

Effectiveness and Student Teachers' Perceptions of Digital Materials in Enhancing Vocabulary Learning among Rural Primary Students

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ABSTRACT

This paper provides insights on the application of digital materials which are developed based on Luckin's Ecology of Resources to enhance the vocabulary learning among rural primary students in Sabah. The paper aims to share the preliminary findings on the effectiveness of the digital materials developed and to objectively investigate the student teachers' perceptions on digital materials. The web-based authoring tools used to develop the digital materials in the research were PowToon, Prezi and VideoScribe. These authoring tools include aspects such as animation, audios, photos, graphics and video creation. The project was conducted in Bundu Tuhan Primary School which is located in the interior area of Ranau. Among the participants involved are primary students from Year One to Year Three classes as well as a group of 14 student teachers from the TESL programme of University Malaysia Sabah. Research data were collected by using quantitative instruments which included both pre and post-tests as well as survey questionnaire. Findings revealed significant differences in the mean scores in the students learning of vocabulary taught with digital materials; and the existence of relationship between the student teachers' perceptions on digital materials and how it improved the students' vocabulary learning. The final section of the paper proposes plausible recommendations to

improve future application and implementation of digital materials in local schools especially in rural schools.

Keywords: *digital materials; rural education; vocabulary learning*

INTRODUCTION

The 21st century marks the era when most youth are exposed to various technological devices and digital materials that transform text beyond its usual traditional form. Digital technologies are deemed as essential parts of one's daily lives, as these digital materials and tools are not only easily accessible, but are also interactive and can be manipulated to cater to the students' learning needs. Brand et al. (2012) stated that technology can help "facilitate the attainment of learning goals for individuals with wide differences in their abilities to see, hear, move, read, write, understand English, sustain attention, organize, engage and remember". Thus, it is important for teachers to maximize the full advantage of the features of ICT to provide education that nurtures the abilities for learners who will lead the 21st century.

However, the surge of new technologies also comes with the arrival of new literacies (Baron, 2010; Jacobs, 2010; Gainer & Lapp, 2010). These new literacies comprise innovative text formats (multiple media or hybrid texts; Lemke 1998), new reader expectations (reading nonlinearly; Warschauer, 2006), and new activities (website publication; Leu et al., 2004). In order to develop the advanced literacy levels required for success in school and beyond, improving students' vocabulary is an area of urgent need (Biancarosa & Snow, 2006; Graves & Watts-Taffe, 2008). Many researchers have identified that learning vocabulary requires children to be exposed to multiple exposures to word meanings (Beck & McKeown, 2001; Blachowicz & Fisher, 2000) before they are able to remember the words (Juel & Deffes, 2004). Under these premises, the present study attempts to maximize the *multimodality* and *adaptivity* features of digital materials, as well as integrating appropriate learning context to enable learners to learn vocabulary effectively.

The study was conducted to (1) throw further light on the process and outcomes of creating digital materials via the Ecology of Resources Model proposed by Luckin (2010) and (2) objectively investigate the student teachers' perceptions of their use of digital materials in enhancing vocabulary learning among rural primary students. Specifically, this paper seeks to answer the following research questions:

1. To what extent are the digital materials developed and used in the project effective in enhancing the rural primary students' vocabulary learning of English?
2. What are the student teachers' perceptions in using digital materials to enhance the rural primary students' vocabulary learning of English?

The Ecology of Resources Model of Context

Luckin (2010) defines context as:

“Dynamic and associated with connections between people, things, locations and events in a narrative that is driven by people’s intentionality and motivations. He further argues that technology can help to make these connections in an operational sense and people can help to make these connections have meaning for a learner.

Luckin further adds that a learner is not exposed to multiple contexts, but rather has a single context that is their lived experience of the world; a ‘phenomenological gestalt’ (Manovich, 2006) that reflects their interactions with multiple people, artifacts and environment. The partial descriptions of the world offered to a learner through these resources acts as the hooks for interactions; in which the action and meaning are built. In this sense, meaning is distributed amongst these resources. However, it is the manner in which the learner at the centre of their context internalizes their interactions that is the core activity of importance. These interactions are not predictable but are created by the people who interact, each of whom will have intentions about how these interactions should be.”

Luckin (2010, p. 18)

This definition recognizes the intricacy of the concept of context, though there are key points to take into considerations for our purpose in which context is about the way a learner is connected to the world, including other people and context is personal to the learner and not something to which they are serially exposed.

The Ecology of Resources Model is illustrated in Figure 1 below. It develops the Zone of Available Assistance (ZAA) and Zone of Proximal Adjustment (ZPA) concepts into a characterization of a learner along with the resources and relationships which form the learner's context. The resources that encompass a learner's ZAA include a wide range of categories; which include people, technologies, buildings, books and knowledge. One of the types of resources that a learner encounters is the knowledge and skills of the subject of their learning. The second category of resource is 'tools and people' which includes books, pens and paper, technology and other people who know more about the knowledge or skills to be learnt as to compare to what the learner knows. The final category of the resource is the 'environment' which includes the location and surrounding environment of the learner such as a school classroom, a park, a virtual world, or rather a place of work. This model provides a way to characterize a learner based on the resources and relationships that form the learner's context.

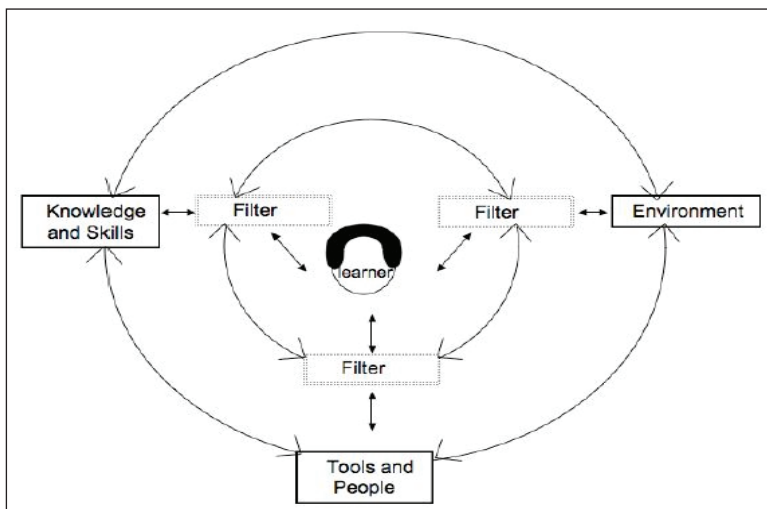


Figure 1: Ecology of Resources Model (Luckin, 2010)

The Ecology of Resources design framework is iterative and it comprises three phases, each of which includes several steps as follows:

1. Phase 1: Creating an Ecology of Resources Model in order to identify and organize the potential forms of assistance that is able to function as resources of learning. The phase is comprised of six steps as listed below:
 - a) Step 1 – to brainstorm potential resources to identify learners' ZAA
 - b) Step 2 – to specify the focus of attention
 - c) Step 3 – to categorize the resource elements
 - d) Step 4 – to identify the potential resource filters
 - e) Step 5 – to identify the learner's resources
 - f) Step 6 – to identify potential more able partners
2. Phase 2: Identifying the relationships within and between the resources produced in Phase 1. The extent to which these relationships meet a learner's needs and how they might be optimized with respect to the learner is also identified.
3. Phase 3: Developing the scaffolds and adjustments in order to facilitate the learning and enabling the negotiation of a ZPA for a learner. Phase 3 of the framework focuses on identifying the possible ways in which the relationships identified in Phase 2 might best be supported or to be scaffold. Hence, this support might be offered through the manner in which technology is introduced, used or designed.

Design and Implementation Phase of Digital Materials

The development of digital materials is guided by the three categories from the Ecology of Resources model namely 'knowledge and skills', 'tools and people' and 'environment'. This model recommends a way of illustrating a learner in the forms of interactions which take the learner's wider context into account. Various forms of assistance available are identified and understood in order to form the resource elements that the learner interacts with.

The Ecology of Resources framework includes a design process which categorizes the ways in which technology, people, and the learners themselves can best support learning. In this research, the learners' vocabulary learning is categorized as 'knowledge and skills', the digital materials used and the student teachers are the 'tools and people' respectively, while the rural primary school is classified as the 'environment'. A learner's interactions with the available resources are often filtered – hence, in this research, the vocabulary learning is filtered into ten selected vocabulary for each topic in each year respectively. The five topics included in the lesson are based on the English Language Curriculum for Primary Schools (KSSR). The tools and people available to the learners are filtered through a variety of features and functions of the digital materials implemented to support learning; and it also depended on how well the student teachers maximized the use of the digital materials in their lessons. Finally, the learner's access to the resources in 'environment' is also filtered by the school settings; which in this research, it was heavily influenced by the electricity supply and the familiarity of the content integrated in the digital materials to the learner's environment.

METHODOLOGY

The research aims to share the preliminary findings on the effectiveness of the digital materials developed in enhancing the students' vocabulary learning and to objectively investigate the student teachers' perceptions on digital materials. Among the web-authoring tools used in the research is to develop digital materials which included *PowToon*, *Prezi* and *VideoScribe*. In order to answer the research questions, two types of statistical tests are used, specifically, non-parametric Wilcoxon signed-rank test and Chi-square test.

Project Site

The site chosen for the research was Bundu Tuhan Primary School, located in the area of Ranau, Sabah which is approximately 100 kilometers away from the state capital, Kota Kinabalu. The school is selected due to its geographical isolation and the school's lack of exposure towards the use of digital materials in the teaching and learning processes.

Participants

A total of 44 students from Year 1, 2 and 3 were involved in the following research. They comprised twelve Year 1 students, nineteen Year 2 students and thirteen Year 3 students respectively. Majority of the students' native language is Kadazandusun and most of them have low level of proficiency in English.

In addition, 9 undergraduate student teachers from the TESL programme volunteered to participate in the research. All of them were undergraduates of the TESL programme in a public university. Nine of them were in their third-year of study, while three of them were in their fourth year of study. The nine third-year pre service teachers had limited knowledge in pedagogy, but had experienced teaching in a rural school as volunteer teachers. In this project, they were assigned to teach in groups of three. The three fourth-year pre service teachers had more experience teaching as volunteer teachers in rural schools. Thus, they were assigned to monitor the other pre service teachers.

Instruments

In the research, the data is analyzed by quantitative means. There were two types of research instruments used; namely achievement test for the students which included both pre-test and post-test which were implemented prior to the intervention of digital materials and after respectively. Survey questionnaires were also distributed for the student teachers in order to investigate on their perceptions towards the use of digital materials in enhancing vocabulary learning.

In the questionnaires distributed, a close-ended Likert-Scale format was used. There were five aspects included in the questionnaire; a) how digital materials help the student teachers in their works; b) how digital materials help the students in their vocabulary learning; c) how confident the student teachers in using digital materials to teach students; d) how the digital materials affect the student teachers' anxiety level and e) the student teachers' beliefs in the values of digital materials in teaching students.

The survey questionnaire was adapted from the research of '*Evaluating the Use of ICT in Education*', (Papanastasiou & Angeli, 2008). Adaptations

were made in terms of its wording where some of the wordings were changed to better reflect the research issues and a few categories were added to meet new needs. Harkness (2008) identified that the purpose of adaptation is to better fit the needs of a new population, location, language, or mode, or any combination of these. Papanastasiou and Angeli (2008) conducted the overall analysis to determine the construct validity of the constructs measured in the questionnaire which disclosed that the items were significantly correlated with each other.

FINDINGS AND DISCUSSIONS

To answer research question; “Are digital materials used in the project effective in enhancing the rural primary students’ vocabulary learning of English?” the null hypothesis would be accepted or rejected based on the sources of data derived from the students’ performance in their achievement tests. For research question; “What are the student teachers’ perceptions on the usage of digital materials in enhancing the rural primary students’ vocabulary learning of English?” the findings from the survey questionnaires of the student teachers are discussed. The examples of the digital materials developed from web-authoring tools used in the research are shown in Figure 2 below.



Figure 2: Examples of Digital Materials Developed

Findings of the Effectiveness of Digital Materials in Enhancing the Rural Primary Students' Vocabulary Learning in English

Table 1: Pre and Post-Test Results for Year 1 to Year 3 Students

Year / Level	Year 1		Year 2		Year 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
Poor	5	2	2	0	1	0
Moderate	5	0	11	2	4	0
Excellent	2	10	6	17	9	13

Based on Table 1, the results of the pre-test and post-test for Year 1 to Year 3 students showed that there were positive increments in their overall performance of vocabulary learning. The number of students who scored poorly in the test for each year decreased, with Year 1 showing great improvement from pre-test to post-test. Furthermore, the number of students who scored moderately also decreased in each year with Year 2 students demonstrating drastic improvement from pre-test to post-test. Majority of the students in each year displayed excellent performance in their post-test with Year 2 students once again showing the most significant improvement.

Table 2: Findings of Research Hypotheses

Hypotheses		Results
H_0	There is no significant difference in the mean scores in the students learning of vocabulary taught with digital materials.	Hypothesis is rejected.
H_a	There is a significant difference in the mean scores in the students learning of vocabulary taught with digital materials.	Hypothesis accepted.

Table 2 above shows that the null hypothesis of the research is rejected, while the alternative hypothesis is accepted. Based on the analysis of the Wilcoxon signed ranks test, Year 1 ($0.002 < .05$), Year 2 ($0.000 < .05$) and Year 3 ($0.001 < .05$); all three tests displayed significant differences in the output for the pre-test and post-test ($p < .05$) respectively. Hence, this can be concluded that the students demonstrated significant improvement in their vocabulary learning through the intervention of digital materials in their teaching and learning process.

Findings of the Student Teachers' Perceptions of Digital Materials in Enhancing the Rural Primary Students' Vocabulary Learning in English

Table 3: Findings of the Survey Questionnaires

No	Item	SD (%)	D (%)	N (%)	A (%)	SA (%)
a) How do digital materials help the student teachers in their work?						
1	Pedagogical skills			11	33	56
2	Technological skills			11	33	56
3	Presentation skills				22	78
4	Understanding of subject area of knowledge				33	67
b) How do student teachers think digital materials help the students in their language learning?						
5	Introduces the students to new language item/skills				67	33
6	Help the students to understand English			11	44	44
7	Promote in-class discussion		11	22	44	22
8	Facilitate collaborative activities in which students work together in a small group		11	22	56	11
9	Help the students to learn problem-solving and critical thinking skills	11		33	44	11
10	Construct the students' own understanding or experience in a content area			11	56	33
c) What is the student teachers' confidence level in using digital materials to teach students?						
11	I can select appropriate software to use in my teaching		11	11	33	44
12	I feel confident in using digital materials as computer will help students understand English better	11		33	33	22
13	I can use internet in my lessons to meet certain learning goals	11		11	44	33
14	I can design technology-enhanced learning activities for my students			22	33	44
15	I can use PowerPoint in my class				22	78

d) How do digital materials affect the student teachers' anxiety level?						
16	It scares me	11	56	11	11	11
17	It stresses me out	22	56	11	11	
18	If something goes wrong, I will not know what to do to fix it		67	22	11	
19	I do not feel comfortable with the idea of digital materials as a tool in teaching and learning	22	67		11	
20	It makes me skeptical	11	78		11	
e) What is the student teachers' belief about the values of digital materials in teaching students?						
21	It allows students to express their thinking in better ways			11	78	11
22	It helps students to understand English better			11	56	33
23	It helps teachers to teach in more effective ways				67	33
24	Whatever the computer can do, I can do equally well			67	22	11
25	The use of digital materials as learning tools excites me			22	44	33
26	It is not conducive to student learning because it is not easy to use		78	22		
27	The computer is not conducive to good teaching because it creates technical problems	11	44	44		
f) How effective is the integration of ICT in education?						
28	Students can enhance their learning skills			22	56	22
29	IT provides vast knowledge to students through Internet				67	33
30	The use of digital projectors helps the students for better learning				56	44
31	ICT can be used to enhance the education efficiency at the local, regional and national level				67	33

* SD Strongly Disagree
D Disagree
N Neutral
A Agree
SA Strongly Agree

Table 3 above summarizes each of the questionnaire items in their sections respectively. Based on the findings, majority of the student teachers chose agree or strongly agree for positive statements; and they also disagreed for majority of the negative statements. However, some of the student teachers were neutral on a few statements. For example, a majority 67% of them (n=6) felt neutral on the statement ‘whatever the computer can do, I can do equally well’. The findings also demonstrated that majority of the student teachers agreed that the integration of ICT in education is indeed effective. For example, 67% of the student teachers (n=6) and 33% of them (n=3) agreed and strongly agreed that ICT can be used to enhance the education efficiency at the local, regional and national levels.

Based on the chi-square test performed, only 2 items (Q20 & Q21) out of the 27 items from the questionnaire are proved to be significant as the result of the analysis shows ($\chi^2 < .05$). Hence, the results demonstrated that a) there is a significant relationship between the student teachers’ skepticism on digital materials on how they affect their anxiety level; and b) there is a significant relationship between the values of digital materials in teaching and how the student teachers believe that digital materials allow the students to express their thinking better.

CONCLUSION

The research was conducted to primarily determine the effectiveness of digital materials used in the project in enhancing the rural primary students’ vocabulary learning of English and secondarily to investigate the student teachers’ perceptions on digital materials. The findings showed two significant points which are related to the Luckin’s Ecology of Resources model. The first point lies on how technology-rich learning experiences of digital materials that take learners’ wider context into account assisted in building learners’ understanding of the vocabulary. The digital materials are effective as they help to assist learners in associating new knowledge with their previous knowledge in L1. The usage of real pictures that relate to the learners’ daily lives also proved to be helpful in enhancing their vocabulary learning. Secondly, majority of the student teachers agreed that the intervention of digital materials does not only help to improve the students’ vocabulary learning but it also helps to enhance their skills as

English teachers. The student teachers stated that the diverse features of the digital materials helped in stimulating the learners' senses which ultimately led to increasing the students' motivation to learn.

In addition, the findings also showed two areas of concern which are bound to be insightful for future implementation of digital materials in rural schools. The first concern is the digital materials' high dependence on the supply of electricity. The frequent blackouts in the area of Ranau had caused interruption in lessons as LCD projector could not be used. Hence, the student teachers had to initiate on backup plans such as using handmade flash cards to introduce vocabulary to students. Secondly is the developers' basic skill in building the digital materials from web-authoring tools, which caused the features of the materials used are limited to certain extent. Thus, it is suggested that for future purposes, the main aim is to improve the digital materials' interactivity such as including moving graphics, providing virtual exercises and advanced games for the learners.

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