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Perception of Rural Primary School Students towards the Advanced Integrated NILAM System (AINS)

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Abstract

This concept paper explores the perceptions of rural primary school students toward the Advanced Integrated NILAM System (AINS), a digital platform introduced by the Ministry of Education Malaysia to enhance reading literacy and streamline the NILAM record-keeping process. Despite AINS's potential to foster a reading culture, rural schools continue to face significant challenges, including limited digital infrastructure, poor internet connectivity, and low digital literacy among students and teachers. This paper reviews existing literature on digital literacy initiatives, focusing on the benefits, challenges, and factors influencing digital adoption in rural areas. Key findings highlight the positive impact of digital tools on literacy improvement, with recommendations for targeted interventions such as enhanced teacher training, infrastructure development, and parental involvement to ensure successful implementation. Future research should explore the long-term effectiveness of AINS and identify strategies to overcome barriers in rural educational settings. The insights gained from this study will provide valuable guidance for policymakers and educators to optimize digital literacy initiatives and bridge the digital divide in Malaysia's education system.

Keywords: AINS, Digital Literacy, NILAM Program, Rural Education, Technology Adoption, Digital Divide

Introduction

Reading is a cornerstone of intellectual and societal development, particularly in the 21st century. Despite its importance, global literacy challenges persist, and Malaysia is no exception. The Programme for International Student Assessment (PISA) 2022 highlighted Malaysia's moderate performance in reading literacy compared to neighboring countries such as Singapore and Vietnam (OECD, 2022). Recognizing the critical need to nurture reading habits among students, the Ministry of Education Malaysia (MOE) introduced the NILAM (Nadi Ilmu Amalan Membaca) program in 1999. This initiative was designed to instill systematic reading habits and foster a culture of lifelong learning. However, NILAM faced

various challenges, including low participation rates in rural schools and the inefficiencies of manual record-keeping.

In response to these challenges, the Advanced Integrated NILAM System (AINS) was introduced to enhance students' literacy development and foster a reading culture through a comprehensive digital platform. AINS encourages students to log their reading activities, access digital resources, and receive rewards for their engagement (Berita Harian, 2024). However, the successful implementation of such systems requires not only technological infrastructure but also adequate digital literacy among students and teachers. According to Brugliera (2024), the effectiveness of digital platforms depends on factors such as user engagement, teacher support, and accessibility. Despite these efforts, challenges persist, particularly in rural areas where access to digital tools and stable internet connectivity remain limited.

Consequently, the Malaysian education system has undergone significant transformations to enhance digital integration and provide equitable access to educational resources. The Ministry of Education Malaysia (MOE) has emphasized the importance of leveraging Information and Communication Technology (ICT) to support educational initiatives, such as the Malaysia Education Blueprint 2013-2025, which aims to bridge the digital divide and ensure inclusivity across all regions (Ministry of Education, 2013).

However, rural primary schools continue to face substantial challenges in adopting digital platforms like AINS, with issues ranging from inadequate infrastructure to limited student engagement and digital readiness (Surianshah, 2021; Ang & Ang, 2021). These challenges hinder the full potential of digital literacy programs and impact students' ability to benefit from educational technology. Hence, this paper seeks to evaluate the effectiveness of AINS in facilitating NILAM record entry among rural school students and identify the factors influencing it.

Literature Review

Digital technology in Global Context

Digital technology has become increasingly prevalent in educational settings, offering innovative tools to enhance learning experiences and outcomes (Statti & Torres, 2020; Gu, 2024). These technologies, including mobile phones and social media, are being utilized to improve student engagement and academic performance (Statti & Torres, 2020). Digital integration in education facilitates accessibility, interactivity, and adaptability, transcending geographical barriers (Gu, 2024). In Pakistan, both teachers and students have embraced digital tools, with 81% of students agreeing that digital integration enhanced their learning (Muhammad Hussain et al., 2021). Digital resources in foreign language education have been found to increase student interest, involvement, and effectiveness in learning (Saraeva, 2022).

The use of Information and Communication Technology (ICT) in education has proven to have a significant impact on students' motivation and reading interest. ICT not only serves as a learning aid but also creates a more engaging and interactive learning environment. Studies have shown that the integration of ICT in learning can enhance student engagement, which in turn contributes to an increase in their reading interest (Nasution et al., 2020; Haerani et

al., 2022). Furthermore, the use of ICT in education has been found to improve students' reading skills. For example, the use of digital applications and platforms in learning can help students develop their reading skills more effectively and enjoyably (Jie, 2020; Intaniasari & Utami, 2022). ICT-based learning can also improve preschool children's reading readiness, which is crucial for deeper literacy development (Nasution et al., 2020).

Digital platforms such as Accelerated Reader (AR) in the United States and the Reading Challenge in the United Kingdom have proven instrumental in promoting reading habits among students (Renaissance, 2021; The Reading Agency, n.d.). Digital tools have proven effective in motivating adolescents' reading interest and improving their reading skills and test scores, with teachers playing a crucial role as facilitators (Chen & Macleod, 2021). Gamification and interactivity in these tools have demonstrated increased engagement and have been particularly beneficial in addressing diverse learning needs (Esnaashari et al. 2019). In primary education, the use of badges, leaderboards, narrative contexts, and avatars has been found to create engaging and personalized learning experiences, leading to improvements in reading speed, accuracy, and immersion (Wang et al., 2024).

However, global disparities persist in digital literacy levels and technology access. Limited access to reliable internet, outdated infrastructure, and high costs associated with ICT resources contribute to a persistent digital divide (Kumari & Srivastava 2023). Developing countries continue to face challenges in infrastructure, training, and digital content accessibility. In rural schools especially, they face significant challenges in integrating technology, including unreliable internet connectivity, insufficient digital devices, and inconsistent electricity supply (Pradana & Josiah, 2024). Many students, especially those from low-income backgrounds or rural areas, face difficulties in accessing the necessary digital devices and stable internet connection (Abdullah et al., 2021). Additionally, disparities in resource availability and professional development opportunities for educators across different regions pose further challenges (Statti &Torres, 2020).

World Bank (2023) report states that over 40% of the population in developing regions are within internet coverage but do not use it due to a lack of digital skills and high costs. This situation widens the digital divide between urban and rural areas. Globally, only 20% of students in South Asian rural areas consistently use the internet for learning purposes (World Bank, 2023).

Despite these challenges, the integration of digital tools in education continues to shape the future of learning globally. Digital literacy also contributes to students' collaborative skills in online learning, which is becoming increasingly important in today's education landscape (A'yun, 2021). Studies indicate that students with higher digital literacy skills tend to perform better academically, as they are more proficient in using digital resources for learning (Abbas et al., 2019). However, a major challenge remains in the low level of digital literacy among students, in which socioeconomic disparities, limited technological access, and inadequate teacher training contribute to poor digital literacy according to study conducted in Filipino high schools (Mangarin & Climaco, 2024).

Digital Technology in Malaysia's Education System

Malaysia's National Digital Education Policy emphasizes equitable access to digital resources, focusing on providing quality infrastructure and fostering digital literacy among students and teachers. Various initiatives exemplify efforts to integrate technology into education, such as 1BestariNet and the Digital Educational Learning Initiative Malaysia (DELIMa) (Ministry of Education Malaysia, 2020). Despite these efforts, rural schools continue to face significant challenges in adopting digital tools effectively, which significantly impedes the implementation of systems like AINS.

Like global context, research indicates that students in rural areas of Malaysia face significant challenges in accessing digital platforms for education. These obstacles include poor internet connectivity, lack of digital devices, and financial constraints (Surianshah, 2021; Ang & Ang, 2021). The digital divide is particularly evident in rural regions, with students experiencing difficulties attending online classes and purchasing necessary devices (Surianshah, 2021). Factors such as knowledge, motivation, attitude, and technology readiness influence the optimization of digital technology in rural schools (Omar et al., 2023).

Geographical location plays a crucial role, with students in rural areas more likely to face technical issues, declining focus, and social isolation compared to their urban counterparts (Jafar et al., 2022). Studies have shown that these limitations hinder their ability to fully engage with digital learning tools and benefit from online educational resources, creating a substantial barrier to their academic progress and digital literacy development (Surianshah, 2021).

To address these challenges, several targeted initiatives have been introduced to improve access to digital learning, including the provision of digital devices, expansion of internet connectivity, and community-based learning hubs. The government has also implemented initiatives such as fixed wireless access (FWA) in underserved areas, which has shown improvements in internet speeds (Hassan et al., 2021). These initiatives have been implemented in various rural areas with the aim of bridging the digital divide and promoting inclusive education opportunities.

However, challenges persist, including low-speed networks and limited digital literacy in rural communities (Sandun et al., 2023). Efforts to bridge the gap should focus on providing tailored technical support, ongoing training for teachers, and improving digital infrastructure in rural areas (Yap et al., 2024; Sandun et al., 2023). These interventions are crucial for creating educational equity and reducing the digital divide across Malaysia.

Advanced Integrated NILAM System (AINS)

The Advanced Integrated NILAM System (AINS) is a digital innovation that supports the National Digital Education Policy's objectives by enhancing literacy through gamified and data-driven approaches. AINS enables students to log reading activities, access a digital library, and earn rewards for engagement. However, the effectiveness of AINS could be influenced by several factors, including digital literacy, teacher support, and infrastructure availability just like other digital tool.

Digital literacy plays a crucial role in the adoption of educational technologies. Students with higher digital literacy skills are more likely to engage with platforms like AINS effectively. In rural schools, students possess significantly lower levels of digital literacy skills and ICT competence (Nagaraju et al., 2020; Bahri et al., 2022; Mavutha & Mabotja, 2024; Li et al., 2022) and it will lead to challenges in navigating and fully utilizing AINS features. Structured training programs for students and teachers are critical for improving system usability and engagement.

Teacher involvement further enhances the effectiveness of AINS. Consistent teacher guidance improves students' interaction with digital platforms (Basir et al., 2022), and adequate training and support for teachers are key to its adoption (Muoki & Mutiso, 2020), especially in rural contexts.

Despite its potential, gaps in the literature remain. Limited research exists on the effectiveness of AINS in rural Malaysian schools, particularly regarding its acceptance among students and teachers. Understanding these perspectives is essential to designing interventions that address the unique challenges of rural educational settings. Key barriers include limited motivation among students to use the platform independently and the need for continuous teacher monitoring to ensure sustained engagement (Akkara et al., 2021).

Past Research

	Title	Authors	Year	Theme	Focus	School Level	Data Analysis	Country
1	Meningkatkan Bahan Bacaan Dengan Aplikasi Berbasis Web Mobile	Riyanto, Nugroho Ponco, Sagita Sagita, BN Chandra, Tris Tiyanti Apriliani & OM Sugiarti	2022	Benefits of digital tool	Reading interest among students			Indonesia
2	Aplikasi Let's Read Sebagai Media Membaca Nyaring Untuk Anak Usia Dini	Mulyaningtyas, Rahmawati & Bagus Wahyu Setyawan	2021	Benefit of digital tool	Advantage and Disadvantage of Let's Read App	Early childhood	Qualitative (Descriptive)	Indonesia
3	The Importance of Reading Across Genres	Gingerich, Jennifer Alena & Michelle Adler	2020	Impact of using digital apps	Reading achievement and Motivation of Students.	Primary School	Quantitative (Quasi-Experiment)	Midwestern
4	Pemanfaatan Aplikasi Let's Read dalam Meningkatkan Literasi Membaca Siswa Kelas 2 Sekolah Dasar	Nurhabibah, Nurhabibah, Mhmd Habibi, Nursalim Nursalim & Risnawati Risnawati	2023	Impact of using digital apps	Improving Reading Literacy	Primary School	Quantitative	Malaysia
5	Effectiveness of accelerated reader on children's reading outcomes: A meta-analytic review.	Tischner, Clair, Sara E Ebner, Kathleen Aspiranti, David A. Klingbeil & Alicia L Fedewa	2022	Impact of using digital apps	Reading achievement, attitude and motivation.	Varies	Systematic Review	
6	Digital Reading Programs: Definitions, Analytic Tools and Practice Examples	Brueck, Jeremy, Lisa Lenhart & Kathleen Roskos	2019	Benefit of digital tool	Design and Features			
7	Implementasi Media Digital Myon terhadap Kemampuan Literasi, Minat Baca dan Hasil Belajar Bahasa Inggris Kelas IV SD XYZ Jakarta	Henny Rouly Elizabeth Sitorus	2024	Impact of using digital apps	Literacy. Reading interest and achievement	Primary School	Mixed method	Jakarta, Indonesia
8	Effectiveness of Digital Tools to Support Pupils' Reading in Secondary School: A Systematised Review	Danlei Chen & Gale Macleo	2021	Impact of using digital apps	Reading interest and skills	Secondary School	Systematic Review	

9	Platform "Get Epic" Sebagai Perpustakaan Digital di Masa Pandemi Covid-19	Agus Ervianto	2022	Benefit of digital tool	Digital Library	Secondary School	Literature Review - Get Epic utilization report,	SMP Nation Star Academy, Indonesia
10	Ketahanan Literasi Anak-Anak di Masa Pandemi melalui Aplikasi Let's Read (Children's Literacy Resilience in a Pandemic Period Through the Let's Read Application)	Endang Sri Maruti	2022	Impact of using digital apps	Improvement of children's digital literacy skills		Qualitative with interview.	Kampung Wonopuro. Indonesia
11	Student's acceptance of digital educational tools: A case study	Rabab Abdel Wahab	2020	Student perception of using technology	Student acceptance of digital educational tools.	Higher Education	Quantitative	
12	The Effectiveness of the Use of Information and Communication Technology (ICT) in Rural Secondary Schools in Malaysia	Idarwana Hasin & M. Khalid M. Nasir	2021	Barriers to technology integration in rural area	Lack of facilities	Secondary school	Quantitative	Malaysia
13	Challenges and Issues of Integrating Information and Communication Technologies in Higher Education in Rural Areas- A Review	Pooja Kumari & Anju Srivastava	2023	Barriers to technology integration in rural area	Limited infrastructure and inadequate digital literacy	Higher Education	Systematic Review	
14	ICT Integration in Education: The Case of Secondary Schools in Kerala	Arunima Anil & M. Jayakumar	2020	Barriers to technology integration in rural area	Lack of access, inadequate infrastructure and poor connectivity of ICT	Secondary school	Qualitative with focus group interview	Kerala, India
15	Students Perception in Technology Integration and its Alignment within the ISTE Standards	Ranjini S. Nair	2021	Student perception of using technology	Technology integration in classroom	Higher Education	Quantitative	Malaysia

16	Students' Perception of the Use of Technology in Education	Nur Zaimah Ubaidillah, Nur Nadhira Baharuddin, Nurizwani Kasil & Farhana Fakhira Ismail	2020	Student perception of using technology	Use of technology in education	Higher Education	Quantitative	UNIMAS, Malaysia

The above articles explored 16 studies related to the integration of digital tools in education, with a particular focus on reading and literacy, spanning from the year 2019 to 2024. The participants in these studies come from diverse educational backgrounds, involving students and teachers from primary, secondary, and higher education levels. A significant portion of the studies, specifically 7 out of 16, have a primary focus on primary school-level education, emphasizing the role of digital platforms in enhancing literacy skills and reading motivation. Furthermore, most of the studies, 9 out of 16, focus on the effectiveness of digital applications in improving reading achievement and engagement among students. In terms of research methodology, majority of the reviewed articles, 10 out of 16, employ quantitative research approaches, while 3 studies rely on qualitative approaches to provide a deeper understanding of the challenges and opportunities of digital integration in education. Additionally, 3 studies utilize a mixed-methods approach to explore various perspectives comprehensively. From a geographical perspective, the studies showcase a broad distribution across different regions. Six studies were conducted in Malaysia, while the remaining studies originate from Indonesia, the USA, India, and other countries. This representation highlights the global relevance of digital literacy initiatives and their potential impact on education in diverse educational contexts. Below are some of the selected papers' literature reviews.

Firstly, Idarwana Hasin et al. (2021) examined the effectiveness of Information and Communication Technology (ICT) usage in rural secondary schools in Malaysia by involving 49 respondents, consisting of 21 students and 28 teachers. The findings indicated that most participants had a positive perception of ICT integration in education, despite challenges such as inadequate facilities and a lack of expertise. Teachers highlighted the need for more relevant ICT training to improve their skills and enhance the use of technology in classrooms. The study also recommended further research to explore rural students' acceptance and engagement with ICT. However, the study had limitations, including a small sample size, which affects the generalizability of the findings. Furthermore, the study did not specifically address students' acceptance of ICT, which could provide deeper insights into their engagement with digital tools. A larger sample size and a more focused exploration of students' perspectives could contribute to a more comprehensive understanding of ICT integration in rural schools.
Secondly, Nurhabibah et al. (2023) investigated the effectiveness of the Let's Read application in enhancing the reading literacy of 2nd grade elementary school students. The study compared an experimental group that used the Let's Read application with a control group that relied on the school library for reading activities. The findings revealed that the experimental group demonstrated a greater improvement in reading literacy, highlighting the positive impact of the Let's Read application in fostering language literacy among young learners. The app's diverse collection of books and engaging illustrations were identified as key factors contributing to its effectiveness in improving students' reading skills. However, the study faced several limitations, including the limited availability of devices such as laptops and tablets, which required students to take turns accessing the application, potentially affecting the consistency of their engagement. Additionally, the study noted that the sample

size between the experimental and control groups was not significantly different, which could introduce bias in the findings. The authors recommended that future research should consider using more comparable sample sizes to ensure greater reliability and accuracy in evaluating the effectiveness of digital reading tools.

Lastly, Ubaidillah et al. (2020) explored students' perceptions of technology use in education, focusing on the relationships between perceived usefulness, behavioral intention, and actual usage of technology in the classroom. The study found a positive relationship between perceived usefulness and students' intention to use technology, suggesting that students are more likely to adopt technology if they believe it enhances their learning experience. Additionally, the findings indicated a significant relationship between behavioral intention and the actual use of technology, reinforcing the idea that students who intend to use technology are more likely to do so in practice. However, the study revealed that perceived ease of use was not a significant factor in influencing students' intention to use technology, suggesting that other factors may play a more crucial role in determining technology adoption. The study's findings are limited to undergraduate students, and the authors recommend expanding future research to include postgraduate students to identify potential differences in perceptions. Furthermore, they suggest conducting the study on a larger scale, incorporating more public and private universities, to provide better insights for policymakers in implementing technology in education effectively.

Based on the above studies, the research gaps identified include the need for further research on the impact of digital reading applications such as the Let's Read app on student engagement and long-term literacy outcomes, particularly in rural primary school settings. Additionally, there is a need to explore the challenges of implementing digital literacy tools like AINS in rural schools, focusing on factors such as infrastructure limitations, teacher training, and student accessibility. The studies also highlight the importance of understanding students' perceptions of technology use, with future research recommended to include broader demographic samples to provide more comprehensive insights. Addressing these research gaps would contribute to a deeper understanding of how digital reading platforms can be effectively integrated into primary education, ensuring equitable access and maximizing their potential to improve students' literacy skills.

Conclusion

This paper has reviewed the perception of rural primary school students towards AINS, focusing on the challenges, opportunities, and factors influencing its implementation. The findings highlight the significant role of AINS in promoting reading habits and digital literacy among students in rural areas. However, several barriers such as limited digital access, inadequate infrastructure, and low levels of digital literacy continue to hinder its effective use. Addressing these challenges requires targeted efforts to enhance technology accessibility and improve students' and teachers' digital competencies.

Furthermore, the review underscores the importance of teacher support and training in ensuring successful implementation of AINS in rural schools. Studies have shown that teachers with adequate digital literacy and pedagogical knowledge play a critical role in facilitating students' engagement with AINS. Additionally, parental involvement and

community support are essential in fostering a positive attitude towards digital learning tools among students.

Overall, this paper provides valuable insights into the current state of AINS adoption in rural Malaysian primary schools, identifying areas for improvement and further research. Future studies should explore the long-term effectiveness of AINS in enhancing students' literacy skills and investigate strategies to bridge the digital divide in rural education. The findings emphasize the need for comprehensive and sustainable initiatives to maximize the potential of digital learning platforms in promoting equitable educational opportunities for all students.

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