INTERNET OF THINGS (IOT) AND QUICK RESPONSE (QR) CODE TO ENHANCE READING AMONG SLOW LEARNERS IN PRIMARY SCHOOL

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ABSTRACT

The proliferation of technology has brought forth many innovative applications in the field of education. On par with the fourth industrial revolution (4IR), the use of Internet of Things (IoT) and Quick Response (QR) code in teaching pedagogy helps to redefine the mundane learning environment and experiences in the classroom. The inclusion of IoT and QR code in teaching reading skills among slow learners in Malaysia has not been explored yet. Therefore, this article aims to report a preliminary study conducted on the use of QR code in improving slow learner's reading skills. The pre and post test showed an increase in their reading abilities using QR code compared to using the traditional method. This shows that there is a bright prospect in using QR code to enhance reading among slow learners in Malaysia.

Keywords: Internet of Things , QR code , reading skills , slow learners

1. INTRODUCTION

The advancement of technology in the forth industrial revolution (4IR) in terms of Internet of Things (IoT) is slowly garnering global attention. Aldowah et.al (2017) advocated that IoT will bring positive changes in education as it is visioned to provide a better learning environment for students. Inadvertently, as Malaysia gears towards 21st century learning, educators and policy makers are working towards incorporating technology into education.

Although the nation is preparing itself to meet the standards of 21st century, it is undeniable that some students are still struggling to cope in the classroom. This notion is supported by Ahmad et.al (2013) who explained that a research conducted by National Union of the Teaching Profession (NUTP) in 143 primary schools, 4.87% of students are still struggling to read. Dzalani and Shamsuddin (2014) believed that students who have below average cognitive abilities are known as slow learners. In Malaysia, these slow learners are screened through a test called Literacy and Numeracy Screening Programme (LINUS).

However, despite the intervention programme, many students are still in the same level. This could be due to the inadequate knowledge on how cater to slow learners' needs as well as the limited resources available in schools nationwide. In addition, in a mainstream classroom, these slow learners are often left out as the teacher has merely an average of 10-15 minutes to spend on focused teaching.

Thus, a platform to promote a more student centered learning is needed. One of the many ways is by utilising IoT via Quick Response (QR) code. The use of IoT and QR code is yet to be explored in the Malaysian education system. Therefore, this preliminary study aims to report the use of IoT and QR code integrated reading module for slow learners.

2. LITERATURE REVIEW

2.1 Internet of Things (IoT)

The phrase Internet of Things is not a new concept in the technological world. The word Internet of Things is introduced by Kevin Ashton in the year 1999 and is coined from the word "internet" and "things" (Suresh et.al, 2014; Coetzee & Eksteen,2011). In addition, Coetzee and Eksteen (2011) advocated that, IoT is a commuication between human-human, human-things and things-things. Suresh et.al (2014) further elaborated that by the Year 2020, over 50 billion devices could be connected with the Internet. Hence, with the concept of IoT, most of the equipment used in our daily life can be controlled and supervised using the IoT where it heightens the connectivity for anyone at anytime and anyplace.

2.2 Quick Response (QR) code

The Quick Response (QR) code is a 2-dimentional bar code that can be read via mobile devices and scanners. The QR code was first founded in 1994 by a Japanese company called Denso (Law & So, 2010). QR code has the ability to store information vertically and horizontally (Saravani & Clayton, 2009) and has an immense capacity to hold 7089 numeric characters, 4296 alphanumeric characters, 2953 binary bytes, and 1817 kanji characters (Law & So, 2010).

Durak (2016) propounded that QR code has been used in a wide array of areas since 2011. There are two types of QR code namely; static and dynamic. Gopen (2012) elaborated that static QR code embeds information after the code is generated whereby the user is unable to modify the contents. On contrary, dynamic QR codes are rewritable as it allows the user to alter the contents as they wish.

2.3 Quick Response (QR) code in reading

Qr code in education is seen as mobile learning where students can learn in an non-restricted area (Low & So, 2010). The use of IoT and QR code in lesson optimizes the concept of Cognitive theory whereby students make logical and operational thought.
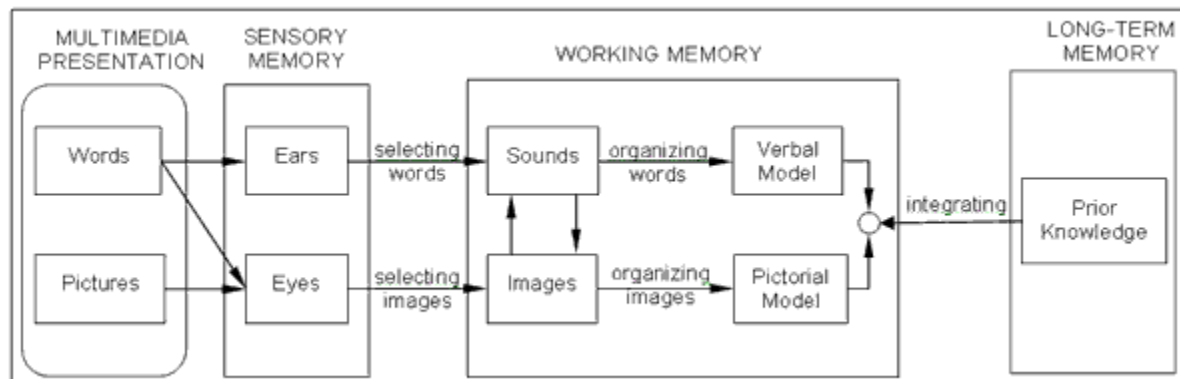

Figure 1 Visual representation of the Cognitive Theory (citied in Pomales-Gracia & Liu,2006)

 Incorporating Cognitive Theory to develop the application and the module helps to cater to the different types of learners. Hence, through the integration of animation, words and sounds, enhances learners sensory and working memory. In addition, using QR code and IoT gives learners the autonomy to explore the topics on their own pace. This notion is supported by Kossey et.al (2015) who stated that QR code based lessons promote independent learning among learners.

3. METHODOLOGY

A quasi-experimental preliminary study was conducted in a rural vernacular primary school in Merlimau, Melaka. The study is conducted on four eight year old students during English class for a duration of two weeks. The topic selected was on 'Animals'. The instruments used were animal reading flashcards with QR code and mobile phones with installed application.

3.1 Procedures

A pre-test was conducted using a traditional method; reading from textbook. The researcher recorded the reading using the developed application.

Before the post-test was conducted, the students were given the flashcards with QR code and mobile phones for them to practice scanning the QR codes. Once the students were well-versed in using the application, they were given the actual set of animal flashcards.

Once the students scanned the flashcards, they will be directed to the main interface of the application. The main interface of the application is designed to be similar to the flashcards to avoid any confusion. To spark more interest among slow learners, the images used were in the form of Graphic Interchange Format (GIF). Other extra features of this interface are the microphone and speaker icon.
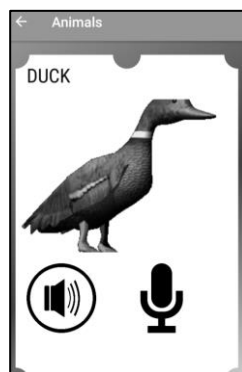

Figure 1 Main interface of the application.

The speaker icon enables students to listen to the pronunciation of the words. Students read the word until they get the "Good" remark. If the students read the word wrongly, the phrase " Try again" will appear. This provides students ample of practice until they were able to get the "Good" remark.

As for the researcher, as soon as the students log in into the application and use it, the result will be automatically available. The data can be retrieved instantly from the Firebase database.

4. RESULTS AND DISCUSSION

An analysis was carried out for the pre and post test. In this preliminary study, the average score for the pre-test is 13.8 (SD 4.32) meanwhile for the post-test the mean score is 8.4 (SD 3.05). the lesser the mean score, the better the reading skills shown by the students. This shows that students were able to read better as the frequency of " Try again" score was less.

Test	Paired difference			
	Mean	N	Std. Deviation	Std. Error mean
Pre test	13.8	5	4.324	1.933
Post test	8.4	5	3.049	1.363

Table 1 Pre and Post test results

The preliminary study showed that the use of QR code helped to improve students reading. Besides that, this method helped students to progress according to their own pace. Students were able to use the application at any time and any place. Hence, a non-threatening environment was established. Hashim et.al (2017) advocated that optimal learning can be created through technology. Thus, students were given the autonomy to self-learn. This notion was supported by Baruffi (2015) who stated that QR code aided lessons helped student's personal growth as well as encouraged them to work independently. This greatly helped the teacher in the class as the teacher could facilitate the mainstream students and the slow learners at the same time.

In addition, the teacher could provide assistance and facilitate their reading if the teacher found that the students were struggling based on the real time data obtained from the Firebase database. Student's reading audio data were automatically inputted into the database although students used the application during their free time. This shows that the teacher could retrieve the data whenever the uses the application to read. By utilizing the concept of IoT, the teacher could retrieve the data of any students at anytime and anywhere. Hence, it gives the teacher flexibility in analysing the data.

5. CONCLUSIONS

Succinctly, the use of IoT and QR code in education has the potency to bring positive results in helping our students to develop their potential. It would be apt for teachers and policy makers to explore the endless possibilities of using IoT and QR code in maximising the teaching and learning experience in the classroom.

As outlined in the Malaysian Education Blueprint (2013), the government is aiming to leverage ICT in education sectors in the nation. Therefore, teachers should grab this opportunity to upgrade their teaching pedagogy to produce a more dynamic and enthusiastic students.

6.   REFERENCE

Ahmad, W. F. W., Noordin, S. M., & Shariffuldin, N. S. M. (2013) . Development of multimedia courseware for slow learnerchildren with reading difficulties: MyLINUS *International Visual Informatics Conference*, 2013, 371-382 (pp. 371-382). Springer, Cham.

Aldowah, H, Rehman, S.U.,Ghazal, S., & Umar, I.N. (2017). Internet of Things in Higher Education: A Study on Future Learning. In *Journal of Physics: Conference Series* (Vol. 892, No. 1, p. 012017). IOP Publishing.

Baruffi, S. (2015). What happens when QR codes are used to increase student engagement, motivation and independence in a fourth grade basic skills classroom? *Theses and Dissertations,* 336.

Coetzee, L., & Eksteen, J. (2011). The Internet of Things- Promise for the future? An introduction. *IST-Africa Conference Proceedings*, 2011 9pp.1-9). IEEE.

Durak, G., OZKESKIN, E. E., & Ataizi, M. (2016). QR codes in education and communication. *Turkish Online Journal of Distance Education.*

Dzalani, H., & Shamsuddin, K. (2014). A review of definitions and identifications of specific learning disabilities in Malaysia and challenges in provision of services. *Pertanika Journal of Social Sciences & Humanities*, *22* (1).

Gopen, D. (2012). Dynamic QR Code Vs Static QR Code. Retrieved on April 28, 2018 from https://uqr.me/blog/dynamic-qr-codes-vs-static-qr-codes/

Hashim, H., Yunus, M. M., Embi, M. A., & Ozir, N. A. M. (2017). Mobile-assisted language learning (MALL) for ESL learners: A review of affordances and constraints. *Sains Humanik*a, 9, 1-5.

Kossey, J., Berger, A., & Brown, V. (2015). Connecting to educational resources online with QR codes. *FDLA Journal*, 2(1), 1.

Law, C. & So, S. (2010). QR codes in education. *Journal of Educational Technology Development and Exchange*, 3(1), 85-100.

Malaysian Education Blueprint. (2013). *Ministry of Education*. Retrieved on April 21, 2018 from http://www.moe.gov.my/cms/upload_files/articlefile/2013/articlefile_file_003108.pdf

Saravani, S. J., & Clayton, J. (2009). *Conceptual model for the educational deployment of QR code*s. Ascilite.

Suresh, P., Daniel, J. V., Parthasarathy, V., & Aswathy, R. H. (2014). A state of the art review on the Internet of Things (IoT) history, technology and fields of deployment. *In* Science Engineering and Management Research (ICSEMR), 2014 International Conference, (pp. 1-8). IEEE.