuous Professional Development (CPD), Teacher Educators, Engagement

A Study of Myanmar-English Translation Methods Focusing on Similes in the Selected Short Stories of Thein Pe Myint Translated into English by Patricia Meredith Milne

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Abstract

Translation plays a crucial role in facilitating communication and information sharing among countries by bridging two languages. There are many challenges when translating from one language to another due to cultural and linguistic differences. Among a variety of genres, literary translation involves conveying not only the literal meaning of words but also the stylistic and rhetorical features that contribute to the overall impact and tone of the original work. Simile, a rhetorical device that compares two things, is widely used by writers to enhance the aesthetic quality of their literary works. Thus, this research aims to study the translation methods with a focus on similes applied in three short stories of Thein Pe Myint and translated into English by Patricia Meredith Milne: *Her Husband or Her Money* (*ငါ့လင်နှင့်ငါ့ငွေ*)*, All's well, Sir* (*အားလုံးကောင်းပါသည်ခင်ဗျား*)*, Bitter-Sweet* (*အချိုရှာတမာတွေ့*) .The study is a descriptive qualitative approach employing the translation theory proposed by Jean-Paul Vinay and Jean Darbelnet (1995). The findings show that 'literal translation' is the dominant method in the three short stories of Thein Pe Myint, accounting for 60% of the 39 instances analyzed. The second most dominant method is 'equivalence', at 15%, while 'modulation' accounts for only 10%. The findings also reveal that certain similes were omitted by the translator, comprising 15% of the data. Although the intended meaning of the simile is to stay as close to the source text as possible, there are deviations from the literal meaning of the source text. This is because of the linguistic and cultural differences between the two languages. The study

could provide insights and ideas for translating Myanmar figurative expressions, particularly similes, into English.

Keywords: Simile, Translation method, Literary translation

Valorization of Wild Taro Stalks for Green Biochemical and Biofuel Preparation

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Abstract

Wild taro stalks (WTS) are inedible and considered as waste with limited or no utilization. Therefore, production of useful chemicals and biofuels from WTS not only reduces environmental pollution but also provides sustainable alternatives. Among these biochemicals and biofuels, ferulic acid (FA) stands out as a valuable platform chemical, and bioethanol is considered as a sustainable fuel. The physicochemical properties such as moisture, ash, extractives, cellulose, hemicellulose, and lignin contents of WTS were analyzed. Biomass to water ratio and reaction time were varied during steam explosion pretreatment. Different concentrations of alkali and reaction times were used as factors in alkaline treatment for maximizing the yield of FA. Simultaneous saccharification and fermentation process parameters such as cellulase concentration, amount of yeast, and SSF time were optimized for the maximum bioethanol yield. Response surface methodology was used to optimize process variables. After pretreatment, the liquid fraction that enriched with hemicellulose was used for the extraction of FA, while the solid fraction with high cellulose content was used for bioethanol production. The changes in chemical composition, cellulose and hemicellulose contents, after pretreatment were studied. The optimal FA yield, 22.71 mg/g, was achieved under 8% (w/v) of alkali concentration with 20 min reaction time. UV-Vis and FTIR spectroscopies were applied for the identification of FA. The yield percent of FA was calculated based on absorbance measured at 312 nm for a given concentration. Total phenolic content and antioxidant activity of FA were analyzed to assess its concentration and bioactive potential, due to the fact that ferulic acid is a phenolic compound and used as an antioxidant. The maximum ethanol yield, 20.34% (w/w) containing 66.81% (v/v) of ethanol strength, was obtained under optimal cellulase concentration of 5% (w/w), 5 g/L yeast amount and 96 h of SSF time. The purity of bioethanol was measured by gas chromatography and the physicochemical properties, including pH, refractive index, and acidity, were also analyzed.

Keywords: Wild taro stalk, Ferulic acid, Bioethanol, Steam explosion pretreatment, Alkaline treatment, Simultaneous saccharification and fermentation

Study on The Preparation and Characterization of Fermented Fish Products (Ngachin)

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Abstract

In this research work, fermented fish products (ngachin and ngalaychin) were prepared from *labeo rohita*, Hamilton (Rohu) and *Amblypharygodom mola*, Hamilton (Mola Carplet). Raw fish samples were collected from Kyauktan Township, Yangon Region. The cooked rice and salt were used as main ingredients with the different ratios in the preparation of fermented fish products. The fermentation processes were carried out under anaerobic condition at the temperature range of 35-37 ºC during 3-4 days. The optimum pH of fermented fish products was in the range of 4.5-5.5.The nutritive values of raw fishes and fermented fish products were analyzed by Association of Official Analytical Chemist (AOAC) methods .The elemental compositions of raw fishes and fermented fish products were analyzed by Energy Dispersive X-Ray fluorescence (EDXRF). Lactic acid bacteria (LAB) were isolated from two types of fermented fish products. The contents of Lactic acid bacteria (LAB) isolate were 6.989 x108 (cfu/ml) in ngachin and 6.414x108 (cfu/ml) in ngalaychin. *Lactobacillus Plantarum* as a gram positive lactic acid bacterium was found in the ngachin and ngalaychin products. *Lactobacillus futsaii* and *Lactobacillus reuteri* present in the ngachin product. The other species such as *Lactobacillus farciminus* and *Pedicoccus pentosacue* were observed in the presence of ngalaychin product.

Keywords: Fish, Fermentation, Temperature range, Gram positive, Lactic acid bacteria (LAB)

Effective Degradation of Rhodamine B Dye Using the Magnetite-Activated Carbon-Clay Composite as a Fenton Catalyst

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Abstract

The growing challenges of environmental pollution and the demand for sustainable materials have driven research into advanced composite materials that combine the strengths of different components. Among these, magnetite-activated carbon-clay composites have garnered significant attention due to their potential applications in water treatment, adsorption processes, and as multifunctional materials. In this research work, a magnetite-activated carbon-clay composite was prepared with a weight ratio of 2:1:1 (magnetite: activated carbon: clay) by the conventional immersion method. Before preparing the composite, the activated carbon was synthesized from coconut shell by the pyrolysis method, and magnetite was prepared by the co-precipitation method from ferric chloride ($FeCl_3$), ferrous sulfate ($FeSO_4 \cdot 7H_2O$), and a 25 % ammonia solution. The clay sample was collected from the Kyaukpadaung Township. After preparing the composite, the samples were characterized by modern techniques such as ED XRF, SEM-EDX, and FT IR. In the current study, we developed a new adsorbent, a magnetite-activated carbon-clay composite that will be used to investigate the degradation efficiency of rhodamine B dye. Fenton's reagent is effective in degrading a wide range of dyes and other

organic pollutants. The advantage of the prepared composite was that it was easily removed from the water after the adsorption by magnet and reused. The experiments have been carried out by varying solution pH, adsorbent dosages, contact time, and initial H_2O_2 concentration. According to the result, optimum degradation efficiencies for rhodamine B were found to be pH 3.0 and 3 mL H_2O_2. The most effective degradation of rhodamine B is likely found between 0.8 g where radical generation and adsorption are maximized. Dosages above 0.8 g may introduce issues related to aggregation, radical scavenging, and suboptimal reaction conditions, leading to decreased dye degradation efficiency. According to the results, the maximum degradation of 82.85 % was achieved at 0.8 g of composite dosage within a reaction time of 30 min, after which the efficiency of degradation was constant.

Keywords: Coconut shell activated carbon, Magnetite, Clay, Composite, Rhodamine B dye, Fenton reaction

Extraction and Characterization of Collagen from the Skins of *Megalaspis cordyla, Pampus argenteus,* and *Nemipterus swainson*: Yield, Purity, and Mineralization Analysis for Potential Applications

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Abstract

This study investigates the extraction of collagen from the skins of three marine fish species: Megalaspis cordyla (FSS-1), Pampus argenteus (FSS-2), and Nemipterus swainson (FSS-3), using the acid-soluble collagen extraction method. Collagen yields varied significantly, with FSS-1 achieving the highest yield (8.83%), followed by FSS-3 (5.94%) and FSS-2 (5.21%). The extracted collagen exhibited differences in color, with FSS-1 being off-white, suggesting higher purity, while FSS-2 and FSS-3 were pale yellow, indicating slightly lower purity. UV-Vis spectroscopy confirmed the presence of collagen in all samples, with characteristic absorption peaks for aromatic amino acids (221–234 nm), validating the extraction process. FT-IR analysis revealed key amide bands (Amide A, B, I, II, and III) consistent with collagen's triple-helix structure. Elemental analysis demonstrated significant variations in mineral content, with FSS-1 showing higher levels of calcium (9.683%) and phosphorus (7.221%), indicating greater mineralization compared to FSS-2 and FSS-3, which exhibited lower mineralization levels. These findings highlight that collagen extracted from fish skins is of high quality and varies in mineralization, suggesting its potential for diverse applications in the food, cosmetic, and medical industries.

Keywords: **A**cid soluble collagen, Yield percent, UV-Vis, FT IR, EDXRF

The Role of Cost-Effective Green Buildings in Climate Change Adaptation and Sustainable Resource Use

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Abstract

Sustainability has become increasingly significant, particularly in the construction industry, due to its direct impact on both the environment and the economy. The sector is a major contributor to global carbon emissions, highlighting the need for sustainable initiatives to mitigate emissions, conserve resources, and promote recycling. Commercial buildings, in particular, represent one of the largest consumers of energy and resources, accounting for a significant share of total CO_2 emissions. In response to this challenge, sustainable building practices emphasizing energy efficiency have been introduced. This project aims to explore the sustainable design aspects of office buildings, focusing on energy-efficient measures and their associated costs and benefits. The methodology involves a comprehensive literature review of sustainable design strategies for office buildings, followed by the development of an office building design using a Building information modelling (BIM) software. The design will prioritize achieving Leadership in Energy and Environmental Design (LEED) for credit evaluation while incorporating a cost-benefit analysis to assess the economic and environmental viability of sustainable features. The study is expected to provide valuable insights into the costs of incorporating sustainable features in buildings and evaluate whether these costs are justified in terms of economic benefits for clients and their environmental impact. Additionally, it shows the broader environmental benefits including reduced carbon emission, reduced energy consumption as well as increased resilience to climate change.

Keywords: Sustainability, Cost and Benefits, LEED, Commercial Building, Energy Modelling

A Study of Teacher Educators' Followership Styles and Altruism in Education Degree Colleges

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Abstract

This paper aimed to study of teacher educators' followership styles and altruism in Education Degree Colleges in Yangon Region. The research was conducted with a quantitative research method. The sample of 177 teacher educators from Education Degree Colleges in Yangon Region was selected using census sampling method. A set of questionnaires was developed based on Robert E. Kelley's Followership Style Questionnaire (Robert E. Kelley, 1992),

altruism on Williams and Anderson (1991). The reliability coefficients (Cronbach's alpha) were 0.93 for followership styles and 0.91 for teacher educators' altruism. According to the first specific objective, the findings suggested that the number of teacher educators who practiced pragmatist followership style are the most in all Education Degree Colleges in Yangon Region. The strategic approach of pragmatic followers guarantees the effectiveness and efficiency of their selfless actions. They contribute in ways that optimize benefits and reduce waste of resources, increasing the productivity of the organization. And then, the organization can react quickly to changes and challenges (Barbara Kellerman, 2008). According to the second specific objective, the findings suggested that a statistically significant difference was found among the followership styles on altruism (Robert E. Kelley, 1992). As exemplary followers were significantly different from pragmatist followers on altruism, more creative and efficient problem-solving may result from their proactive approach to assisting others. As exemplary followers were significantly different from passive followers on altruism, teams are likely to be more cohesive and collaborative when excellent followers take the initiative to offer assistance and support. The idealism of exemplary followers might be balanced by pragmatic followers who behave strategically and practically as exemplary followers were significantly different from pragmatist followers on altruism. As conformist followers were significantly different from passive followers on altruism, their selfless actions can contribute to the upkeep of a peaceful atmosphere. With their strategic and pragmatic attitude, pragmatic followers can aid passive followers in efficient problem-solving, as pragmatist followers were significantly different from passive followers on altruism. Leaders should adopt different strategies to engage and motivate each followership style and develop targeted training programs that encourage altruistic behavior in all follower types. Moreover, leaders should foster an environment where different follower types can collaborate to lead to more balanced and effective organization.

Keywords: Followership Styles, Altruism

Effect of A Flipped Classroom on Empowerment and Social Connectedness of Student Teachers

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Abstract

This study aimed to investigate the effect of flipped classroom on student teachers' empowerment and social connectedness based on an experimental research. First year student teachers participated in this study. The sample was selected by a simple random sampling method and one group pretest posttest research design was utilized. The total participants were 50 student teachers, including 28 females and 22 males. The experimental group was the heterogeneous group. In order to examine student teachers' empowerment and social connectedness, Learner Empowerment Scale and Social Connectedness Questionnaire were validated and used. The summative test was also developed to evaluate the student teachers'

achievement in the subject matter taught in the flipped classroom. The results indicated that the levels of empowerment and social connectedness among student teachers were significantly higher following the intervention compared to prior to the intervention. The effect size between pretest and posttest of empowerment among student teachers is 0.87 and the effect size between pretest and posttest of social connectedness among student teachers is 0.67. Therefore, it is clearly seen that the flipped classroom has a great influence on the student teachers' empowerment and social connectedness. Consequently, the flipped classroom should be manipulated to enhance not only the academic performance of student teachers but also the crucial skills for 21st century student teachers such as empowerment and social connectedness.
Keywords: Flipped classroom, Empowerment, Social connectedness, Student teacher

Isolation, Morphology and Microscopical Characters of Endophytic Fungi from *Zingiber officinale* Rosc.

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Abstract

In the present study, the leaves and rhizomes of *Zingiber officinale* Rosc. were collected from Dagon University Campus, East Dagon Township in Yangon Region. Ten endophytic strains (SYH 1 to SYH 10) were isolated from the leaves and rhizomes of *Zingiber officinale* Rosc. on three different media at Microbiology Laboratory, Department of Botany, Dagon University. In the morphological characters of isolated fungal strains, colony appearances of five strains were irregular, one strain was punctiform and other four strains were circular. The margins of isolated fungal strains were curled, filamentous, entire, lobate and undulate. In their elevations, they were convex, flat, raised and pulvinate. The surface and reverse colors of isolated strains were light pink, orange, black, gray, light brown, dark brown, brownish white, whitish green, white and light yellow. The microscopical characters of all isolated strains were carried out under light microscope with high magnification. Fungal strain SYH 1 was identified as *Dendryphiella* species, strains SYH 2, SYH 5, SYH 6 and SYH 7 were identified as *Aspergillus* species, strains SYH 3 and SYH 4 were identified as *Cephalosporium* species, strain SYH 9 was identified as *Madurella* species, and strains SYH 8 and SYH 10 were identified as *Rhizoctonia* species. Most strains possessed good antimicrobial activity which has been presented in the previous paper.
Keywords: Endophytes, Morphology, Microscopical characters, *Zingiber officinale* Rosc.

Gemological Characteristics of Sapphires from Baw Mar Deposit, Mogok Region, Myanmar

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Abstract

Detailed gemmological fingerprinting studies and geochemical analysis of associated syenitic

host rocks can be used to characterize the gemmological features of blue sapphires. Therefore, in this study, we focus on the geochemistry and internal features in relation to the host syenitic rocks to apply gemmological fingerprinting of the blue sapphires from the Baw Mar sapphire deposit, Mogok Stone Tract, Myanmar. The size of the sapphires varies from 2 to 8 mm, reaching up to 15 cm. Gem-quality blue sapphires typically exhibit distinct pleochroism, ranging from greenish to violet-blue, and are relatively free of inclusions under a microscope. Through observations with high-powered gem microscopes, some show multiple twinning and are associated with whitish needle-like tiny inclusions such as boehmite. Unlike sapphires from other Mogok locations, needle-like rutile inclusions are infrequent in the Baw Mar sapphires. Common internal features include surface-reaching healing fissures, small platelets, and needle-like particles (probably ilmenite), negative crystals, and unidentified dark crystal inclusions. Occasionally, mineral inclusions of K-feldspar, mica, and zircon are identified using high-powered gemmological microscopes and Raman analysis. EPMA analysis reveals the trace element geochemistry of the Baw Mar sapphires, showing a relatively high iron content, exceptionally low titanium percentage, and gallium. The Ga/Mg ratio ranges from 0.5 to 18, indicating that most Baw Mar sapphires originate from both magmatic and metamorphic sources. Their UV-Vis-NIR spectra displayed intense iron-related bands and absorptions. Based on careful microscopic observations, combined with spectroscopic and chemical analysis, the sapphire from Baw Mar Deposit can be distinguished from the blue sapphire of other localities.

Keywords: Corunndum; Sapphire; Syenite; Pegmatite; Mogok

Study on Ahlone Waterway in the Chindwin River

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Abstract

The Chindwin River, the major tributary of Ayeyarwady River, is crucial to the lives of thousands of communities in Myanmar. Since it is often the only means of transport connecting the upper and central regions of Myanmar, it is important to the economic development of its region as well as the quality of life of its inhabitants. The Ahlone Waterway, one of the important water routes in Chindwin River, has been less operation due to the excess of sedimentation which leads to shallower navigation channel. The minimum water depth is about 1 meter and the waterway transport is inconvenient for the whole year round. Continuous channel improvement works including dredging, groynes and bank protection structures have been constructed in this waterway since 1993. In this study, the morphological changes of Ahlone Waterway is analysed using satellite image processing in QGIS within 24 years (2000-2024) and the annual amount of sediment of Chindwin River is calculated using Delft-3D Flow. Based on the results of image processing, sandbar formation and changes in channel planform have been experienced simultaneously within 24 years in the Waterway. According to the model results, maximum range of water depth is 4 to 5 meters between dry and monsoon season; the total annual sediment load of Chindwin River at Monywa Station is 116.07 Mt/yr.

By this study, the results will give great benefits not only on the development of Ahlone Waterway but also on the Integrated River Basin Management of Chindwin River.

Keywords: Chindwin River, Ahlone Waterway, Morphological Changes, Satellite Image Processing, Cross-Sectional Analysis, QGIS, Delft3D.