

Proceeding of International University Carnival on E-Learning



INTERNATIONAL UNIVERSITY CARNIVAL ON E-LEARNING

*“ Embracing AI for
Innovative Learning and
Inclusive Education ”*

Chief Editor
Loh Ser Lee

Editors
Nur Zareen Zulkarnain
Safiza Suhana Kamal Baharin
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Preface

We are pleased to present the e-Proceedings of the International University Carnival on E-Learning 2025 (IUCEL2025), organised by the Centre for Open and Distance Learning (CODL), Universiti Teknikal Malaysia Melaka (UTeM), in collaboration with the Ministry of Higher Education Malaysia (MoHE). The event was supported by the Department of Higher Education, MoHE, and the Public University e-Learning Council (MEIPTA).

Held on 13 November 2025, IUCEL2025 brought together 196 e-learning innovators from 26 institutions. All presenters were invited to submit extended abstracts in August 2025. After a thorough evaluation and peer-review process completed in September 2025, a total of 160 articles were accepted for inclusion in this publication. The papers compiled here represent diverse perspectives and practices aligned with the event's theme, *“Embracing AI for Innovative Learning and Inclusive Education.”*

We extend our sincere appreciation to all authors for their valuable contributions, as well as to the panel of reviewers for their time and expertise. Special acknowledgement is also extended to the Patron of IUCEL2025, Professor Datuk Ts. Dr. Massila binti Kamalrudin, and Chairman, Professor Ir. Dr. Gan Chin Kim, for their leadership and guidance throughout the preparation of this event.

We also express our heartfelt gratitude to the CODL and UTeM team members whose dedication made this publication possible. We hope that the research and ideas presented in this e-proceedings will serve as a meaningful reference for educators, researchers, and practitioners committed to advancing e-learning innovation.

Editors

IUCEL2025 E-Proceedings

Foreword

As Patron of the International University Carnival on E-Learning 2025 (IUCEL2025), I am pleased to present this e-proceedings, which reflects Universiti Teknikal Malaysia Melaka's (UTeM) continued commitment to advancing innovation in digital learning. In collaboration with the Ministry of Higher Education Malaysia (MoHE), IUCEL2025 stands as a testament to our aspiration to nurture a progressive and inclusive educational ecosystem enriched by emerging technologies.

The theme, *“Embracing AI for Innovative Learning and Inclusive Education,”* captures the spirit of transformation shaping higher education today. Artificial intelligence, when applied thoughtfully, has the capacity to broaden access, personalise learning experiences, and strengthen teaching effectiveness across diverse disciplines. IUCEL2025 offered a valuable avenue for educators, researchers, and practitioners to reflect on these opportunities and share meaningful insights that will guide the future of e-learning in Malaysia and beyond.



I would like to express my appreciation to all contributors who have shared their work in this publication. My gratitude also goes to the organising committee members, especially those from Centre for Open and Distance Learning (CODL), for their dedication in ensuring the success of IUCEL2025.

I hope that this e-proceedings will serve as a useful resource and inspire continued exploration, collaboration, and innovation in the pursuit of excellence in teaching and learning.

PROFESSOR DATUK TS. DR. MASSILA BINTI KAMALRUDIN

Vice-Chancellor

Universiti Teknikal Malaysia Melaka (UTeM)

Patron, IUCEL2025

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MAPPING BARRIERS AND OPPORTUNITIES: ADVANCING INCLUSIVE SERVICE DELIVERY FOR AUTISTIC CHILDREN IN KELANTAN.

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Abstract

This study investigates the spatial distribution of Autism Spectrum Disorders (ASD) in Kelantan, Malaysia, with the aim of improving service delivery and advancing social justice in the care of autistic children. Kelantan, a predominantly rural state, faces persistent disparities in healthcare access, making it an ideal context for examining inequities in diagnosis and intervention. Using data from 103 ASD cases recorded between 2022 and 2024 at two major autism centers, we employed Geographic Information Systems (GIS) tools (including Global Moran's I, Getis-Ord Gi, mean center, Standard Deviational Ellipse (SDE), and Local Indicators of Spatial Association (LISA) to identify spatial clustering patterns of severe, mild, and high-functioning ASD. The findings indicate that the selected analysis effectively visualises pertinent information for the autism community in Kelantan and facilitates the planning of comprehensive intervention strategies for this population. From a social work perspective, these findings highlight the potential of GIS mapping to reveal inequities in service provision. GIS results can support cross-sector collaboration among healthcare providers, educators, and planners, and inform advocacy for policies that expand diagnostic outreach and resource distribution in underserved areas. By integrating spatial evidence with principles of inclusion and social equity, this study demonstrates how GIS mapping can guide interventions to close service gaps, strengthen community-based support systems, and foster safer, more nurturing environments for children with ASD and their families in Kelantan.*

Keywords: Autism Spectrum Disorders (ASD), Geographic Information Systems (GIS), Service Delivery Inequities, Social Justice, Intervention Strategies

BACKGROUND OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

Autism spectrum disorders are developmental conditions that affect social interaction,

communication, and behaviour. Individuals with severe, high-functioning, or mild autism have average or above-average intelligence but persistent social and behavioural issues. These categories are often underdiagnosed, especially in rural Malaysia where specialist services are scarce. Shair et al. (2024) found that Malaysian schoolchildren with ASD had a prevalence of 9.29 per 1,000 in 2022, up from 6.34 in 2018. Due to better awareness and diagnosis, primary school cohorts had the highest rates. Malaysia has no centralised Autism Spectrum Disorder (ASD) registration system and little regional data on urban-rural disparities and service availability (Neik et al., 2014; Othman & Rahmat, 2020). Rural children risk delayed diagnosis and limited early intervention due to the concentration of autism services and diagnostic capabilities in urban areas. Service distribution, transportation, and sociocultural barriers create spatial inequalities in Kelantan. GIS helps visualise and quantify place-based disparities, supporting ecological and place-sensitive social work practise, planning, and advocacy. In Kelantan, Malaysia, urban and rural areas have different access to specialised services for autistic children. This gap delays help and hurts development. Addressing these disparities requires analysing autistic children's spatial distribution and access to essential services. This study maps the geographical distribution of autistic children, assesses service accessibility issues, and examines environmental risks to their health. The main goals are to (1) analyse spatial patterns in autistic populations, (2) assess service availability and barriers, and (3) inform social work interventions and policy development.

DESCRIPTION OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

Geographic mapping and social work are used to address service inequities for Kelantan autistic children. This assessment visualises service gaps and environmental hazards using spatial analysis, unlike traditional need assessments. This method improves data-driven advocacy and resource distribution by identifying underserved regions and risk factors more accurately. Visual maps and comparative spatial data help social workers and policymakers improve community support by revealing disparities. This study examines Kelantan administrative districts' High-Functioning, Mild, and Severe Autism rates using advanced quantitative spatial analysis. Public health uses ArcGIS to identify spatial patterns and clusters for policy and resource allocation. This integrated approach reveals Kelantan's autism prevalence spatial inequalities, enabling targeted interventions and fair service distribution. The Kelantan Autism Community Centre (KACC) and Autism Development and Care Centre (ADCC) district-level diagnostic records form the primary dataset. The dataset includes anonymised records of 2022 children diagnosed with Severe, High-Functioning Autism, and Mild Autism.

The clustering of autism diagnoses in Kelantan corresponds with international findings indicating that access to care and social determinants substantially affect the identification of ASD cases. Urban hotspots indicate high population density and robust healthcare infrastructure, whereas rural communities frequently experience delayed or missed diagnoses attributable to resource limitations. We also employed Geographic Information Systems (GIS) tools, including Global Moran's I, Getis-Ord G_i^* , mean center, Standard Deviational Ellipse (SDE), and Local Indicators of Spatial Association (LISA), to identify spatial clustering patterns of severe, mild, and high-functioning ASD. Results revealed significant clustering of mild ($I \approx 0.065$, $p < 0.001$) and high-functioning cases ($I \approx 0.039$, $p = 0.0096$) in urban districts such as Kota Bharu, while severe ASD showed no significant autocorrelation. Hotspot analysis further indicated concentrated urban clusters and widespread rural cold spots, suggesting that disparities in detection and diagnostic access—rather than true variation in prevalence—drive geographic differences. Severe ASD cases were more commonly identified in urban areas at earlier ages and were disproportionately male, while mild and high-functioning ASD remained under-detected in rural districts with limited healthcare infrastructure.

Figure 2 shows how quantitative and qualitative GIS integration could be sustainable. This project shows how mapping can identify service accessibility issues and environmental hazards for autistic children in Kelantan, Malaysia. By visualising spatial patterns, social workers can better target interventions, advocate for equitable resource distribution, and collaborate with community stakeholders. The approach prioritises social justice and inclusion in order to make autistic children and their families safer and more supportive. Using geographic mapping in social work improves outcomes and service equity. This project uses spatially informed social work methods to improve vulnerable population service delivery in a replicable and sustainable way.

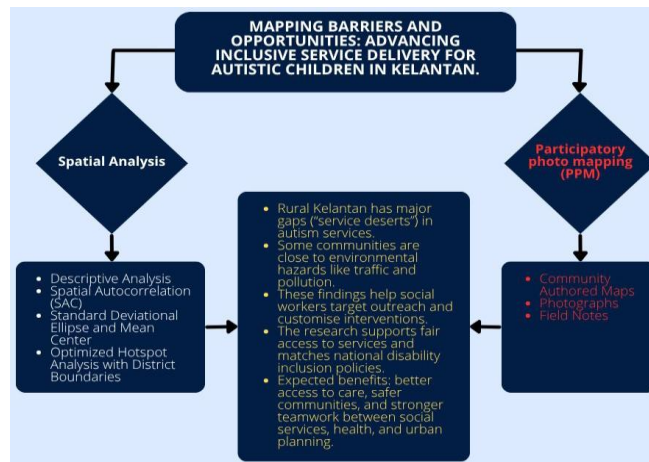


Figure 2: Future integration of quantitative and qualitative GIS

SIGNIFICANCE OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

This project shows how mapping can reveal service accessibility gaps and environmental risks for autistic children in Kelantan, Malaysia. Social workers can better target interventions, advocate for equitable resource distribution, and collaborate with community stakeholders by visualising spatial patterns. Social justice and inclusion are emphasised to create safer, more supportive environments for autistic children and their families. Geography in social work can improve outcomes and promote equity in service delivery. This project offers a replicable, sustainable spatially informed social work strategy to improve vulnerable population service delivery.

IMPACT OF THE INNOVATION/INVENTION/DESIGN TOWARDS EDUCATION OR COMMUNITY

Figure 3 shows innovative, context-sensitive strategies for serving autistic children in Kelantan. Spatial analysis maps service accessibility, participatory photo mapping (PPM) documents lived experiences, and performance arts-based therapies promote social and emotional development. Entrepreneurial-based therapies improve practical skills and independence, while nature-based therapies regulate sensory function and wellbeing. These approaches emphasise a community-based, comprehensive approach to therapeutic, social, and economic inclusion for autistic children.

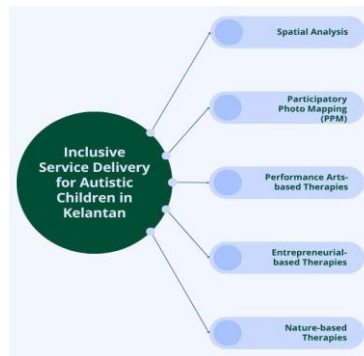


Figure 3. Inclusive Approach

COMMERCIALISATION POTENTIAL

A GIS solution and service package created to help governments, NGOs, and private providers make sure everyone has fair access to autism care by finding differences in where diagnoses and services are available. Additional offerings may comprise Data-as-a-Service for accurate resource allocation, consultancy for community engagement and sustainable interventions, and a mobile application for caregivers to efficiently locate services and manage appointments.

CONCLUSION

These insights enable social workers to prioritise outreach activities and tailor interventions effectively. This project is in accordance with institutional goals for equitable service delivery and aligns with national policies regarding disability inclusion. Potential impacts include improved access to care, enhanced community safety, and strengthened collaboration among social services, health, and urban planning sectors.

Acknowledgement: We thank the Kelantan Autism Care Centre (KACC) and Autism Development and Care Centre (ADCC) for their invaluable contributions to this research. Their resources and assistance helped us finish our study. The work they do to improve autism care is greatly appreciated.

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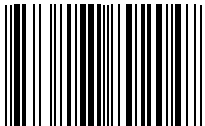
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