



การพัฒนาสื่ออินโฟกราฟิกเพื่อเสริมสร้างความเข้าใจในการอ่านของผู้เรียนรุ่นเยาว์ ที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ

Development of Infographic Materials to Enhance Young English as Foreign Language Learners' Reading Comprehension

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อ 1) พัฒนาสื่ออินโฟกราฟิกเพื่อสร้างความเข้าใจในการอ่านของผู้เรียนรุ่นเยาว์ที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ 2) ทดสอบคุณภาพประสิทธิภาพของสื่ออินโฟกราฟิกในการช่วยสร้างความเข้าใจในการอ่านบทความสารคดีของผู้เรียนรุ่นเยาว์ที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ กลุ่มตัวอย่างในงานวิจัยประกอบด้วย นักเรียนชั้น Year 4 จำนวน 20 คน และครูต่างชาติจำนวน 5 คน จากโครงการหลักสูตรนานาชาติ โรงเรียนสาธิตแห่งหนึ่งในประเทศไทย เครื่องมือที่ใช้ในการทดลองได้แก่ การสัมภาษณ์ผู้สอน แบบสอบถามความต้องการของนักเรียน แบบทดสอบวัดความเข้าใจในการอ่านภาษาอังกฤษ การสัมภาษณ์นักเรียน และแบบประเมินผลสำหรับผู้สอน ข้อมูลเชิงคุณภาพใช้การวิเคราะห์เนื้อหา ข้อมูลเชิงปริมาณใช้ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และสถิตินอนพารามิตริก Wilcoxon Sign-Rank test ผลการวิจัยพบว่าสื่ออินโฟกราฟิกสามารถพัฒนาตามกรอบแนวคิดการพัฒนาสื่อของ Tomlinson (2011) ผ่านกับการพัฒนาสื่ออินโฟกราฟิกของ Krauss (2012) และ การสอนอ่านแบบ close reading ของ Sisson and Sisson (2014) โดยพบประสิทธิภาพ ดังนี้ 1) ผลเฉลี่ยคะแนนการสอบวัดความเข้าใจในการอ่านหลังการเรียนของผู้เรียนสูงกว่าก่อนเรียนอย่างมีนัยสำคัญทางสถิติที่ระดับ .05 2) ผลของการสัมภาษณ์และผลของแบบประเมินผลแสดงให้เห็นถึงความพึงพอใจของนักเรียน และครุผู้สอนที่มีต่อการใช้สื่ออินโฟกราฟิกในการเรียนการสอนวิชาการอ่าน

คำสำคัญ : สื่ออินโฟกราฟิก, ความเข้าใจในการอ่าน, ผู้เรียนรุ่นเยาว์ที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ

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Abstract

The objectives of this study were to: 1) develop infographic materials to help teach young English as foreign language learners' reading comprehension skills and 2) examine how effective the developed materials were in increasing young English as foreign language learners' reading comprehension skills focusing upon non-fiction text. The participants included 20 year-four students and five foreign teachers who were purposefully selected from an international programme in one of demonstration school in Thailand. The instruments used were: 1) semi-structured interviews for teachers, 2) need analysis questionnaires for students, 3) English reading comprehension tests, 4) semi-structured interviews for students, and 5) material evaluation forms for teachers. The qualitative data was analysed through content analysis. The quantitative data was analysed by statistics using percentage, mean, standard deviation and Wilcoxon signed rank test.

Using Tomlinson's material development framework (2011) Krauss's process of creating infographic (2012) and Sisson and Sisson's close reading instruction (2014) the infographics were developed. The results of the comprehensions tests demonstrated that 1) The students posttest mean scores of the English reading comprehension tests improved at the significant level of 0.5 2) The results from students' semi-interview and teachers' material evaluation showed the satisfaction of both students and teachers toward the implementation of the developed infographic materials.

Keywords: infographic material, reading comprehension, young English as foreign language learner

Introduction

Reading is a fundamental skill and is the ability to draw meaning from the printed page and interpret information appropriately. It is a crucial step to develop learners' comprehension because it is the ultimate goal of reading (Grabe & Stoller, 2019). For teaching young EFL learners the goal of reading, teachers must consider the reading processes (Nunan, 2003) that involve inferential processes to develop their fundamental knowledge for developing the levels of comprehension (Van Den Broek et al., 2005). Also, teachers need to use effective teaching methods and tools to aid students (Peregoy & Boyle, 2000). Employing texts that are plain and unattractive in reading lessons is ineffective for reading non-fiction texts which mostly contain multisyllabic, rare, and technical words. Some students could not interpret, imagine, think or link information from the text (Grabe, 2009) which reduced their understanding and led to students facing difficulties when reading (Sweet & Snow, 2003). For young EFL learners in an international school in Thailand, there is also the added pressure of

reading reaching the expected level of inference as explained in the British National Curriculum that is followed in the school (Education, 2013). Current methods for teaching reading and insufficient effective reading materials are the problem.

One effective strategy that improves reading is the use of visual and concrete resources an example of this would be pictorial representation (Duke et al., 2009). Barry (1997) found young learners' visual comprehension develops earlier than verbal comprehension. Learner's cognition grows directly related to building reading comprehension. Students would be effectively stimulated by an emphasis between verbal and visual experiences (Paivio & Clark, 2006). Currently, the increasing in imagery means that visual literacy is crucial for obtaining information, constructing knowledge, and building successful educational outcomes (Bamford, 2003). As well as communicating meaning with visual text, aiding learner's ability to understand and express the meaning of the graphic. Infographics are a resource that can be used to clarify meaning, organise ideas, make more challenging and abstract ideas simple and show extra information in a clear way (Duke et al., 2009). From the concept, it is crucial to develop instructional reading materials that help enhance young EFL reading comprehension skills. The developed materials would instruct the cognitive learning levels (Anderson & Bloom, 2001) with the levels of comprehension refers to the effective close reading teaching instruction that builds the students' understanding step by step. This effectively improves the engagement of students when analysing complex texts. Students are offered opportunities to discuss and decipher meaning. This process develops the level of understanding (Fisher & Frey, 2012). Together with the Dual-coding theory (Paivio & Clark, 2006), This develops students' comprehension through the use of verbal and non-verbal processing. The balance emphasising of both elements would be beneficial to the young learners.

Thus, in this research, the researcher aimed to create the infographic as a reading material for the Year 4 students using integration of Tomlinson (2011) material development framework, the process of creating infographic of Krauss (2012) and close reading instruction of Sisson and Sisson (2014).

Research objectives

This study aimed: 1) to develop infographic material to help teach young English as foreign language learners' reading comprehension skills and 2) to examine how the

effectiveness of the developed materials helped increase young English as foreign language learners' reading comprehension of non-fiction texts.

Research participants

The research participants consisted of 20 Thai Year 4 students from two classes and 5 British teachers including a Key Stage 2 leader, a head of literacy, 2 Year 4 teachers and a support teacher who were purposefully selected from one international programmes of a demonstration school in Thailand.

Research methodology

The research process consisted of six stages from Tomlinson's material development framework which were divided into two phases. The first phase was material development which encompassed stage one to stage five. The second phase was material implementation and evaluation focussed on stage six as shown in Table 1.

Table 1

Research procedures

Phase 1: The development of infographic materials	
Stage1: Identification of needs	1.1 Design the interview questions for teachers
	1.2 Validate the interview questions for teachers by three experts
	1.3 Interview five teachers using the interview questions
	1.4 Design the needs analysis questionnaire for students
	1.5 Validate the needs analysis questionnaire for students by three experts
	1.6 Administer the needs analysis questionnaire with 20 year 4 students
Stage 2: Exploration of the needs	2.1 Review literature and theories about material developing
	2.2 Conduct a document study
Stage 3: Contextual realisation	3.1 Identify the unit of learning from IPC (contents and texts)
Stage 4: Pedagogical realisation	4.1 Determine, design, and draft infographics
	4.2 Design the exercises and activities
	4.3 Write four units lesson plans and create worksheets
Stage 5: Material Production	5.1 Physically design and model the infographic materials
	5.2 Validate developed infographic materials by the three experts

Table 1 (Cont.)*Research procedures*

Phase 2: The evaluation of the effectiveness of the developed infographic materials	
Stage 6: Evaluation of the effectiveness of the developed material	6.1 Before implementing <ul style="list-style-type: none"> 6.1.1 Design four units English reading comprehension tests 6.1.2 Validate English reading comprehension tests by three experts 6.1.3 Data collection and data analysis of the English reading comprehension tests 6.1.4 Design students' interview questions 6.1.5 Design the material evaluation form for teachers 6.1.6 Validate interview questions and material evaluation form by three experts 6.1.7 Data collection and data analysis of the interview questions 6.1.8 Data collection and data analysis of the material evaluation form 6.1.9 Conduct teachers' training 6.1.10 Conduct pilot study with 10 year 3 students (High ability group)
	6.2 While implementing <ul style="list-style-type: none"> 6.2.1 Administer Pre-test 6.2.2 Implement the developed infographic materials; 4 units of learning 6.2.3 Administer Post-test
	6.3 After implementing <ul style="list-style-type: none"> 6.3.1 Interview students 6.3.2 Administer material evaluation form with five teachers 6.3.3 Writing up the result

*Research instruments***1. The interview questions for teachers**

The questions for teachers were designed to obtain information on the development of suitable infographic materials. The prearranged open-ended questions were used in the semi-structured interview with the purposefully selected teachers. The focus was on the needs from the teachers' perspective, problems and the obstacles in teaching reading that need to be solved by the creation of the material. The interview questions were verified by three experts in the field of language teaching and material development using the evaluation form Items-Objective Congruence (IOC). The result from IOC was 1.00.

2. The needs analysis questionnaire for students

The purpose of the questionnaire was to investigate students' needs, preferences, and obstacles that affect their reading comprehension skills. The questionnaire was designed

as a survey divided into three parts including five tick boxes about problems in reading non-fiction texts, four tick boxes of students' reading preferences, and ten multi-choice options focusing on reading material. The validity of the questionnaire content was evaluated by the three experts. The result of the IOC index was at 0.86.

3. The English reading comprehension test

The content of the reading comprehension tests was focused around four non-fiction texts. The comprehension tests consisted of a matching or arranging tasks with inference text-dependent questions. The purpose was to assess students' literal and inferential comprehension before and after the implementation of the developed material in reading lesson. All the test items were validated by the three experts with the result of 0.83 and minor adjustment. After the revising the test, pilot study was implemented with a small group.

4. The interview questions for students

The interview questions for students were developed to investigate and explore students' opinions and feedback after the implementation of the developed materials. All the interview questions were validated by the three experts and were accepted with the experts' opinion at 0.86 with suggestions about word choices.

5. The material evaluation form for teachers

The material evaluation form was designed to evaluate the quality of the developed materials based on Masuhara and Tomlinson (2008) in the form of questionnaire which the respondents were asked to rate the level of satisfaction on the scales from four (strongly agree) to one (strongly disagree) with ten items. The three experts validated the material evaluation form with the IOC index at 0.83.

Data analysis

In phase one of this study, to find the needs for the material development, content analysis was used to analyse the interview data from teachers' semi-structured interview and percentage was used to analyse the collected data from the needs analysis questionnaire for students. In phase two, to find the effectiveness of the developed infographic material Wilcoxon signed rank test was applied to calculate the difference in the students' reading comprehension ability. Content analysis was used to analyse the interview data from students' semi-structured interview. Additionally, the results from the teachers' material evaluation form were analysed using mean and standard deviation.

Results

Result of research question 1

To answer this research question, the six stages of framework of material developments of Tomlinson (2011) were integrated with the process of creating infographic of Krauss (2012) and close reading instruction of Sisson and Sisson (2014) as follows.

Stage 1: Identification of needs of materials or problems to be solved by the creation of the materials.

From the results of the data analysis of both teachers and students' needs, a common theme arose. Both teachers and students highlighted the lack of effective materials and preferred the pictorial representations of non-fiction texts that presented the information and enabled the comprehension. Moreover, lack of specific teaching reading steps, time consuming, and age-inappropriate text were mentioned.

Stage 2: Exploration of the needs or problems by identifying language, functions, skills that should be included in the developed materials.

After exploring the needs, the researcher explored and studied the effective way of teaching reading to young EFL learners. The researcher found the Dual-coding theories which highlighted a focus on the visual element (Paivio & Clark, 2006), which could respond back to the needs by the development an infographic (Krauss, 2012) as a reading material to be used with an effective close reading instruction (Sisson & Sisson, 2014) that would develop and help scaffold reading comprehension skills to reach the expected level. The material development process followed the paths of Tomlinson (2011) materials developments framework.

Stage 3: Contextual realization by examining and selecting texts that provide familiarity and appropriateness to the learners' context.

To ensure appropriate material contents, the researcher met with the Key Stage leader, the head of literacy and two Year 4 teachers. They considered the non-fiction texts from IPC units. The selections of texts were based on three criteria: 1) content of the non-fiction text, 2) the complexity of the text, and 3) the readability of the text. After the consideration, four non-fiction texts from the four units of learning were selected to use for the material development as shown in Table 2.

Table 2*The selected texts for unit of learning*

Unit of learning	Text	Content	Complexity	Readability of the text	Necessary material
Active planet	Natural Disaster	Appropriate	Appropriate	71.2 (Fairly easy to read)	Needed
Land, sea, and sky	Clouds	Appropriate	Appropriate	68.8 (Standard)	Needed
Footprint from the past	Fossils	Appropriate	Appropriate	67.2 (Standard)	Needed
Living together	Skeleton	Appropriate	Appropriate	72.6 (Fairly easy to read)	Needed

Stage 4: Pedagogical realization by examining and selecting meaningful exercise and activities with clear explanations

4.1 The creation of four infographic

From the selected non-fiction texts, the infographic production was implemented by the researcher as shown in Table 3.

Table 3*The summary of infographic production*

The process of creating infographic	Applied step
Step 1	1) Analysed the text 2) Listed main ideas and information of the text
Get an idea	3) Analysed and classified the information of the text 4) Considered key vocabulary to be included
Step 2	1) Sketched and decided the layout of the infographic
Sketch it out	2) Organised the position of the elements of the infographic
Step 3 Collect data	1) Researched and created the component of infographic
Step 4 Develop proof of concept	1) Checked the correctness and appropriateness of the information 2) Sought advice from the experts
Step 5 Lay it out	1) Created the infographic using Adobe Photoshop, Adobe Illustrator and Savage Interactive Procreate software

4.2 Designing the worksheet

The worksheet was the tool that was designed for the student to use during the reading lesson. It allowed the students to follow each step of close reading instruction. The worksheet was developed following the cycles of close reading of Sisson and Sisson (2014) divided into three parts; (1) annotation, (2) reading cycles, and (3) summary.

4.3 Writing the lesson plan

The lesson plan followed the steps of close reading instruction Sisson and Sisson (2014) divided into five steps which were: 1) warm up, 2) first read; comprehend text with evidence on a surface level, 3) second read; analyse the text, 4) third read; get a deeper understanding of the text and 5) production. The researcher added ‘Link to the infographic’ point where the students needed to refer from text to the infographic. This demonstrated the use of both verbal and non-verbal processing, helped students develop their cognition and their comprehension (Paivio & Clark, 2006; Paivio & Desrochers, 1979)

Stage 5: Material production concerning the physical and academic aspects

The information from the previous stages including the results from the needs analysis used to develop infographic materials. They were created using Adobe Photoshop, Adobe Illustrator and Procreate software. The developed infographic materials included infographics, worksheets, and lesson plans all of which were complied into a teachers’ manual.

Once developed, the materials were assessed and validated by the three experts in the field of language teaching and material development using Item-Objective Congruence (IOC) index. The developed infographic material received IOC index at 0.89. Then, the researcher pilot tested on ten year-three high ability students. Finally, the developed infographic materials came to the final version which was ready for the implementation within year-four reading lesson.

Stage 6: Evaluation of the effectiveness of the developed infographic materials.

Before the implementation, five English teachers involved in teaching reading lessons to year 4 students were trained on how to teach reading using the developed infographic materials and close reading teaching instruction. The interview questions for students and the material evaluation form for teachers were also developed within this stage.

The results of the developed material implementation and the effectiveness of the developed infographic materials are presented in the following research question.

Result of research question 2

To answer this research question, English reading comprehension tests, the interview questions for the students and the material evaluation forms for English teachers were constructed and completed after the implementation of the infographic materials.

1. The result of the English reading comprehension test

Wilcoxon signed rank test was applied to analyse and identify the pretest and posttest scores of the test. Table 4 presents the descriptive statistics of the test score of the four units.

Table 4

A comparison of pretest and posttest scores of the English reading comprehension tests by Wilcoxon Signed Ranks Test (20 students)

	Unit	n	M	Min	Max	SD	MD	Z	Asymp. Sig. (2-tailed)
1	Pretest	12	4	2	7	1.59	6.2	-3.95	< .001**
	Posttest		10.2	7	12	1.77			
2	Pretest	12	3.4	2	6	0.99	5.8	-3.95	< .001**
	Posttest		9.2	5	12	2.09			
3	Pretest	8	2.9	1	7	1.94	3.8	-3.94	< .001**
	Posttest		6.75	5	8	1.37			
4	Pretest	12	3.4	2	6	0.99	7.1	-3.93	< .001**
	Posttest		10.5	7	12	2.04			

* $p < .05$, n = maximum score of the test in each unit

According to Table 4, the results indicate that the test scores after the implementation of the developed infographic material were clearly higher than before the implementation. The results show the Unit 1 mean score of posttest, 10.2 ($SD = 1.77$), is higher than the pretest, 4 ($SD = 1.59$), Unit 2 mean score of posttest, 9.2 ($SD = 2.09$), is higher than the pretest, 3.4 ($SD = 0.99$), Unit 3 mean score of posttest, 6.75 ($SD = 1.37$), is higher than the pretest, 2.9 ($SD = 1.94$) and Unit 4 mean score of posttest, 10.5 ($SD = 2.04$), is higher than the pretest, 3.4 ($SD = 0.99$). The mean differences were 6.2, 5.8, 3.8 and 7.1 respectively. It can be seen there were significant differences between pretest and posttest mean scores at a significant level ($p < .05$). This demonstrates that students' comprehension improved after experiencing the developed infographic materials.

2. The result of students' interview questions

From the content analysis of the students' interview data emerged the two main topics with the sub detail included.

A. Elements affecting improvement of students' English reading comprehension skills

Four elements that affect comprehensions skills were revealed from the data analysis of the students' interview. The first and the second elements were the picture with word representing information and the presentation of the information which could be interpreted that was the 'infographic' used in the lesson. The students mentioned that:

"... Hard words in texts are always hard for me to know the meaning. But infographic helps me to understand it quicker. The pictures in the infographic were very clear to know the meaning." (Student interview transcript 10, personal communication, April 16, 2021)

"... The infographics is good because there are many pictures that I can understand. It helps me a lot so I can answer the questions that the teacher asked." (Student interview transcript 03, personal communication, April 16, 2021)

Therefore, it can be concluded that infographics which were developed according to Paivio's dual-coding theory had a positive effect on the young EFL learners' reading comprehension skills.

The third and the fourth elements mentioned by the students were 'questioning' and 'reading cycle'. Both aspects formed parts of the close reading instruction which the developed infographic materials were designed accordingly. The students explained that:

"... Because we read many times, and we have the infographic to show what is what so I can answer the questions even [though] questions get harder and harder every time the teacher asks." (Student interview transcript 08, personal communication, April 16, 2021)

"In one text, we read three times, but it is not boring because the teachers asked different questions each time. It is challenging. I can think the answer out of the text by myself too." (Student interview transcript 18, personal communication, April 18, 2021)

Students' answers showed that the question and reading cycle in the reading lesson prompted thinking and challenged them. With the reading cycle, the students must read before answering text-dependent questions. This initiated their thought process, developed their cognition, scaffolded, and enhanced their comprehension.

As the result, it can be seen that the developed infographic materials were effective in enhancing young English as foreign language learners' comprehension skills.

B. The advantage of the developed infographic material from students' opinion

The result indicated that the developed materials improved students' attitudes, built communicative classroom, increased students' self-confidence, and saved time.

3. The result of the material evaluation form for teachers

After the implementation, five teachers who were involved in teaching reading were asked to evaluate the effectiveness of the developed materials. The mean score, standard deviation and interpretation of teachers are shown in Table 5 below.

Table 5

The statistical results of teachers' material evaluation form

No.	Criteria for evaluating the developed infographic materials	M	SD	Interpretation
1.	Through the materials, my students' reading comprehension of non-fiction text has satisfactorily improved.	3.80	0.44	strongly agree
2	The developed infographic materials help my students connect new knowledge of the unit of learning with IPC subject.	4.00	0.00	strongly agree
3	The developed infographic materials cause my students to be motivated to read non-fiction texts.	4.00	0.00	strongly agree
4	The developed infographic materials are beneficial to be implemented in close reading teaching instruction.	3.80	0.44	strongly agree
5	The developed materials can represent the non-fiction text well and help students understand and engage more with the text.	3.80	0.44	strongly agree
6	When my students come across with an unfamiliar word, they can find or guess its meaning using infographic.	4.00	0.00	strongly agree
7	The developed materials are suitable and beneficial to be used as a reading material within all steps of close reading instruction.	3.60	0.54	strongly agree
8	The developed infographic materials help my students to comprehend the non-fiction text to the level of literal and inferential comprehension.	3.60	0.54	strongly agree
9	The developed infographic materials are concordantly use with close reading instruction to teach reading lesson.	4.00	0.00	strongly agree
10.	I am satisfied to use developed infographic materials as a reading material to teach reading non-fiction text.	4.00	0.00	strongly agree
Total		3.86	0.13	strongly agree

According to Table 5, the teachers' opinions towards the developed infographic materials show the teachers strongly agreed or were very satisfied ($M = 3.86$, $SD = 0.13$).

Accordingly, it can be concluded that the teachers had positive opinions of the implementation of the developed infographic material and were satisfied with the quality of the developed infographic material.

In conclusion, the integration of Tomlinson (2011) material development framework, the process of creating infographic of Krauss (2012) and close reading instruction of Sisson and Sisson (2014) could effectively produce the infographic materials for teaching non-fiction text for young English as foreign language learners. Also, the results of the English reading comprehension test, the students' interview and the teachers' material evaluation form showed the effectiveness of the developed infographic materials.

Discussion

According to the result referring to the material production process, Tomlinson's (2011) framework provides a systematic method that helps individuals design and implement meaningful and effective instructional materials. However, the framework alone is insufficient when aiming to produce more specific infographic material that relate to learning English as a foreign language. It therefore requires that the process of creating an infographic by Krauss (2012) and the use of close reading instruction by Sisson and Sisson (2014) are integrated into the process. These theories and frameworks contribute positively when creating specific instructional infographic materials; specifically focused on the teaching of reading.

The results of this study clearly indicate infographics are an effective instructional material to enhance comprehension. Most students mentioned that pictures in the infographic help them understand the meaning of the words (López Cupita & Puerta Franco, 2019). Additionally, infographic presents information that helps students comprehend the whole message of the text. Thus, infographics help students effectively improve their reading comprehension (Kongwat & Sukavatee, 2019) Moreover, the result showed the implementing close reading instruction supported the use of infographics when teaching EFL learners' how to improve their reading comprehension. The students were able to answer text-dependent questions that required inference meaning that their reading comprehension skill had improved. Most of students mentioned that the questions and reading cycles of close reading instruction helped scaffold their understanding (Fisher & Frey, 2012). Comparatively, using text in compared to infographics with close reading of complex text could enhance students' comprehension (Wertz & Saine, 2014).

It can be concluded that the infographic materials developed based on the integration of Tomlinson's (2011) material development framework, the process of creating an infographic by Krauss (2012) and close reading instruction by Sisson and Sisson (2014) were able to enhance the reading comprehension skill of young EFL learners.

Recommendation for future research

With the power of technology and the increase in assistive technology in education, future research should study the development of an interactive infographic to enhance young students' comprehension. An interactive infographic would provide stimulus to most of the senses including vision, hearing, and touch. This interactive gateway would offer even more benefit to the students and perhaps enhance students' other abilities and skills.

Also, apart from creating an infographic as an instructional reading material with close reading instruction, infographics could be used as a tool for summarising the students' understanding of the text by having students create infographics of the information they read. This promotes expression of concept using verbal and non-verbal elements.

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