

Accessibility of Technology Affecting Pupils' Learning in Rural Schools

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Abstract

This research explores how the accessibility of technology impacts pupils' learning in rural schools. It examines the challenges and opportunities presented by technology access, including infrastructure limitations, digital literacy gaps, and the potential of technology to bridge educational disparities. The study investigates how varying levels of technology access influence student learning outcomes, teacher practices, and community engagement. By analyzing the complex interplay of these factors, this research aims to provide insights into effective strategies for enhancing technology accessibility and maximizing its positive impact on education in rural school settings. The paper concludes by acknowledging the government's efforts to bridge the technology gap between rural and urban schools in Malaysia. To achieve the goal of educational democratization, new policies have been introduced to address differences in student demographics, socioeconomic backgrounds, school locations, and available facilities.

Keywords: Technology, rural schools, accessibility

1. Introduction

Education is the most powerful tool in the world which can be used to improve oneself. Democratization of education implies that equal opportunity must be given to all children in this world to be successful in learning or to use education as a medium to become successful (Dewey, 1966). The most important message underlying the concept of democratization of education is equal opportunity. Equal opportunity means every child in this world must be given the same right to education despite their differences in terms of gender, religion, socio-economic status, ethnicity or geographical conditions (Abu Bakar, 2011).

In Malaysia, efforts have been taken in ensuring democratization of education is well acquired. One of this effort had been started from the Razak Report 1956 which outlines free primary education of 6 years to be given to all citizens irrespective of race, culture or need with immediate effects (Ministry of Education, 2016). The Ministry of Education also aspires that all Malaysian children receive equal access to education so that pupils can develop to their best potential starting from preschool to upper secondary school by the year of 2020 (Ministry of Education, 2016).

In tandem with democratization of education, Malaysia also proposes the concept of equity which is written in the Malaysia Education Blueprint 2013-2025. It aims to reduce in halve the urban-rural, socio-

economic and gender achievement gap by the year of 2020 (Ministry of Education, 2011). However, the lack of accessibility of technology in rural schools in Malaysia becomes one of the factors hindering democratization of education in the country. UNESCO (2013) stated that urban schools in Malaysia are provided with better infrastructure and technological equipments compared to rural schools. This technology gap between urban and rural schools shows that inequality occurs among pupils in Malaysia. It also suggests that there is a clash between ideas written in the policy with the efforts taken in reality.

2. Problem Statement

Research studies in the past decade has proven computer-aided teaching and learning process is an effective tool in widening educational opportunities. According to Hasan et al., 2007 the rural communities in the world have been facing a common problem and that is being able to get access to technology and have not been able to obtain advantages from the usage of ICT. The country of Malaysia has introduced various steps to close the digital gap between urban and rural communities in the country by taking into consideration of providing internet access and ICT equipment in the rural areas especially in national-type schools. Although the rural community has begun to receive technology facilities, this issue hasn't been overcome completely.

One of the contributing factors that causes the inaccessibility of technology in the rural areas is the rural students' acceptance and mental readiness upon using the ICT equipment for educational purposes. According to Ghavifekr and Ibrahim, 2015 integration of ICT in the Malaysian national-type schools need serious consideration in order to increase the competency of those enrolled in the country's education system. Students in the rural areas should be well informed on the importance of incorporating ICT in learning process as it is one of the supporting factors of students' better academic performances in future. As Zhao, 2007 stated that in the 21st century learning, ICT is playing a vital role in teaching and learning process whereby its existence in the education system has brought to tremendous improvement along the process of execution. 21st century learning style emphasis on students' centered learning whereby teachers are merely facilitators in classroom. Students should take responsibility of their learning as well as enhancing their prior knowledge and skills when comes to using technology for educational purposes.

Teachers' belief on technology-based teaching and learning process is at unsatisfactory level. According to Carlson and Gadio, 2003, teachers acceptance on technology-based teaching and learning process is absolutely essential if the technology provided to schools is to be maximised effectively for educational purposes. Researches highlighted that it would be a waste spending on resources and equipping schools with the newest technology in the rural areas without taking into consideration of teachers' readiness and whether they are computer literate and well skilled in using ICT. These are the key factors that would lead to students' improvement in knowledge acquisition and upskilling their prior knowledge on ICT. Accordingly, the Malaysian government with collaboration of the Ministry of Education (National Education Blueprint 2013-2025) has upgraded most schools especially schools in the secluded areas with the latest ICT tools and technology. Despite all of these efforts, the issue faced was on teachers' ICT skills, aptitude, technical support and not forgetting consistency of the policy to maintain the existing programme to achieve the standards of academic performances of students both in the urban and rural area.

As stated by Hosseini, Nikomi and Chizari, 2009, there are several other factors that affects the accessibility of technology in rural settings. As stressed by the researchers above, technical aspect that led to factors like low-bandwidth, hardware shortages, lack of appropriate infrastructure in rural schools, lack of software and proper telecommunication system and not forgetting the incompetent ICT technical practitioners in rural areas. Thus, the lack of ICT infrastructure and other basic amenities would probably give negative impact on the entire infrastructure and poses a greater threat to the implementation of ICT services in rural areas. Another factor highlighted by the researchers above is the social aspect whereby the rural communities' rigid thinking on against the technology that might affect the way their future generation would think and behave, leaving behind their believes and cultural aspects.

Lastly, the lack of general infrastructure and poor road quality are major challenges faced by our government in providing quality educational delivery especially getting installed the latest technology in these areas. As Malaysia is known for its geographical conditions, some schools are located in the areas where the accessibility is limited and challenging. For example, in the state of Sarawak, the rural communities living in secluded areas whereby they rely on river transport system. Either accessibility of technology or utilization of technology is possible as the issue addressed above would be one the major factors that affects the implementation of ICT and having to access the technology would be a problem in the secluded areas. Referring to above cited statements, these are the obstacles or factors affecting the accessibility of technology on the learning progress of students in the secluded areas.

3. Purpose Statement

The purpose of this paper is to identify the effect of accessibility of technology on the learning progress of students in rural areas.

4. Research Objective

The objective in this study is to study the effect of accessibility of technology on the learning progress of students in rural areas.

5. Research Question

How the accessibility of technology affects the learning progress of students in rural areas?

6. Research Hypothesis

Accessibility of technology has no effect on the learning progress of the students in rural areas. (null hypothesis)

7. Operational Definition

In order to have a better understanding of the issue, we need to understand the terms used in this paper. 'Rural school' means schools that can be accessed through limited access by road or river transport system. In Malaysia, rural schools are defined based on three levels which are P1, P2 and P3. Nine criteria are used to differentiate between P1, P2 and P3 schools which are transportation mode, risk of journey, electrical supply, water supply, accommodation, sanitation, telecommunication, health services and other community services like bank or post office (Ministry of Education, 2017). A P3 school is located in the remote area where three modes of transportation are needed to go to the school and you will face at least 3 risks during the journey. Meanwhile, a P1 school is a rural school which only needs

one mode of transportation and you might only face one or two risks during the journey to the school. Hence, the term rural school in this paper means all the schools which are located in P1, P2 and P3.

Other than that, we must also understand the term ‘accessibility’. Accessibility is defined as equal opportunities given to all children to come to school which is equipped with adequate facilities (Abu Bakar, 2011). Effort has been taken by the government to reduce the digital gap by providing basic enabling infrastructure to all schools and educational institutes as well as regularly updating the lists of schools which are still lacking of all the infrastructures (Adila, Nor ‘Izzah & Habee, 2013). This is aligned with the Policy of ICT in Education Malaysia 2010. However, providing does not mean accessible. According to Siti Hajar and Hamidah (2018) accessibility of technology in rural schools can be understood based on these four main ideas; performance expectancy, effort expectancy, social influence factor and facilitating conditions. For performance expectancy, technology is accessible if the usage of technology helps to improve the academic performance of the rural school pupils who use it for educational purpose. Meanwhile, effort expectancy describes accessibility of technology as the efforts taken by pupils who live in rural area to use the technology during the teaching and learning process. It also relates to the pupils believe on whether the use of technology can make their learning process better.

Besides that, technology is also accessible when the living community in the rural areas support and encourage everyone in that area to use technology in their daily life. This is what it means with social influence factor. A study conducted by Abdul Hapes (2012) suggested that community in rural areas will more likely use computers if the content is relatable to their daily life. Therefore, it is important to provide local content so that the community has positive mind towards technology. Lastly, accessibility of technology can be seen through facilitating condition. Factors like electricity, strong Wi-Fi connection, computer maintenance and school technicians are some of the facilitating conditions that will determine the accessibility of technology in the rural schools. Thus, the term ‘accessibility of technology in rural schools’ carries the idea of equal opportunities given to all rural school pupils in using the technology to enhance academic achievement with proper support and guidance given from the teachers and also the community living in the area.

8. Literature Review

In this era of globalization, the Ministry of Education has been working to enhance the quality of education in order to ensure parity in academic achievement between rural and urban areas. However, education in rural regions continues to lag behind due to a lack of resources, significant disparities in community education levels, low academic performance, insufficient teaching aids, and limited information technology infrastructure (Raman, Othman, & Affandi, 2019). According to Belalang and Abd Rahman (2016), the necessary knowledge and skills to comprehend information and communication technology encompass hardware, software, local area network systems, the internet, and other technological and communication components. The integration of ICT in the teaching and learning process has the potential to improve the efficiency and effectiveness of learning outcomes (Nasir, Surat, Maat, Abd Karim, & Daud, 2018a; Sufian, Nordin, Tauji, & Nasir, 2020). Silin and Kwok (2017) posit that the effective utilization of ICT in teaching and learning can strongly influence both students and teachers to implement ICT in rural school settings. Teachers can make early preparations for lessons by identifying appropriate teaching materials and engaging teaching methods to ensure effective delivery. They can also transform the learning process through the use of tools such as PowerPoint and other

interactive visual aids. The integration of ICT is crucial for teachers to share knowledge and develop their expertise in the field of education (Khan, 2017).

However, rural schools often face obstacles in utilizing ICT facilities. Some institutions lack adequate technological infrastructure and supporting materials to facilitate effective teaching and learning within the classroom. Additionally, time constraints pose a significant barrier to integrating ICT into the educational process. Furthermore, students frequently encounter difficulties in accessing the internet due to a scarcity of necessary equipment, such as laptops and desktops, as well as unstable internet connectivity, as rural internet services are limited. Moreover, as suggested by Raman et al. (2019), this issue is exacerbated by a shortage of trainers skilled in ICT, as they often lack the requisite experience and knowledge. Instructors if adequately trained, could potentially clarify complex instructions (Khalid & Quick, 2016; Nasir, Mansor, & Rahman, 2018) and conduct more interactive sessions, and ultimately enhance student engagement (Timbang & Ambotang, 2020). According to Herbert, Campbell, and Loong (2016), rural schools may also face challenges in accessing online resources, as they are reliant on the expertise of their teachers and the availability of technological facilities. The inadequate availability of Information and Communication Technologies in rural schools has a significant impact on the teaching and learning process.

Information and communication technology facilities could address the diverse learning needs of students, including auditory, visual, kinesthetic, and verbal preferences. Educators leverage information technology to enhance instructional materials, thereby making teaching and learning more engaging (Min & Nasir, 2020). The national education system maintains a high level of quality and competitiveness with global standards (Raman et al., 2019). The Ministry of Education is in the process of equipping schools with sufficient ICT facilities to ensure students can compete globally in the field of technology. The ministry has implemented diversified strategies and provided technology resources for rural teachers, enabling them to access and utilize these facilities on par with their urban counterparts (Kelly et al., 2018). These strategies include the development of ICT infrastructure and an increase in the number of IT experts and experienced teachers serving rural schools.

9. Significance of the Study

9.1 Keep Pace with Globalisation

Accessibility of technology in rural schools is crucial, as the Malaysian Ministry of Education believes that the integration of ICT in teaching and learning is essential for the country's progress towards becoming a high-income nation (Ministry of Education 2012). Globalization and rapid technological advancements have led to a borderless world, the liberalization of global information, and global learning. Moreover, ICT skills are one of the essential criteria in 21st-century education (Hrehová&Teplická, 2020). Thus, ensuring the accessibility of ICT in rural schools is a vital issue to be addressed, enabling rural students to keep pace with the demands of globalization.

The proponents of globalization claim that it is beneficial for global economic development and improving the standard of living in less affluent nations (Stiglitz 2002; Ohmae 2005). This aligns with the Ministry of Education's aim of extensively incorporating ICT in Malaysian schools. Conversely, the

National Education Policy Act 27 of 1996 in South Africa emphasizes the concept of educational equity, which aims to make education accessible to all, including the poor and previously disadvantaged individuals, so that they can fully participate in society. The implementation of 'Curriculum 2005' and Outcomes-Based Education in South Africa is a result of the impact of globalization and the growing importance of information technology education. The new South African curriculum has introduced various learning areas, such as technology, economic and management sciences, and life orientation, designed to equip learners with skills that will enable them to become productive members of a thriving, diverse, and dynamic economy.

Furthermore, the South African curriculum aims to ensure the accessibility of ICT in both rural and urban schools, shaping students to become skilled citizens with the necessary assets to participate in the new knowledge-based global economy. (Dzansi&Amedzo, 2014) The curriculum's integration of technology exposes learners to global information and the means for global communication, enabling them to become active global players. Therefore, the South African curriculum can serve as a benchmark to evaluate and analyze the Malaysian curriculum's progress towards meeting the demands of globalization, as both countries are classified as developing nations.

9.2 Independent Learning

Independent learning falls in the concept of constructivist learning theory and this theory is based around the idea that people actively construct understanding or knowledge (Council for Educational Change 2004). Independent learning requires the learner to be less teacher dependent. Hence, integration of ICT in rural schools able to encourage pupils to be active learners consequently could realise New economic policy (1969) in which the main policy thrusts were the eradication of poverty particularly in the rural areas of the country. In this context education was viewed as playing an important role in the long run, in achieving the thrust. However, to achieve the thrust education needs to be equitable.

According to a case study entitled "Malaysian Teachers' Levels Of ICT Integration And Its Perceived Impact On Teaching And Learning "conducted by Irfan Naufal and Amat Sazali in 2015, the researchers have found out that 58.10% of teachers agreed that students exhibit high level of independence while using computers during teaching and learning session in classroom. The respondents for the case study were teachers throughout Malaysia. Furthermore, 84.1% of the respondents agree that ICT promotes collaborative learning among their students and 81.7% agree that their students often share information from multiple sources. The use of ICT in teaching and learning especially with the use of interactive multimedia will assist in understanding and improve retention among the students, as learning through multimedia involves multiple intelligence such as auditory and visual (Marziana 2013). Such approach encourages students to work together and share ideas collaboratively to achieve common learning goal.

On the other hand, based on a case study conducted by Vaughan in 2011 to discover the expectations and experiences of students and staff involved in an independent learning programme in two New Zealand secondary schools, the researcher has found out that 59% of the findings proven that the accessibility of technology in the school has given majority of the students positive impact on their independent learning style. The New Zealand Curriculum (Ministry of Education 2007), clearly identifies some key elements that complies the nature of the twenty first century learning in a New

Zealand schooling context such as lifelong learning, learner empowerment, student engagement, learner and teacher innovation that have links to constructivist theory and independent learning theory.

Research conducted by Gill and Halim (2008) identifies independent learning as significant in developing learners who are able to apply the learning skills they have gained to develop and grow as holistic individuals and able to manage their own learning goals. In addition, Knowles (1975) stated that the successful learner is one that is proactive and takes responsibility for their own learning. This statement is supported by the finding from the questionnaire in the case study conducted by Vaughan (2011) where 44.2% of respondents stated that they utilise independent learning time to work on extra credit assignments. According to the case study also, the students' independent learning style merely depending on the accessibility of ICT since the New Zealand curriculum focuses on e-learning.

9.3 Dissemination of Knowledge and Information

The Malaysian government, through its Ministry of Education, has allocated substantial funds for the implementation of ICT in schools. This investment has been channeled directly into various ICT initiatives, such as Smart Schools, MySchoolNet Project, School Access Centre, Eduweb, and 1BestariNet (Ismail et al., 2013). One of the primary objectives of integrating ICT in education is to equip students with the necessary digital skills, which are crucial in the 21st-century learning environment (Gidadawa&Dogondaji, 2014). Additionally, the use of ICT is expected to alleviate the workload of teachers in planning and delivering their teaching and learning activities. For instance, the abundance of educational resources available on the internet allows teachers to enrich their instructional practices and enhance students' learning.

According to Kop (2011), the impact of educational technology is evident in the dissemination of learning content across borders, enabling students to access the internet and improve their understanding of subject matter. However, in 2005, there were 5,077 primary schools and 792 secondary schools located in rural areas in Malaysia (Mansor et al., 2020). Many of these institutions lacked proper infrastructure and learning facilities. Specifically, 767 primary schools and 28 secondary schools did not have a consistent 24-hour electricity supply, and some were reliant on diesel generators that were not regularly maintained (Mahmud & Blanchard, 2016). Furthermore, some rural schools were supplied with low-voltage electricity, rendering them unsuitable for ICT utilization (MOE 2006).

10. Argument of the Study

10.1 The implication of Technology Inaccessibility in Rural Schools

There will be tonnes of impacts when it comes to lacking of technology in rural areas. First and foremost, the student's gap of achievement between rural and remote areas versus those in urban areas. Technology has been proven to be bridging the gap of student's achievement. Research by Edgar (2009) stated that ICT based initiatives are effective when it comes to bridging up the learning gap of communities in different areas. This is supported by the statement of the research of Siti (2017) where she stated about the effectiveness of technologies enhances collaborations among the teachers and students. Teachers may exchange information and teaching ideas while students may share and exchange their knowledge with the help of internet access and the appropriate device of technology.

Besides that, the situation of lacking of technological access among rural areas students will cause a huge blow on the local students. Students will be the benefactor from technological access as they may equip themselves with ICT skills, shaping themselves to be a more competent individual. (Siti 2017) Ibrahim (2015) has stated that ICT skills is proven to be effective in increasing one's competency as the global economy is moving towards K-economy (knowledge economy) and with the skills of ICT, an individual will thrive in the era of K-economy.

The importance of technology accessibility is what drives the government to establish a programme named National Broadband Initiative in 2007 with the aim of enhancing the ICT strategies in the rural and remote areas in Malaysia. The importance of accessibility of technology can be seen from the effort of government through the Smart School Project in 1999, and technological accessibility was emphasized in the Education Strategic Blueprint (2006-2010).

However, the unequal distribution of the resources is the main factor that technological access is far beyond reach in some areas in Malaysia.(Abu Bakar 2010) the students in remote areas are unable to do anything about it but waiting. As a conclusion, the lack of technological accessibility will not only diminish the chance of learning among the remote area students but also it will further widening the gap of student's achievement between both the urban areas and remote areas.

10.2 Improving the Quality of Life of the Local Community

The stretch of influence of technological accessibility stretches till the living standard of the local community itself. Technological accessibility allows the local communities to have a share of participation on the digital economy like those in the urban areas, thus generating incomes for themselves as the incomes will then to be utilised for improving their own lifestyle. (Edgar 2009). Walsham (2007) further solidifies the statement by stating that technological access raises the living standards of locals in economic growth.

Technology helps the local students to shape up their minds for future careers. The changing of the local student's mind-set will thus be thriving them towards the current trend of work employment in the working market. Siti (2017) stated that technology will alter the mind sets of the users. Thus, with the sufficient exposure towards technology, it will not only benefit the students but also changing the mind sets of the mostly closed-minded locals who have opinions about utilizing technologies in the classrooms.

10.3 Teaching and Learning Booster

Lacking of technological access does not only portray in living standards and achievement gap bridging, but also lagging behind in the latest trend of teaching and learning methodology. Siti (2017) stated that, ICT development is essential and a game changer in the teaching and learning process as it enables the access of abundant variety of teaching methods, and it provides a platform that can tailor-made all types of learning ways for all types of learners.

Ibrahim (2015) stated that developments in the field of technologies allows the teaching processes to switch from traditional, one-way instruction method towards the technology-based approach. The method will change the role of teacher to a facilitator.

Education through technology will be the trend in teaching and learning due to its borderless traits where knowledge can be shared and discussions on knowledge can be held (Kop 2011). The lack of reach of technological access will deal a huge impact on the rural area students as it will not only widen the gap of academic achievement but the students will be less exposed to the outer world, thus causing themselves a limited steps of life advancement. When education and technological access are free, accessible to all of the citizen of the country, the rate of illiteracy and the attitude of ignorance would be eradicated and there will be an improvement in the society (Madumere 2011).

11. Solutions

Rural schools' facilities and resources always has been challenges for teachers and pupils to learn according to the developing era. According to Malhoit (2005), technology is another factor that a rural school should take into account like the facilities in urban schools. Research by Mitra (2008) shows, a common feature that all rural school shared is lack of infrastructure and technology. Lack of facilities hinders the teachers to inculcate 21st century skills in their lesson and the pupils were left behind too. There are few suggestions that can be taken into consideration in order to improve technology resources in rural schools.

11.1 Maintaining school facilities.

Our study of a rural school in the state of Perak reveals that the technology resources, such as computers, are often not well-maintained. This issue can be addressed if policymakers assign teams to oversee the maintenance of school facilities. It is believed that the longevity of resources provided by the ministry depends on proper maintenance (Ropi& Tabassi, 2014). Ensuring that the facilities are well-cared for and maximized for teaching and learning can be achieved by establishing a skilled team to maintain the technology resources in schools. This would help realize the ministry's objective of supplying technology resources to schools.

11.2 Upskilling Teachers from Rural Schools

Besides this, upskilling of teachers from rural schools to use technology resources must enhance. Suhada (2015) said that it was important for teachers to keep up with technology and to use Information and Communication Technology (ICT) in classrooms as it could encourage students to learn. In order to that, there are a lot of trainings given to the teachers to master the ICT skills. Efforts taken are, trainee teachers are introduced to the special subject where they learnt the basic skills on using technology in their classroom. For example, creating interactive video, animations and so on. This effort should continue to make sure the teachers exposed to the basic skills from their training. Apart from that, there are also trainings for in service teachers by ministry. As stated by ministry of education in (2015), 19,562 in service teachers completed online courses that incorporates modules from Microsoft Digital Literacy curriculum. These effort should be an ongoing process to ensure the ICT resources effusively used in school for better teaching and learning process.

11.3 Equity in education.

“Equity in education” seems to be a very familiar phrases in our education system. According to Education Blue Print 2006 -2010, it is emphasised on producing talented human capital with world class education. Narrowing the education gap also has been a part of the plan. However, the percentage of achievement reached at the end of year 2010 is not stated. Further to this, another education blue print of 2013 – 2025 is again formed targeting to narrow down the achievement gap to 50% by 2020 between rural and urban. Questions raised here are, even though “equity in education is one of the idea in our previous blueprint, why do it still exist again in our current blueprint? And to what extent are the achievements gained in this notion? It is believed, both blueprints are introduced by different stake holders. Each time when there is a transition of political power, they intended to come out with their own new idea. So, suggestion that can be given here is, those stake holders need to give considerations on the previous and current state of any issues and need to work on it to ensure concerns highlighted able to solve accordingly.

11.4 Cooperation with commercial partners.

Furthermore, there are other than ministries, teachers and policy makers who can help us to overcome this. A well-known technology company Google has worked with rural schools to distribute Wi-Fi and chrome books to advance the technology resources in the school Chris Welch (2018). This kind action of them can help hundreds of pupils to be aware of technology which is very important in nowadays. The particular schools who need the facilities of technology resources can work with commercial partners to have more technology resources in their school. Besides, the district officers can list down the rural schools which in need of these resources and worked with commercial partners to support these schools in having enough technology resources in each school.

12. Conclusion

The paper concludes by acknowledging the government's efforts to bridge the technology gap between rural and urban schools in Malaysia. To achieve the goal of educational democratization, new policies have been introduced to address differences in student demographics, socioeconomic backgrounds, school locations, and available facilities. However, the authors emphasize that equal technology accessibility can only be achieved through consistency and continuity. Ratnawati and Ismail (2013) have identified these as crucial factors for realizing democratization in the Malaysian education system. The success of this endeavor depends on the government's continuous evaluation of its initiatives and unwavering implementation of proposed solutions. Constant assessment of barriers to technology access in rural schools, such as electricity supply, equipment maintenance, staff expertise, and teacher-student readiness, is essential. Consistent implementation of remedies is necessary to prevent the recurrence of these issues. By maintaining this approach, Malaysia can make progress towards its objective of democratizing the education system and ensuring no child is deprived of educational opportunities.

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