Kit-Build Concept Map with source connection to support Reading Comprehension in English as Foreign Language

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Abstract: *Kit-Build Concept Map with source connection in Reading Comprehension for EFL aim to confirm learners' understanding and fix their misunderstanding by making a connection between proposition and text*
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Introduction

In the modern era, reading is viewed as an active process where readers are making a selection from a range of cues, emanating it from the text and in the situational context they need to construct a model of meaning that represents, to some degree, the meaning intended by the writer. The situation will become harder when it was dealing with readers that are not using English as their first language, Stanley [1] said that one of the major problems for the second language (L2) readers is that they may view the reading material as samples of language rather than information. L2 reader may have an inadequate or inappropriate orientation with the content and the structure of the text [2].

Some researcher in Language learning suggested that to be successful in Reading Comprehension; a graphical display must be somehow reconstructed by the reader as a meaningful language [3, 4]. Other researchers also suggested that teachers should spontaneously create an instructional scaffolding-cueing, prompting, analogies, metaphors, questioning, elaborations, and remodeling that can provide or give access to the students with the necessary information that will help them to restructure their understandings [5].

Many researchers used Concept mapping as the strategies to support reading comprehension, and it's proven to be an effective way and give a good effect on reading comprehension of EFL learners [6, 7]. Concept mapping can act as a visual representation of knowledge that can be employed as a learning strategy by learners so they can find the relationship between their knowledge and new information [8]. Many researchers also confirmed that EFL learners who used concept mapping as a learning strategy gain high understanding in reading comprehension [9, 10, 8]. Also, many studies have proved that the concept mapping can improve the learners' reading comprehension because they could understand the reading material easily by the visualization of the concept map [10, 8, 11].

Kit-build concept mapping (KB-Map) method [12, 13], a kind of concept mapping method, is proven to have the same efficiency compared to the original concept mapping method

when used for comprehending information in a comprehension test right after the reading process. But in advance, it has a better efficiency when dealing with recalling the comprehended information when conducting a delayed comprehension test [14].

In a classroom situation, the reading process can become more complex; one of the complexities is a misunderstanding. It could happen in any teaching situation even when the graphical strategies were used. It can lead them to understand different information intended by the author or the teacher, especially for L2 Reading comprehension, which requires more effort compared with the L1.

To minimize this issue, we are providing a function in graphical strategies called source-connection to facilitate learners to make confirmation of their understanding directly with the reading material. We are formulating a research question as a guide for this study as follow: "Can the source-connection function in KB-Map help learners to have a better immediate and delay test score compare to the traditional summarization group and the usual kit-build group?"

Kit-Build Concept map

Kit-build Concept Map is a kind of concept map that is using a closed-end approach, unlike the concept map that is using an open-end approach.

Novak defined a tool called concept map. The defined definition is: Concept maps are graphical tools used for organizing and representing knowledge. There are two main parts to the concept map. The first part is the concepts that shaped like a circle or boxes of some type, and the other parts are the connecting line that consists of words that are connecting between two concepts. That word on the line describes the relationship between them and referred to as linking word or linking phrase. It specifies the relationship between two concepts [11].

There are three main phases in KB-Map, the first phase is goal map building or expert map building, the second phase is learner's map building, and the third phase is the analyzer. The first phase is the phase for teacher or expert to create an initial map called goal map by extracting the information consist of the reading material into a concept map. The system then will be dissembling this goal map into parts consist of unrelated concepts and links called kits. At the second phase called learner's map building, the system will provide learners with the kits and asked them to re-construct the kits into a new map called learner's map. During the re-construction process, learners cannot create a new concept and the link they only have to re-construct the provided concepts and links. The third phase, called KB analyzer. This phase is used by the teacher or expert to analyze the learner's map by comparing them with the initial map or goal map.

Figure 1 illustrates as an example of a goal map. The Teachers or expert is creating goal maps as a representation of the structure of reading material according to their intention of what learners should learn. Figure 2 illustrates as an example of parts that are called *kit*. As described before that in general concept map building, learners are required to extract the part from the reading material by them self, but in KB-Map building they only have to recognize the parts and reconstruct it.
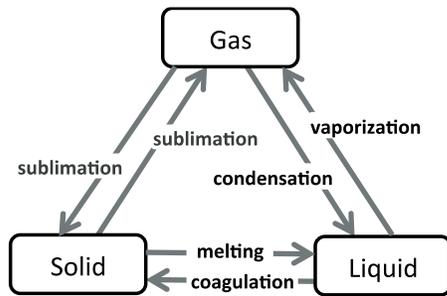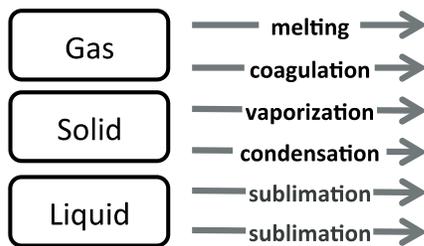
Figure 1 an example of goal map

Figure 2 an example of a kit

In this research, we are using an English reading material and makes a Goal Map from it. Instructor or teacher should understand the main idea of the content and then he/ she should choose or use the words from the content or creating a new word that has the same meaning or purpose with the sentence. For example:

"Any substance may exist as solid, liquid, or gas. If a solid is heated, it will melt to become a liquid. This is called melting. If the liquid is then cooled, it will freeze to become a solid again. This is called freezing. Similarly, if a liquid is heated it will boil to become a gas. This is called boiling……"

From the reading material, instructor or teacher construct a Goal map and separate it into Kits as shown in Figure 1

Map Score

KB-Map has an automate map assessment tools by using an exact matching method at the proposition level by comparing between the learner's map with the teacher's map. In the form of learning a task or exercise, it is used for checking learner's comprehension of the topic that they've already learned [15]. It will evaluate for every proposition that learners made and comparing them with the teacher propositions. The score of the proposition will depend on the number of the proposition of the teachers' map. If the teachers' map consists of four propositions, then each proposition score would be 25 or 100 divides by four which is 25 and so on.

When learner creating a proposition, which does not consist in teacher proposition, then we could say that the student has a different understanding or misunderstanding of a subject. But when learners failed to make a proposition of a subject, then we could say that learners don't understand about the current subject represent by the proposition.

Source-connection in Kit-Build

Source connection function was added into KB-Map to improve the process of learning during map construction. This function aims to facilitate learners to make confirmation of their understanding in the form of learners' map with the reading material. It is prompting learners to confirm each proposition by making a connection between a proposition and a specific sentence of the reading material. After the connection was made, the color of the proposition will be changed into black, and the selected text will also change into the red (Figure 3).
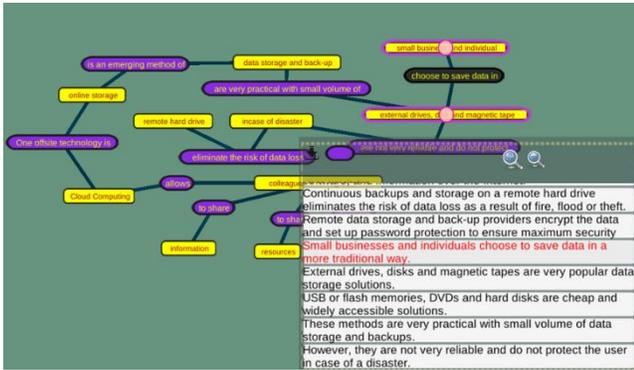
Figure 3 an example source-connection function

Experiment Setting and Method
Procedure

This experiment is involving two hundred and thirty-two undergraduate students from State Polytechnic of Malang, Indonesia who learn English as a foreign language. Before the experiment, we were conducting an English Comprehension test to divide each group equally, as shown in table 1. We conduct three sessions by using three different reading material. Each session has several activities to complete see figure 4.
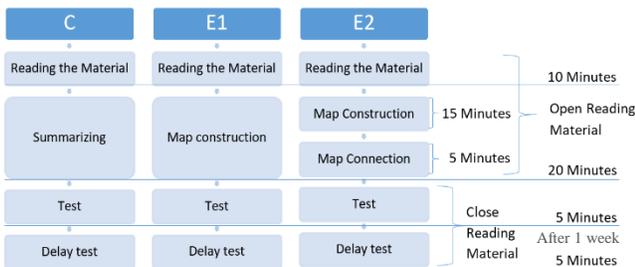

Figure 4. Activities session for each group

Table 1. Mean pre-Reading Comprehension test

Group	N	M	F	Mean	SD
Summarizing method (C)	78	58	20	30.1667	11.6423
Kit-Build (E1)	77	44	33	30.5325	8.5480
Kit-Build with Source-connection (E2)	77	48	29	30.0390	10.6418

Material

Based on the Reading score information, we are choosing to use three intermediate English reading material taken from *English for Information Technology book by* Olejniczak, and the other was from the Indonesian University English teacher's handbook. That material was being graded by using the Flesch Grade Level formula to make sure that they are suitable to be used in this experiment. The result is shown in table 2

Table 2. The Flesch Grade Level result of the reading material

Reading Material	Grade Level	Reading Level
Data Storage (M1)	10	fairly difficult to read
Channel of Communication (M2)	11	difficult to read
Banana (M3)	12	difficult to read

Experimental Result and Discussion

The students are divided into three groups, Control group using summarization method (C), Experimental group 1 (E1) using the usual kit-build and Experimental group 2 (E2) using kit-build with source-connection function. We are using the immediate and delay reading comprehension test score to represent their understanding.

The test result of the first session by using M1 graphically shows that E2 got the highest score among all group for both immediate and delay tests (see Figure 5), but to support it statistically, further analysis was conducted by using Holm's Sequentially Rejective Bonferroni Procedure and it shows that E2 score result was higher among all groups followed by E1 in second and C as the lowest (see table 3 and 4).

Figure 5. Mean score of all groups in both test for M1

Table 3. Mean of combined test score in M1

Group	n	Mean	S.D.
C	156	6.3654	2.1010
E1	154	7.5909	1.4802
E2	154	6.9156	1.6207

Table 4. Holm's Sequentially Rejective Bonferroni Procedure result for M1

Pair	Diff	t-value	df	p	Adj.p	
C – E2	-1.2255	4.9591	229	0.0000	0.0000	C < E2 *
E2 – E1	0.6753	2.7240	229	0.0069	0.0139	E2 > E1 *
C – E1	-0.5502	2.2264	229	0.0270	0.0270	C < E1 *

The test result of the second session by using M2 graphically shows that E2 also got the highest score among all group for both immediate and delay tests (see Figure 6), but to support it statistically, further analysis was conducted by using Holm's Sequentially Rejective Bonferroni Procedure and it shows that the E2 was higher than the C and had the same score with the E1 and E1 had the same score with C. This situation happens because there are no significant differences between E2 and E1, between E1 and C but there are significant differences between E2 and C (see table 5 and 6).

Figure 6. Mean score of all groups in both test for M2

Table 5 Mean of combined test score in M2

Group	n	Mean	S.D.
C	156	5.6859	1.6177
E1	154	6.2338	1.2566
E2	154	5.9481	1.3421

Table 6. Holm's Sequentially Rejective Bonferroni Procedure result for M2

Pair	Diff	t-value	df	P	Adj.p	
C – E2	-0.5479	2.7195	229	0.0070	0.0211	C < E2 *
E2 – E1	0.2857	1.4137	229	0.1588	0.3176	E2 = E1
C – E1	-0.2622	1.3013	229	0.1945	0.3176	C = E1

The test result of the third session by using M3 graphically shows that E2 also got the highest score among all group for both immediate and delay tests (see Figure 7), but to support it statistically, further analysis was conducted by using Holm's Sequentially Rejective Bonferroni Procedure and it shows that both E2 and E1 had overachieved the C and there was no significant difference between them (see table 7 and 8).

Figure 7. Mean score of all groups in both test for M3

Table 7. Mean of combined test score in M3

Group	n	Mean	S.D.
C	156	5.4744	2.1021
E1	154	6.5844	1.7253
E2	154	6.1364	1.7417

Table 8. Holm's Sequentially Rejective Bonferroni Procedure result for M3

Pair	Diff	t-value	df	p	Adj.p	
C – E2	-1.1101	4.0812	229	0.0001	0.0002	C < E2 *
C – E1	-0.6620	2.4339	229	0.0157	0.0314	C < E1 *
E2 – E1	0.4481	1.6420	229	0.1020	0.1020	E2=E1

Based on the above discussion then we could answer the research question and the answer would be that E2 was overachieved C in all the material but only one time it can overachieve the E1 and the rest are equal.

Conclusion and Future Work

Source-connection function in KB-Map indicates a good result to be used as a function to promote learners to clarify their understanding during the map construction process and lead them

to have better scores in the Reading Comprehension test. For future work, we need to conduct deeper analysis to analyze the learners' behavior and the connection between the propositions and the test result in detail.

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