



CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

The present study investigates the effect of comic strips and sequencing of its presentation (pre-reading, during-reading, and post-reading) on Taiwanese junior high school students' reading comprehension and inference generation as indicated by recall, as well as their perceptions of text and presentation sequencing as indicated by students ratings in Questionnaires and their responses in Interviews. This chapter aims to discuss the results of the study based on the findings in Chapter Four and proposes implications for pedagogical use and future research.

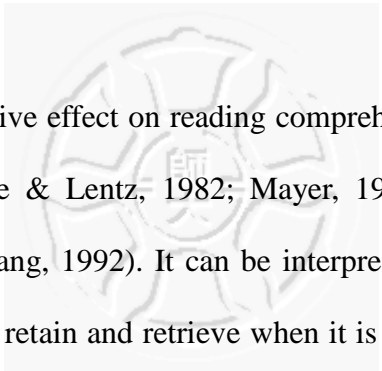
Discussion

Discussion is presented in four sections. The first two sections are the discussion of significant effects in the study: the effects of comic strips and the effect of sequencing comic strips. The other two sections present the discussion of null effects of sequencing comic strips among Experimental groups.

The Effects of Comic Strips

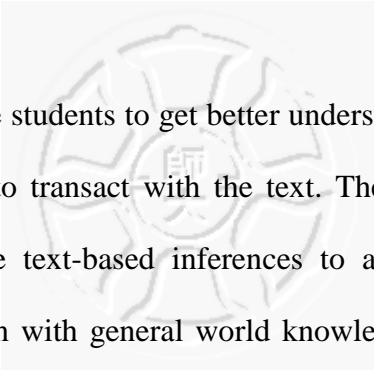
The results of the present study reveal the positive effects of comic strips on three measures: recall, text-based and reader-based inference generation, and perceptions of text interest, difficulty, and mental imagery. The discussion of each part is presented as follows.

Comic strips promote more recall when they are presented during reading the text than reading the text-only. This finding is consistent with many previous studies



that visual aids have a positive effect on reading comprehension (Gambrell & Jawitz, 1993; Hudson, 1982; Levie & Lentz, 1982; Mayer, 1989, 1999; Omaggio, 1979; Purnell & Solman, 1991; Tang, 1992). It can be interpreted by Dual-Coding Theory that information is easier to retain and retrieve when it is dual-coded than coded with one channel (Paivio, 1991). In the present study, students in the During-reading Group, with spreading activation of verbal codes and imagery codes, gained better comprehension as indicated by written recall. With the nonverbal stimulus involved simultaneously, students could read more holistically, processing the text with referential connections between two codes (Paivio, 1991; Rieber, 1994; Simpson, 1995; Sadoski & Paivio, 2001).

Comic strips also promote inference generation in students' recall. Students in every one of the three Experimental Groups generated significantly more text-based and reader-based inferences than those in Control Group. Hence, providing visuals for reading texts can induce more inferences either to fill up textual gap (text-based) or to elaborate from readers' background knowledge (reader-based). Readers' generation of inferences is an indicator of readers' interaction with the text. According to Long et al. (1996), inferential processing during reading involves two components—first, text representation of the meaning of a text and second, the construction of an interpretation of information presented in the text. Both meaning and interpretation play important roles in comprehension (p.190). To construct a representation of the situation described in the text, readers may not only execute linguistic processes but also access to their world knowledge continually. Thus, readers' recall may “include inferences that specify (a) spatial relations among objects, (b) goals and motivations of characters in a story, and (c) casual relations among events, actions, and episodes” (p.191). In the present study, comic strips which serve their interpretational function can provide the text with more concrete explanation for the readers to interpret

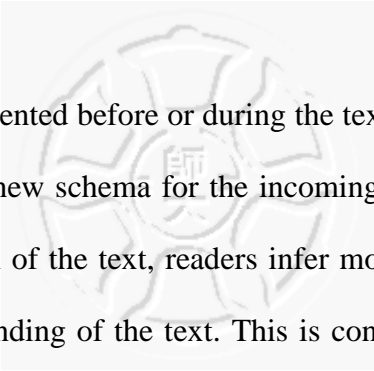


(Wright, 1989). They enable students to get better understanding of spatial and causal relations in the story, and to transact with the text. Therefore, when doing recalls, student can not only make text-based inferences to achieve local coherence but integrate textual information with general world knowledge by making “pragmatic” inferences based on their mental modes of the situation (Sadoski & Paivio, 2004).

In addition to the enhancement of textual retention and elaboration in recall of the text, comic strips also boost the perceptions of text interest, lower perception of text difficulty, and promote the perception of mental imagery. To begin with, in terms of interest, students who read the text with comic strip before, during, or after the text regarded the story more interesting than those who read text-only. This finding supports Swain’s (1978) study that comic strips can interest both good and poor readers. Visuals can serve as a motivating effect that attracts readers’ attention and makes the text more engrossing for readers’ to explore (Glenberg & Langson, 1992; Gyselinck & Tardieu, 1999; Mayer & Sims, 1994; Moore & Scevak, 1997; Peeck, 1987).

Moreover, the provision of comic strips makes the text less difficult when they are presented along with the text, although the presentation of comic strip before or after reading text did not produce the same perception. This result echoes our finding of recalls that reading comic strip simultaneously with the text facilitates recall because the information is dual-coded. The connection between verbal and nonverbal codes eases the text processing for students in During-reading Group. As a result, they perceived the text less difficult and remembered the text better.

Lastly, Pre-reading Group and During-reading Group activated significantly more imagery in readers’ mind than Control Group. Students may not have the habit of generating images in mind when reading the English texts unless they are explicitly given the visual aids. However, comic strips help create images during reading the



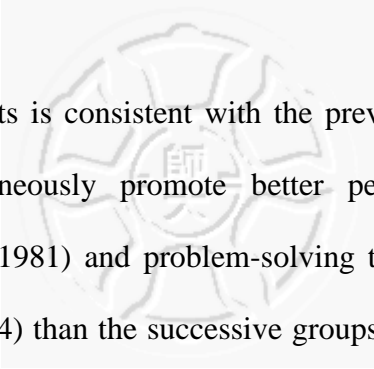
text only when they are presented before or during the text. They can activate readers' prior knowledge and build new schema for the incoming data. With the construction of the mental representation of the text, readers infer more images when reading the text and get better understanding of the text. This is consistent with Schema Theory that the activation of readers' background knowledge before they begin to read helps students' comprehension (Carrell & Eisterhold, 1983; Coady, 1979; Grabe, 1991; Ur, 1996), provides scaffolding in reading (Anderson, 1985; Wilson & Anderson, 1986), and compensates for syntactic deficiencies (Coady, 1979). The results of interview also show that students in Pre-reading and During-reading Groups all responded that they referred to comic strips either in their mind or on the sheet when they read the text. Instead, students in Post-reading Group responded that images emerged automatically only when they could comprehend the relative part in the text. Therefore, students who were not exposed to comic strips or exposed after the text would have little mental imagery.

Effects of the Sequencing of Comic Strips Presentation

Significant effects through pairwise comparisons between three Experimental Groups are discussed respectively in this section. Among these groups, the comparison between During-reading and Post-reading is most obvious and noteworthy. Significant differences found between these two groups were on recall and text-based inferences. Here is the discussion and explanation of these three differences.

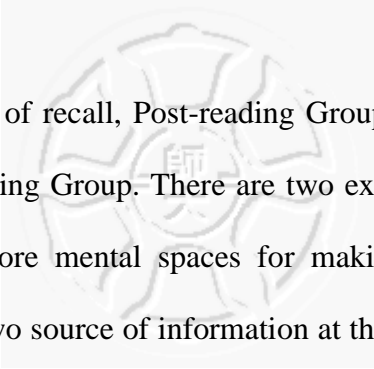
During vs. Post

First, students in During-reading Group outperformed those in Post-reading



Group on recall. This results is consistent with the previous studies that presenting visuals and texts simultaneously promote better performance on free recall, short-answer test (Peeverly, 1981) and problem-solving tasks (Mayer and Anderson, 1991; Mayer and Sims, 1994) than the successive groups (before or after). Effects of referential processing between two codes may be better activated and functioned when the text and the comic strip are presented at the same time. Hegarty and Just (1993) claimed that pictures are actually processed during reading and have an effect during the construction of the mental representation. Therefore, with the comic strip presented during reading the text, readers gain better retention of the content and unknown words because they can refer to either the text or the comic strip immediately and as many times as they want.

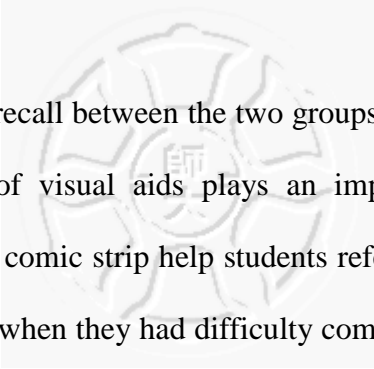
However, students in Post-reading Group, though they received and retained the information from both the text and the comic strip, may not perform as well as those in During-reading Group. For students in Post-reading Group, the information they retained from the first-round processing of the text might be lost when they moved on to the second-round processing of comic strip. For example, when poor comprehenders in Post-reading Group processed the text without visuals, they might not fully understand or remember all the information in the text. Even if they read the comic strip later, weaker textual representation might result in weaker referential activation between two codes. Besides, good comprehenders, though they could understand the text in the first-round processing, might not be helped by the comic strip in the second-round processing because comic strip was much simpler than the text. This can be interpreted with Liu's (2004) finding that comic strip does not enhance recall when it fails to reflect text's linguistic complexities. Therefore, reading comic strip after the text, without cross-references of dual-codes, may not facilitate recall.



Contrary to the results of recall, Post-reading Group generated more text-based inferences than During-reading Group. There are two explanations. First, students in Post-reading Group had more mental spaces for making inferences because they didn't need to process the two source of information at the same time with continuous activation of referential processing between two codes. They might not be able to recall every detail as well as students in During-reading Group, but with the extra mental space, they can elaborate on the limited textual inferences gleaned from the first round reading. Therefore, pictures presented after reading text serves as anchors to the knowledge source to fill up the textual gaps, producing text-based inferences. Although there's a difference between the two groups in text-based inferences, there's no difference in the generation of reader-based inferences. Two possible explanations are: first, the genre for the present study, a narrative text, did not promote reasoning and second, the readers, junior high school students, were not able to read at a higher-level processing.

The results that During-reading Group performed better on recall, but generated fewer text-based inferences than Post-reading Group is contradictory to the findings of Mayer and Anderson (1991) that words-with-pictures group outperformed the words-before-pictures group on problem-solving questions, but not on the recall. The explanations for the disparity between their study and present study are as follows.

On recall, During-reading Group in our study outperformed Post-reading Group while no difference found between such groups in Mayer and Anderson's study. The explanation may be the text factor---text language and text genre. First, students in their study read a L1 text while students in our study read a L2 text. The experience of reading L1 texts is different from that of reading L2 texts. Reading L1 texts, wherever visual aids are presented, is easy for readers to comprehend. Therefore, the

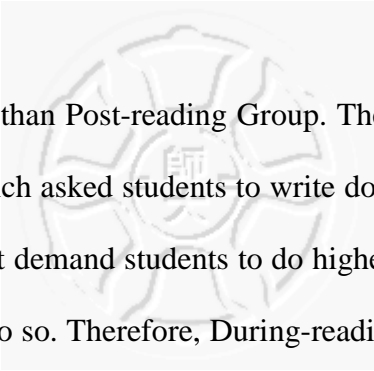


results of their L1 study on recall between the two groups didn't reach any difference. However, the sequencing of visual aids plays an important role in L2 reading. Reading the text along with comic strip help students refer to the images and the text as many times as they want when they had difficulty comprehending the L2 text. This referential connection enabled students in During-reading Group in our study generate better recall than those in Post-reading Group.

Second, concerning the text genre, the text of their study is a lengthy scientific text while the text of the present study is a short narrative text. The aims of reading scientific texts are to make students know how to solve technical problems which demand students to do more higher-level thinking. However, the text in our study is a L2 237-word narrative. It is short and the meaning of the content is presented completely, so it doesn't leave much room for students to do more thinking.

Besides recall, another result of Mayer and Anderson's study is contradictive to our study. That is, in their study, word-with-picture group outperformed word-before-picture group on problem-solving while Post-reading Group in our study significantly generated more text-based inferences than During-reading Group. Generating text-based inferences, like problem-solving tests, demands students' ability of doing high-level processing of the text, and requires students to integrate textual information. The different outcomes of the two studies may result from the factor of task type and instruction. The task in their study is the problem-solving task which requires students to fully understand the technical process so that they could know the solution to any problems they meet. Reading the text simultaneously with the picture helps to gain better understanding of the technical process than reading pictures after the text, thus word-with-picture group outperformed word-before-picture group on problem-solving task.

However, During-reading Group in our study did write more recall but generated



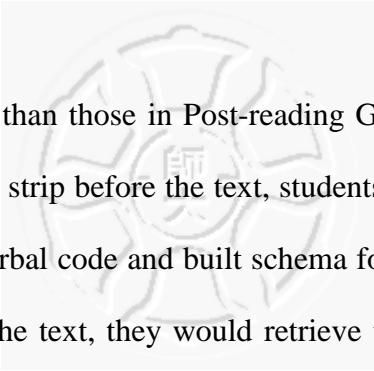
fewer text-based inferences than Post-reading Group. The reason may be that we use recall as a measurement which asked students to write down what they can remember in the text, but recall doesn't demand students to do higher-level thinking, unless they are explicitly instructed to do so. Therefore, During-reading Group comprehended the text better with both of the two codes activated, but had no more room for doing higher-level thinking. Instead, when the retained information that students in Post-reading Group received from the first round processing of the text was lost, they needed to make text-based inferences gleaned from their limited text representation to achieve the coherence of their recall. Therefore, Post-reading Group in our study had better performance on text-based inferences than During-reading Group.

During vs Pre

There is only one significant difference between During-reading Group and Pre-reading Group. Students in Pre-reading Group generated more text-based inferences than those in During-reading Group. Unlike students in During-reading group, who processed two sources of information at the same time and kept making references between the text and the comic strip, students in Pre-reading Group had more mental spaces to make text-based inferences. Reading comic strips before the text helps students build mental models of the information and activate their prior knowledge. When they later moved on the second-round processing of the text, they kept referring to the knowledge base they constructed in their minds. Therefore, more text-based inferences are produced when they processed the text.

Pre vs Post

As for the comparison of Pre-reading Group and Post-reading Group, only one significant difference was found as well. Students in Pre-reading Group ranked higher



mental imagery association than those in Post-reading Group when reading the text. With the provision of comic strip before the text, students stored what they read from the comic strip in the nonverbal code and built schema for the incoming data. Hence, when they later processed the text, they would retrieve the nonverbal codes in their minds, relating more mental imagery association while reading the text than those in Post-reading Group who were exposed to the text first.

Null Effects among the Experimental Groups

Reader-based Inferences

There is no significant effect of comic strips among the three Experimental Groups on the generation of reader-based inferences. All of the three Experimental Groups generated similar amount of reader-based inferences. There were few reader-based inferences generated in any of these groups. It is probable that the text is too short (237 words in length), and thus contains ideas not dense enough for logical reasoning to generate reader-based inferences. According to Chu (2002), shorter texts demand a lesser degree of text processing than longer texts and preclude readers' interpretation at a global level.

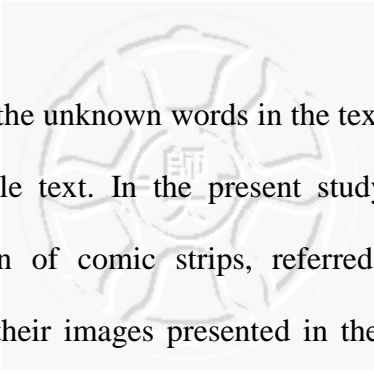
Another explanation may be that students, at the age of 15, lacked the relevant background knowledge as stated in the text. Driving a jeep, having an accident for not wearing the seatbelt, hanging up on the wires seemed not correspond to their personal experience, thus decreasing their degree of involvement in the text. Lastly, text genre for the present study, a narrative rather than an expository, may reduce students' reader-based inferences for reasoning. To recall a narrative, students may merely need to fill up the textual cues to fill up for details of the story with little effort invested in reasoning.

Perceptions of Willingness, Cognition, Memory, and Speed

There is no effect among the three Experimental Groups on these perceptions indicated by their ratings in the Questionnaire. All students in these three Experimental Groups held positive attitude toward the influence of comic strips on their reading willingness, guessing of unknown words, reading comprehension, memory of the story, and speed of reading. That not any significant difference was found by pairwise comparison among the three groups means sequencing of comic strip presentation is not an influential factor for these perceptions. Students felt benefited from comic strips in whichever sequencing of its presentation.

It is proved that the comic strip can serve its affective-motivational function (Levie & Lentz, 1982; Peeck, 1987) to motivate the readers' willingness toward reading the text. The supplement of comic strips can "make reading the text more enjoyable, and can influence the time readers are willing to spend on a text" (Hibbing & Rankin-Erickson, 2003, p.762). Besides, comics are the combination of humor and exaggeration, and these two elements can not only attract readers' attention but also arouse their emotions. Therefore, in the present study, the addition of comic strip raises students' willingness of reading no matter at what sequencing of its presentation.

In cognitive domain, the inclusion of comic strips, whether they were presented before, during, or after reading, enables students process the same content twice, and eases processing load with the referential activation between two codes. They were thus successful in guessing the unknown words and comprehending text content, which supports the findings that combination of verbal and visual forms information is effective for successful cognition and retention (Hibbing & Rankin-Erickson, 2003; Omaggio, 1979; Oxford & Crookall, 1990; Sadoski, 2005; Sadoski & Paivio, 2004). Word meaning plays a crucial role in text comprehension, the meaning support from



comic strips helps guessing the unknown words in the text, which in turn facilitate the comprehension of the whole text. In the present study, students in Experimental Groups, with the provision of comic strips, referred the unknown words they encountered in the text to their images presented in the comic strip. The unknown abstract verbal representations became meaningful because of the connection with concrete imagery representation. For example, from our interview, students didn't know what "wires" meant until they connected the word with what they read in the comic strip. And almost all students in the interview responded that comic strips facilitate their comprehension, especially on their understanding of new words and content. Therefore, reading the text with comic strips can not only provide concreteness for comprehension but also promote incidental vocabulary learning.

Lastly, with the meaning supported reinforced by comic strips presented whether pre, during, or post reading, text content become not only easier for readers to understand, but also more memorable for readers to remember. Paivio (1971) assumed that pictures have superiority for encoding information in the memory over words, and this picture superiority effect has already been proved by previous studies (Beck, 1987; Shepard, 1967). From students' responses in interview, eleven out of fifteen said that they recalled more from the comic strip than from the text because comic strip was easier to remember. Therefore, the inclusion of comic strips can not only accelerate the speed of reading because of easiness to comprehend but also helps text retention because of its more memorable form (Glenberg & Langston, 1992; Sadoski, Goetz & Avila, 1995).



Implications

Some implications relevant to the use of comic strips for language instruction and further study are suggested below.

Pedagogical Implications

The findings of the present study prove that comic strips can increase students' reading comprehension as indicated by recall, and reading the text simultaneously with the comic strip is the most effective in recall. Besides, comic strips can promote text-based and reader-based inference generation whether it is presented before or after the text. In answer to the nature of human cognition, the inclusion of the comic strip should be put into consideration for the material designs and English reading instruction. Several pedagogical implications can be drawn as follows.

On Material Design

It is recommended that comic strips as visual aids can be supplemented along with the texts in EFL English textbooks or in test papers. First, appropriate comic strips with adequate content can be carefully chosen for a reading course. Visuals aid comprehension only when they are consistent with the text content and reflect text complexity. Material designers should keep this in mind so that readers' effective learning can be achieved with the activation of dual-codes.

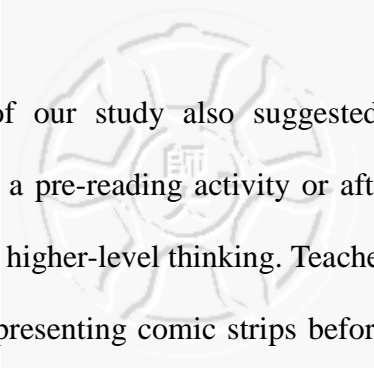
Second, the finding of our study reveals that having comic strip during reading is more effective in retention than having it before or after reading. Therefore, if the purpose is for retention, it is suggested that material designers can arrange the comic strip laid out right beside the text so that readers can refer to both codes immediately

and as many times as they need.

Third, our finding also presents that the supplement of comic strips can help the generation of text-based and reader-based inferences and sequencing of comic strip presentation plays a role in the production of text-based inferences. While reading comic strip during the text processing facilitates recall, reading it before or after the text processing promotes better ability of making text-based inferences. Therefore, if the purpose is for inference generation, material designers are recommended not to put the comic strips and the text on the same page. Successive presentation of the comic strip and the text allows readers more mental spaces to make reasoning and fill up textual gap between these two stimuli.

On Teaching

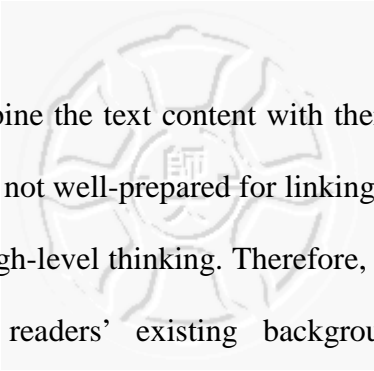
It is suggested that EFL language teachers can make use of comic strips in the reading classroom. If the text doesn't come along with comic strips, teacher-generated comic strips or students' drawing may be good solutions (Hibbing & Rankin-Erickson, 2003). Teachers can draw the comic strip related to the text on the worksheet before class, or sketch the text content step-by-step on the blackboard when teaching the reading text. This can "help students visualize events and relationships portrayed in the text." (Hibbing & Rankin-Erickson, 2003, p.761) In traditional EFL reading classrooms in Taiwan, teachers always spend lots of time translating and explaining the meaning of texts. Instead, with the comic strip high-relevant to the text included during-reading in class, it can transform the text information into an easy-to-remember form, activate reader's dual codes for successful comprehension, and thus motivate the readers to read. Saving time for translation, EFL teachers can guide students to explore more about the embedded ideas of the text and teach the grammar that students need to learn.



Second, the finding of our study also suggested that comic strips can be presented before reading as a pre-reading activity or after reading as a post-reading activity to enhance students' higher-level thinking. Teachers can encourage students to predict the text content by presenting comic strips before teaching the text and help students build background knowledge. As for post-reading activities, teachers can invite students to retell the text by means of ready-made comic strips or student-created ones. Moreover, during these activities, teachers are suggested to help students interact with the comic strips. That is, students can be given more questions about student' life experience or what they will do if they are the leading roles in the comic strips, so as to produce inferences and elaborations and to transact with the text.

Third, teaching students to generate mental images in mind when reading texts is another way to activate dual-coding systems if class period and drawing ability are limited. Teacher should not assume students can exert imagination inherently when reading. In our experiment, some students in Post-reading Group responded that when they read the text, they concentrated on decoding the text without any images emerged in their mind. Therefore, students should be taught to generate mental images as they read so that their recall of the text and the abilities to draw inferences and make predictions can all be enhanced (Anderson, 1971; Gambrell & Jawitz, 1993; Hibbing & Rankin-Erickson, 2003; Sadoski, 1985). Moreover, in the study of Gambrell & Jawitz (1993), they proposed an *imagery-illustration interaction theory*, “which posits that readers use mental imagery and text-relevant illustrations in dynamic, flexible and interconnected ways that result in enhanced comprehension of text” (Gambrell & Jawitz, 1993). Therefore, with the comic strip presented with the text, students can also be instructed to induce mental imagery.

Lastly, in the present study, students generated remarkably few reader-based inferences. It seems that junior high EFL students can only get the textual meaning of



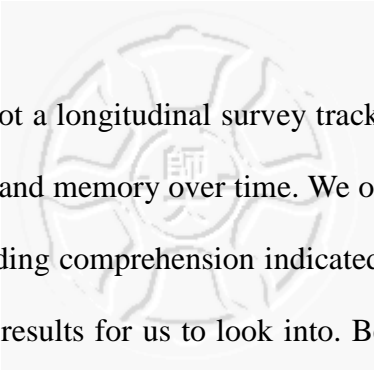
the text, but unable to combine the text content with their personal experience. High school students appear to be not well-prepared for linking the text to world knowledge they experience by doing high-level thinking. Therefore, the inclusion of comic strips is suggested to activate readers' existing background knowledge and it is recommended that EFL teachers can explicitly encourage readers to participate in the text actively. Students are expected to have the ability of reading the text globally, and making their own judgments toward the text.

Implications for Future Study

In this study, we examined the effect of comic strip and sequencing of comic strip presentation on students' reading recall and inference generation indicated by written recall. However, there are still some limitations to this study in participant selection, in text design, and in experiment design.

First, due to time constraint, we only conducted the study on a small group of students with limited materials. Results might not be the same with students of different age or from different location. Besides, we didn't take learner individual differences into consideration, such as language proficiency level (high-achievers / low-achievers), reading styles (verbalizers or visualizers), and gender. Therefore, it is suggested that future research might incorporate these factors to explore the effect of comic strip on EFL reading comprehension.

Second, on text material, we only investigated the effect of comic strip on narratives in this study. However, other kinds of genres might often be used in high school students' English textbook. In order to suit different students' needs, future studies can investigate the effect of comic strip on other genres, such as expository texts, process texts, and descriptive texts.



Third, this study was not a longitudinal survey tracking the effect of comic strip on learners' comprehension and memory over time. We only investigated the effect of comic strip on students' reading comprehension indicated by immediate recall. Delay recall would yield different results for us to look into. Besides, students in our study remarked that comic strip enhanced their understanding of unknown words. It is suggested that vocabulary tasks can also be incorporated in delay recall test so that we can understand the effect of comic strip on long-term vocabulary learning and reading comprehension.

Finally, students' reading comprehension and inference generation in this study were measured through written recall protocols. However, the amounts students recalled might not guarantee their comprehension of the text, and the inferences students generated in their recalls were quite few. Therefore, other measures, such as short-answer questions, think-aloud protocols, or problem-solving tasks, are suggested so that the learners' cognitive and psychological process can be completely manifested.