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INTERNATIONAL SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

**INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION**

# **E-PROCEEDING**

## **EXTENDED ABSTRACT**

**UiTM** *di hatiku*

اوسها تقوى موليا

# **E-PROCEEDING**

## **EXTENDED ABSTRACT**



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## *Welcome Message*

**RECTOR, UITM KEDAH BRANCH**

Assalamualaikum warahmatullahi wabarakatuh,

First and foremost, I would like to extend my deepest appreciation to the organising committee of i-SPIKE 2025 for their steadfast dedication and commitment in making this prestigious event a reality. My heartfelt congratulations to the committee for their tireless efforts in ensuring that i-SPIKE continues to grow as a meaningful and impactful platform for academics, researchers, students, and industry players worldwide.

The theme for this year, “Empowering Minds: Bridging Innovation, Knowledge and Education for a Sustainable Future,” is both timely and significant. It reflects our shared responsibility to not only embrace creativity and technological advancement, but also to ensure that innovation directly contributes to sustainable development, equitable education, and the well-being of future generations.

i-SPIKE 2025 provides a dynamic platform for showcasing innovations that address real-world challenges while opening new avenues for collaboration, engagement, and inclusivity. By bridging knowledge, innovation, and education, this symposium strengthens our collective capacity to design solutions that empower communities and inspire positive change.

I am truly impressed by the diversity and calibre of participants in this year’s event. The projects and ideas presented highlight the extraordinary creativity and determination of our innovators. I am confident that the insights and solutions shared here will pave the way for continuous advancement in teaching, learning, and innovation.

It is my sincere hope that you will find i-SPIKE 2025 an enriching experience, one that sparks new ideas, builds lasting collaborations, and strengthens our shared vision for a sustainable future. To all participants, I wish you every success, and to the winners, my warmest congratulations.

Once again, I thank the organising committee, partners, and contributors for their invaluable support. May i-SPIKE 2025 continue to inspire and empower minds for many years to come.

Professor Dr. Roshima Haji Said  
Acting Rector  
Universiti Teknologi MARA (UiTM) Kedah Branch

## *Welcome Message* (i-SPIKE 2025 CHAIR)

It is my great pleasure to welcome you to the 4th International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2025 (i-SPIKE 2025). This year's theme, "Empowering Minds: Bridging Innovation, Knowledge, and Education for a Sustainable Future," reflects our collective commitment to advancing innovation and fostering meaningful collaboration across academia, industry, and communities.

i-SPIKE 2025 provides a platform for scholars, researchers, students, and practitioners from diverse fields to showcase their ideas, share knowledge, and inspire new solutions to global challenges. We extend our sincere appreciation to all participants and contributors whose efforts and dedication have made this symposium possible.

We hope that this e-proceedings serves not only as a record of the innovations presented but also as a valuable resource that continues to inspire long after the event.

Thank you.

Dr Junaida Ismail  
Chair

4th International Exhibition & Symposium on Productivity, Innovation,  
Knowledge, and Education 2025 (i-SPIKE 2025)

**PREFACE**

The 4th International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education (i-SPIKE 2025) marks yet another milestone in our ongoing commitment to fostering innovation, creativity, and collaboration across disciplines. Guided by this year's theme, "Empowering Minds: Bridging Innovation, Knowledge and Education for a Sustainable Future," the event provides a dynamic platform for students, educators, researchers, and professionals to share their ideas, showcase their innovations, and engage in meaningful knowledge exchange.

This year, we are pleased to report that i-SPIKE 2025 received approximately 50 initial submissions, with more than 35 projects successfully advancing to final presentation and exhibition. These projects reflect a rich diversity of innovation, ranging from educational technologies, digital applications, and gamified learning tools to sustainable materials, cultural heritage preservation, and community-focused solutions. Collectively, they embody the spirit of bridging innovation and education to address pressing societal and global challenges.

We sincerely thank all participants, reviewers, and committee members for their invaluable contributions in making i-SPIKE 2025 a success. It is our hope that this e-proceedings will not only serve as a record of the ideas and innovations presented, but also as an inspiration for future collaborations and advancements in the pursuit of sustainable knowledge and innovation.

Assoc. Prof. Dr. Azlyn Ahmad Zawawi  
Editor-in-Chief, i-SPIKE 2025 Proceedings

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**CATEGORY 2**  
**SS (ACADEMIC)**

## REBER LINE 2.0

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## ABSTRACT

Understanding the real number line is a foundational skill in mathematics, yet it remains a persistent challenge for many learners due to its abstract nature and the limitations of traditional instructional methods. To address this gap, we developed Reber Line 2.0, an interactive educational application designed to deepen conceptual understanding while fostering sustained engagement. Unlike conventional math platforms that emphasize correctness-based feedback alone, Reber Line 2.0 introduces a visually enriched learning environment that integrates images directly into the exercise interface. This design choice is grounded in the belief that cognitive engagement is amplified when paired with affective stimuli. The application features a dynamic number line interface where users perform tasks such as identifying numerical positions, comparing magnitudes, and manipulating a virtual ruler. Each task is accompanied by immediate visual reinforcement through embedded images, which serve both as motivational cues and contextual anchors. This multimodal approach transforms routine exercises into visually stimulating experiences, reducing learner fatigue and promoting persistence in problem-solving. Reber Line 1.0 investigated pre-school learner group and found that it can significantly enhance interest and comprehension. By integrating images directly into the exercise interface in Reber Line 2.0, it promises greater enjoyment and a stronger grasp of numerical relationships, indicating that the fusion of mathematical rigor with visual interactivity can lead to more effective learning outcomes. By bridging the gap between abstract mathematical concepts and tangible visual experiences, Reber Line 2.0 exemplifies how educational technology can evolve to meet the cognitive and emotional needs of learners. Its scalable design and intuitive interface position it as a promising tool for reimagining mathematics education in both formal and informal learning settings.

**Keywords:** Reber Line 2.0, Mathematics, Images, Visual, Application

## INTRODUCTION

The real number line is a fundamental mathematical concept, serving as the backbone for understanding numerical magnitude, ordering, and operations across integers, fractions, decimals, and irrational numbers (The Math Learning Center, 2025). Despite its centrality, many learners struggle with internalizing the number line due to its abstract nature and limited engagement in conventional classroom practice. Traditional teaching approaches often rely on static diagrams or repetitive exercises, which may fail to sustain student motivation or provide sufficient interactive reinforcement.

In recent years, the integration of digital learning tools has demonstrated significant potential for enhancing mathematics education. Interactive applications, gamified platforms, and visual-based learning environments have been shown to increase learner engagement and persistence (Minero, 2020). However, many of these digital solutions still prioritize correctness-based feedback and gamification elements such as points and badges, which, while useful, may not always sustain intrinsic motivation or curiosity (Jee, 2003).

In response to this gap, we developed an enhanced version of Reber Line 1.0 which is Reber Line 2.0, an innovative learning application (app) that focuses on the real number line while introducing a novel motivational component. The app not only provides interactive number line exercises but also integrates images directly into the exercises section to attract, engage, and motivate users. By embedding visual stimuli within the practice environment, Reber Line 2.0 aims to create a more stimulating and enjoyable learning experience that merges conceptual learning with affective reinforcement.

## DISCUSSION

The overarching objective of Reber Line 2.0 is to strengthen learners' understanding of the real number line while enhancing motivation through visual engagement (Top Teacher, 2025). The specific goals are a few. Firstly, to provide an interactive and user-friendly platform for practicing real number line problems. Next, the purpose of integrating images into the exercises section as a mean of attracting users' attention and maintaining engagement. Besides that, to investigate the impact of visual reinforcement on learners' persistence, enjoyment, and accuracy in mathematics practice. Lastly, Reber Line 2.0 is developed to create a scalable and adaptable tool that can be implemented in both formal education settings and informal, self-paced learning contexts.

Furthermore, Reber Line 2.0 is a digital application accessible via mobile and web platforms. It is designed to help learners engage with various tasks related to the real number line, including identifying the position of numbers on the number line, comparing values (greater than, less than, equal to), moving and placing natural, whole, integer, rational and irrational numbers accurately and solving arithmetic operations such as addition and subtraction with the number line as a visual tool.

The most recent enhancement of the app introduces images within the exercises section. Instead of presenting exercises in a purely abstract or text-based format, tasks are now accompanied by interesting, colorful, or thematic images that contextualize the problems or provide visual rewards.

Feature images of animals, landscapes, or cultural symbols display may attract the learner completes the step, thereby merging problem-solving with visual discovery. Some of the main key features of Reber Line 2.0 are interactive number line interface where learners drag, drop, or move positions on a dynamic number line. On the other hand, when exercises are paired with pictures, and correct solutions reveal new images to sustain curiosity this will embedded visual stimuli among learners. Moreover, the app records learner attempts, successes, and areas needing improvement, enabling adaptive learning pathways with the emergence of images. This enhances the learners' motivation. Thus, the novelty of Reber Line 2.0 lies in its integration of images within the exercise process, rather than using external reward systems such as badges or leaderboards. This approach represents a significant shift from conventional gamification by embedding visual attraction as part of the core learning task.

Unlike most educational apps where images serve decorative or reward-only roles, Reber Line uses images as an integral component of the exercise section to directly enhance user engagement and this embedded image-based engagement. Another unique contribution of this app is that it promises cognitive–affective learning blend. This is because the app combines mathematical reasoning with affective reinforcement, leveraging the motivational power of visuals to reduce learner fatigue and sustain focus. It is worth noting too that personalization potential is seen in the way where it allows the integration of customized images, the app accommodates cultural, social, or personal learner contexts, thereby increasing relatability and inclusivity. Viewing Reber Line 2.0 from a commercial perspective, although the initial focus is on the real number line, the design can be extended to other mathematical concepts (e.g., geometry, fractions, measurement). This app contributes to scalability across many domains where visual attraction enhances learning.

## CONCLUSION

Reber Line 2.0 represents a novel contribution to digital mathematics education by addressing both the cognitive challenge of learning the real number line and the affective challenge of sustaining motivation. By embedding pictures and images directly into the exercises section, the app offers a unique approach to engaging learners in mathematics.

This innovation provides a dual benefit: (1) reinforcing mathematical understanding through interactive number line practice, and (2) enhancing learner motivation and persistence through visually stimulating experiences. Initial trials and feedback from Reber Line 1.0 finding the exercises more enjoyable and less monotonous compared to traditional or purely abstract approaches. However, learners suggest for the integration of images in the app. Hence, Reber Line 2.0 includes this component to overcome this gap.

Future directions include conducting empirical studies with diverse learner groups to evaluate the impact of Reber Line 2.0 on mathematical achievement, motivation, and engagement. Additionally, expanding the scope of visual integration across broader mathematical topics may further enhance the app's educational value.

In conclusion, Reber Line 2.0 demonstrates that merging mathematical rigor with visual attraction creates a powerful synergy that has the potential to transform how learners interact with foundational mathematical concepts.

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