E-PROCEEDINGS

INTERNATIONAL TINKER INNOVATION & ENTREPRENEURSHIP CHALLENGE (i-TIEC 2025)

"Fostering a Culture of Innovation and Entrepreneurial Excellence"

23 January 2025
PTDI, UiTM Cawangan Johor
Kampus Pasir Gudang

ORGANIZED BY:

Electrical Engineering Studies, College of Engineering
Universiti Teknologi MARA (UiTM) Cawangan Johor
Kampus Pasir Gudang
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PREFACE

It is with great pleasure that we present the e-proceedings of International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), which compiles the extended abstracts submitted to the International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), held on 23 January 2025 at **PTDI, Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang.** This publication serves as a valuable resource, showcasing the intellectual contributions on the invention and innovation among students, academics, researchers, and professionals.

The International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), organized under the theme "Fostering a Culture of Innovation and Entrepreneurial Excellence," is designed to inspire participants at various academic levels, from secondary students to higher education students and professionals. The competition emphasizes both innovation and entrepreneurship, encouraging the development of product prototypes that address real-world problems and have clear commercialization potential. By focusing on technological and social innovations, i-TIEC 2025 highlights the importance of turning creative ideas into viable, market-ready solutions that can benefit users and society. The extended abstracts in this e-proceedings book showcase the diverse perspectives and depth of research presented during the event, reflecting the strong entrepreneurial element at its core.

We extend our sincere gratitude to the contributors for their dedication in sharing their innovation and the organizing committee for their hard work in ensuring the success of the event and this publication. We also appreciate the support of our collaborators; Mass Rapid Transit Corporation Sdn. Bhd. (MRT Corp), Universitas Labuhanbatu, Indonesia (ULB), Universitas Riau Kepulauan, Indonesia (UNRIKA) and IEEE Young Professionals Malaysia, whose contributions have been instrumental in making this event and publication possible.

We hope that this e-proceedings book will serve as a valuable reference for researchers, educators, and practitioners, inspiring further studies and collaborations in both innovation and entrepreneurship. May the knowledge shared here continue to spark new ideas and market-ready solutions, advancing our collective expertise and fostering the growth of entrepreneurial ventures.

B-ST129: DESIGNING A SPECIAL NEED SCHOOL TYPE C WITH A BEHAVIORAL ARCHITECTURE APPROACH IN BATAM CITY

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ABSTRACT

National education has an important role for all citizens. Good education will give birth to quality human resources. National education aims to educate the nation's life (1945 Constitution 4th paragraph). The right to education for every citizen is also contained in Article 31 paragraph 1 of the Constitution of the Republic of Indonesia. In addition, the opportunity to get education for children with special needs is mentioned in Law number 20 of 2003 concerning the National Education System in article 5 paragraph 2 that "every citizen has the same right to obtain quality education and citizens who have physical, emotional, mental, intellectual, or social disorders have the right to obtain special education". There are several limitations in facilities and accessibility available at SLB in Batam City, including the lack of study rooms, toilet facilities, unavailable waiting rooms for students' parents, unavailable counseling/assessment rooms, lack of access for wheelchair users, and uncomfortable space circulation. With these conditions, the author designed SLB C with a Behavioral Architecture approach. So, with this design, it is hoped that later it will be able to facilitate and provide space for students in accordance with their behavior analysis and can provide good and comfortable accessibility for students in school activities.

Keywords: **Behavioral** Architecture, Design, Extraordinary School C

1. Product Description

The journal focuses on designing a special school (SLB C) in Batam City, Indonesia, using a Behavioral Architecture approach. National education is vital for empowering citizens, as emphasized in the 1945 Constitution and Law No. 20 of 2003, which highlights the right to quality education, including for individuals with disabilities. However, existing SLB facilities in Batam face significant challenges such as inadequate classrooms, lack of toilets, insufficient parent waiting areas, and limited accessibility for wheelchair users. The proposed design aims to address these shortcomings by integrating behavior-oriented architecture, ensuring spaces accommodate the unique needs of intellectually disabled students. The concept incorporates accessible circulation, appropriate lighting, and noise-reduction strategies to create a conducive learning environment. Functional zones are divided into public, semi-public, and private spaces, including tailored classrooms, skill development areas, and counseling rooms.

Behavioral architecture here emphasizes creating environments responsive to human activities, promoting comfort and security. Key considerations include spatial dimensions, furniture layout, color schemes, temperature control, and sound management to foster a positive learning atmosphere. The ultimate goal is to support the holistic development of students with disabilities, equipping them with life skills and enhancing their overall well-being.

2. Pictures of location, Noise Analysis of Site, Building Concept.

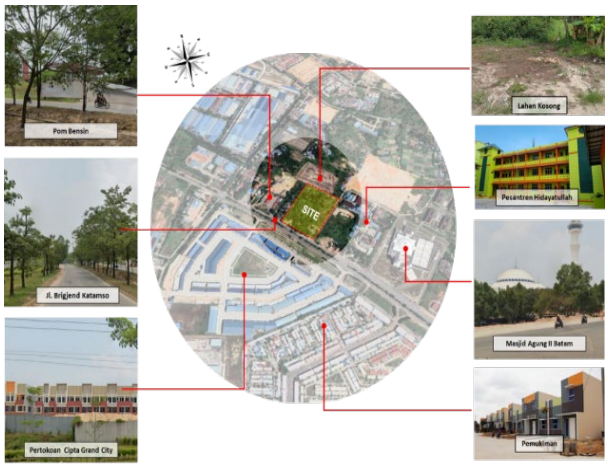

Figure 1. Location

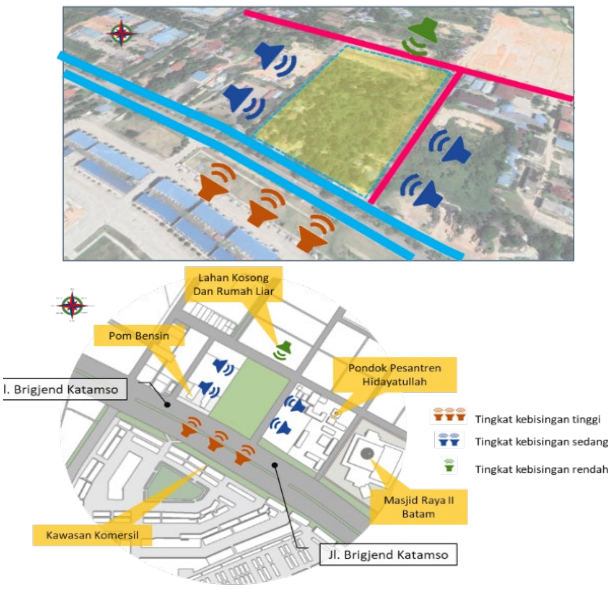

Figure 2. Noise Analysis on site

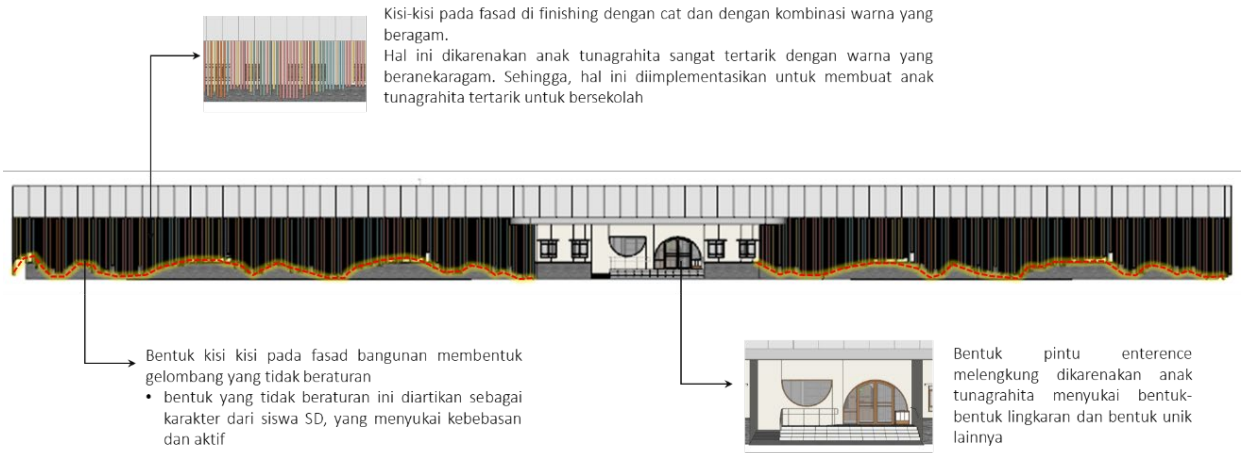

Figure 3. Building Concept

3. Novelty and uniqueness

The design of the Special Needs School C in Batam City exemplifies a novel approach by integrating behavioral architecture to address the specific requirements of intellectually disabled students. This concept introduces a unique perspective in educational facilities, emphasizing the interplay between students' behavioral patterns and the built environment. The project innovatively resolves limitations in existing facilities by incorporating purpose-specific spaces such as self-care rooms, sensory motor activity areas, and specialized classrooms. These elements not only cater to educational needs but also promote accessibility, comfort, and inclusivity. The use of adaptive architectural elements, such as cross-ventilation systems, shading devices, and acoustic barriers, further enhances the learning experience. By aligning the physical environment with students' behavioral and sensory needs, the design transcends traditional architectural practices, offering a groundbreaking framework for inclusive educational spaces.

4. Benefit to mankind

Spaces The Special Needs School C design in Batam City significantly benefits humanity by promoting inclusive education for children with intellectual disabilities. This innovative approach ensures equal access to quality education, aligning with universal human rights principles. By integrating behavioral architecture, the school provides a safe, accessible, and supportive environment tailored to students' specific needs, fostering their personal development and social integration. Specialized facilities, such as sensory motor areas and skill-training workshops, empower students to achieve greater independence, enhancing their quality of life and future opportunities. Additionally, sustainable design elements, including natural lighting and ventilation, demonstrate a commitment to environmental and societal well-being. The project not only serves its immediate users but also raises awareness about the importance of inclusivity and equity in educational spaces. It sets a vital example, encouraging similar initiatives worldwide to create a more compassionate and inclusive society.

5. Innovation and Entrepreneurial Impact

The design of Special Needs School C in Batam City exemplifies innovation and entrepreneurial impact by introducing a groundbreaking application of behavioral architecture in educational facilities. This approach redefines traditional school designs, aligning spatial functionality with the unique behavioral and sensory needs of intellectually disabled students. The inclusion of specialized areas, such as motor skill development zones, self-care spaces, and skill-training workshops, showcases a forward-thinking strategy to empower students and prepare them for societal integration and future employment. Furthermore, the project's emphasis on sustainability—through natural ventilation, shading devices, and adaptive layouts—demonstrates an entrepreneurial mindset, addressing both environmental and social challenges. By enhancing accessibility and fostering skill development, the school cultivates human potential while setting a benchmark for inclusive architectural practices. This innovative model inspires similar projects globally, bridging gaps in education and inclusivity while contributing to long-term societal and economic progress.

6. Potential commercialization

The design of Special Needs School C in Batam City presents significant potential for commercialization by offering a replicable model of inclusive educational facilities. The integration of behavioral architecture tailored to the needs of intellectually disabled students provides a unique selling proposition that can be adapted for various contexts globally. Specialized features, such as sensory motor spaces, skill-development workshops, and sustainable design elements, highlight its market viability for institutions seeking innovative solutions for inclusive education. The project's focus on accessibility, comfort, and environmental efficiency makes it attractive to governments, NGOs, and private investors aiming to promote equity in education. Furthermore, the modular design and adaptive architectural principles enable cost-effective scaling, enhancing its appeal in diverse socioeconomic settings. This commercial potential positions the project as a trailblazer in inclusive infrastructure, paving the way for widespread adoption while simultaneously generating positive social and economic impacts.

7. Acknowledgment

The authors express their sincere gratitude to all individuals and organizations that have contributed to the successful completion of this research and design project. We extend our appreciation to the Faculty of Engineering, Universitas Riau Kepulauan, for providing essential resources and support throughout the process. Special thanks go to the mentors and advisors whose guidance and expertise were invaluable in shaping this work.

We also acknowledge the assistance of local stakeholders and educational institutions in Batam City for sharing critical insights and data that informed the project's development. Furthermore, we are deeply grateful to the families, educators, and students involved in the study for their cooperation and trust, which allowed us to better understand their needs. Lastly, this work would not have been possible without the encouragement and support from our families and peers. We hope this project serves as a meaningful contribution to the advancement of inclusive educational infrastructure.

8. Authors' Biography

Indri Astuti Maulana, S.T., M.T., is the Head of the Architecture Study Program at Universitas Riau Kepulauan. She specializes in urban architecture and behavioral architecture, focusing on the connection between humans, activities, and space identity in cities. She has authored several nationally accredited journals, one of which is titled "A Study of the Genius Loci/Spirit of Place Theory Through the Dimension of Philosophy of Science."

Faradila Ramadhani Siketang graduated in 2024 with a degree in Architecture from Universitas Riau Kepulauan. She focus on the relationship between humans, activities, and spatial identity in urban environments. During her architectural studies at Universitas Riau Kepulauan, She completed several journals, research and projects.

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Arbaiyah Zuhfa is a first-semester architecture student at Universitas Riau Kepulauan. Her academic interests focus on architecture that intersects with nature and renewable environments. During his studies, Zuhfa has conducted extensive research and explored topics related to environmental conditions and building physics.