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# Study of Manga Reading as an Effective Teaching Method Based on the Text Comprehension Process

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## Abstract

This study examined the use of the Japanese comic form manga as an effective tool for teaching reading. Specifically, it evaluated a learning program to foster media literacy among fifth-grade students through reading, interpretation, and appreciation of manga using the framework of text comprehension models. The resulting analyses indicated that reading manga promoted sentence-level understanding, and multiple levels of text comprehension can be taught through reading manga, including surface level and semantic processing, as well as situation model construction. The use of manga to foster reading comprehension can be effectively accomplished by planning lessons and activities in the order of the learning content corresponding to each level of text comprehension.

*Keywords:* manga comprehension, media literacy, sentence comprehension, situation model

## 1 Introduction

In the Programme for International Student Assessment (PISA) survey conducted in Japan in 2003, reading comprehension tests were not limited to continuous text, but rather included non-continuous text and text in various forms. This skill is important in modern society due to the dramatic increase in the distribution and quantity of accessible information, necessitating the ability to read and understand a variety of media.

Reading comprehension has emerged as a major issue in Japan, as PISA survey results show that reading comprehension scores in the country have fallen to the level of Organization for Economic Co-operation and Development averages. The Ministry of Education, Culture, Sports, Science and Technology has developed a Reading Comprehension Improvement Program to improve reading comprehension for various forms of texts, requiring clear positioning in school curricula [1]. However, as Kishi et al. pointed out, previous studies of sentence-level reading comprehension, including non-continuous texts and illustrations, have been limited [2]. Without guidance, it may be problematic

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to understand the teaching of complex, non-continuous text [2]. Therefore, it is critical to establish a broader base of background knowledge for developing teaching methods in this area.

Manga is one variety of complex text that is widely available in Japan. The term manga covers multiple kinds of texts, thus, making it difficult to define. According to Kojien, manga are texts “represented by successive pictures, which in many cases are accompanied by dialog” [3] In other words, manga are a complex media consisting of pictures and words. Nemoto observed that it is necessary to decipher pictures and texts to identify themes from contexts for a deeper understanding of manga [4]. However, other scholars, such as Sasamoto, have proposed that manga is characterized by high readability because it eliminates difficulties in understanding words and images [5]. Similarly, Murata found that reading manga promotes the development of situation modeling, as readers who have extensive manga reading experience can read a lot of information from the same picture [6]. From the above, it can be said that manga is a representation that is easy-to-read; however, it might be a medium that requires corresponding reading skills for fuller comprehension also.

# 2 Previous Studies

## 2.1 Studies on the learning effects of reading manga

Teaching using manga as a learning material has been studied in the field of educational psychology. Over a decade ago, Ieshima advocated the need for developing research of manga in the field of psychology, and Tamada and Yoshida promoted the effectiveness of this genre as an educational tool [7][8][9].

Kougo and Kougo divided understanding manga into two parts: learning the content and understanding the story [10]. In considering whether these two factors have an impact on the understanding and retention of content, they examined the following: (1) the method of expression of the lesson content, that is, via manga or sentences; and (2) the presence or absence of a story in the manga in addition to the lesson content [10]. They found that the presentation of lesson content using manga is effective when students do not need deep understanding to answer comprehension questions, and that the inclusion of an additional story is a valid approach when it is necessary to apply inferences in new situations [10]. Murata compared learning results between three activities: (1) in the manga condition, when students both draw and write parts of the lesson content in a manga; (2) in the non-essential manga condition, whereby students draw something not related to the lesson content in a manga; and (3) in the sentence condition, when students only write sentences [11]. The results of comprehension tests and free descriptions showed that the manga condition promoted the understanding of lesson content best; however, even the non-essential manga condition promoted the understanding of lesson content better than the sentence condition [11].

## 2.2 Studies on learning to read manga

There have also been a small number of studies on the educational significance of reading manga. Machida reported on the use of manga for teaching reading in Japanese junior and senior high school textbooks, and proposed and practiced a reading comprehension lesson using manga as a teaching material [12]. Okubo et al. developed, practiced, and evaluated a lesson program in which children created a report, book wraparound band, and shelf talker to introduce manga, which resulted in an increase in manga media literacy, thus, demonstrating a valid possibility of using manga to teach reading comprehension on a wider range [13]. However, currently, the educational use of manga is limited primarily to its exploitation as an easy-to-understand medium.

## 2.3 Studies on manga and reading comprehension

Previous studies have indicated that manga might have positive effects on reading comprehension; however, due to a lack of empirical evidence, precisely what types or areas of reading comprehension enhanced by manga remains largely unknown. To assert the validity of using manga in this manner, it is necessary to know what cognitive processing occurs when reading manga, which as Kurata noted [14], has not been accomplished yet. However, some preliminary research includes a study on reading comprehension of manga elements (e.g., film frames, balloons, effect, and lines) and a study measuring the relationship between manga reading frequency and reading comprehension [6][16]. Murata [6] found that readers proficient in reading manga could gain more information from the patterns drawn in the background and were also adept at understanding the meaning of the texts, on which basis he proposed that readers proficient in manga reading used the situation model of text comprehension outlined by van Dijk & Kintsch [15]. Nakazawa developed a test (Chiba University Comic Comprehension Test3: CCCT3) to measure manga reading comprehension, which he administered to both elementary school children and adults [16]. In a study of factors constituting manga reading comprehension have also been considered, Nakazawa suggested that manga reading comprehension is composed of a combination of the “literacy of film frame understanding,” encompassing visual and aural comprehension of things such as paintings, facial expressions, feelings, sign, onomatopoeia, and mimicry, and the “literacy of context understanding,” denoting the ability to infer events occurring between two film frames, order relations within a film frame, and comprehending words [16][17]. The results of manga comprehension testing among elementary school children indicated an association between both literacy types and understanding based on the results of factor analysis; however, the manga comprehension tests for adults demonstrated an association only with the literacy of context understanding [16]. Nakazawa examined how the “literacy of the film frame understanding” develops, showing that it increases along with child development and can also be divided into several types depending on difficulty. Both literacy types are acquired in stages [17].

A study by Murata on reading background symbols in manga suggested that a deeper level of reading occurs when reading manga, thus promoting the construction of situation models [6]. However, there is room for further study of whether there are multiple levels of manga reading and what relationships might exist among those levels.

Okubo et al. considered the relationship between reading skills of manga and text reading comprehension among sixth graders [18]. They performed comprehension tests for manga and sentences that reflected the representation of van Dijk & Kintsch's three levels of text comprehension model [15][18]. Mediation analysis demonstrated that text-base scores were a significant mediator of the association of surface level and situation model scores, and based on this finding, Okubo et al. proposed that van Dijk & Kintsch's text comprehension model could also be applied to the manga reading process [15][18]. Additionally, correlation analysis showed that whereas different cognitive abilities contributed to surface level understanding in manga reading versus text reading, the same abilities were influential in text-base processing and situation model construction [18].

As described above, the educational use of manga has been widely investigated in Japan, particularly as an easy-to-understand medium for conveying lesson contents. Conversely, cognitive research on how readers decipher manga has been advancing more slowly, and the number of cases studied for manga reading as a learning activity remains very small as well. By understanding the activities used to decipher manga, it might be possible to learn more about how to develop reading comprehension skills for a wider range of media.

# 3 The Purpose of this Study

The current study considers the use of manga as a teaching material as an element in establishing an effective method of teaching reading comprehension. Accordingly, we reanalyzed the outcomes of the learning program to foster media literacy using manga developed by Okubo et al. in the context of the text comprehension model of van Dijk & Kintsch and the manga reading process elucidated in a later study by Okubo et al. [13][15][18]. In doing so, we compared characteristics of the comprehension process associated with between manga reading and sentence reading as a basis for discussing possible effective teaching methods to cultivate the manga reading ability of elementary school students.

# 4 Method of Research

As mentioned above, van Dijk & Kintsch described the process of sentence reading as being comprised of three stages, namely the surface level, text base, and situation model [15]. Surface-level reading involves understanding the verbatim, surface representation of the text, words, and syntactic structure, whereas forming a text-base denotes the process processing chunks of text to create a semantic representation of the material. At the deepest level, situation model construction incorporates pre-existing knowledge into the text base to form a higher representation of meaning.

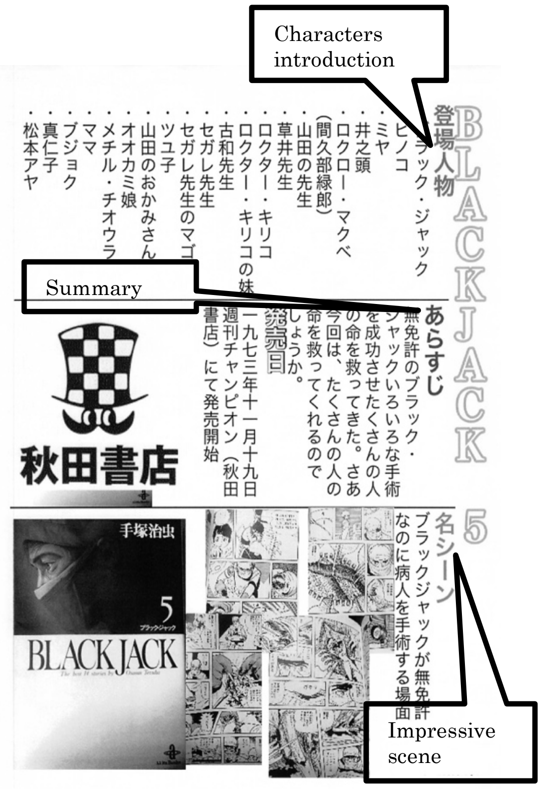
According to Okubo et al., the manga reading process develops through the same three different levels of representation described above [18]. In reading manga stories, the surface-level stage constitutes the process of reading the individual film frames, words, and symbols, whereas the text base level is the process of reading the story consisting of continuous film frames and situation model construction is the process of forming a more complete representation of the story's meaning by incorporating pre-existing knowledge, experiences, or interests to the text and illustration base.

In our analysis of learning activities, first, we considered the correspondence of the learning objectives set by Okubo et al. and the sentence-level model [13][15]. Then, we extracted a description of the content from a reported learning program and verify whether or not the extracted learning content matches any stage in the text comprehension model and manga reading process shown by Okubo et al. [18]. Finally, we considered whether or not the artifacts the children created reflect any stage of the sentence-understanding model and evaluated the relationship between the score and the evaluation of the work. A causal relationship between the scores relating to the surface level can be expected to mediate the text-base scores and influence the situation model scores. Establishing a correlation between each score establishes the premise of a causal relationship. Accordingly, we conducted correlation analyses of the evaluation scores for the children's works as reported by Okubo [13]. Additionally, based on the Okubo et al.'s findings, the scores of activities aimed at reflecting the surface and textbase processing levels were expected to have some effects on those associated with situation model construction, and a simple regression analysis was performed to seek a relation-ship between these variables.

## 5 The Content of Educational Practice Developed by Okubo et al.

As mentioned above, Okubo et al. conducted an experimental study that developed and evaluated the outcomes of a learning program for fifth graders to foster media literacy through reading, interpreting, and appreciating manga [13]. The program was conducted among 30 students from late February to mid-March 2015 and was focused on the way of life of a manga artist whose biography was included in a Japanese textbook. First, the children learned the representation techniques of manga by reading an explanatory text about the life of the artist. After reading the biography, participants in the experimental group read a manga drawn by the artist whereas children in the control group merely wrote an opinion statement about the biography. After that, the children read a manga and created reports on it (Figure. 1), as well as book wraparound bands and shelf talkers (Figure. 2). Then, the children introduced the manga they had read to each other (Figure. 3).

Prior to and following the lessons, the students' ability to read, interpret, and appreciate manga was measured through an ability-rating scale and evaluation criteria. Elementary school teachers carried out the evaluation of the children's work; each piece was given three scores, and the average points were calculated.


Characters introduction
Summary
Impressive scene
BLACK JACK 5
秋田書店
手塚治虫
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BLACK JACK

登場人物

・ブラック・ジャック
・ピノコ
・ミヤ
・井之頭
・ロクロー・マクベ
（間久部緑郎）
・山田の先生
・草井先生
・ロクター・キリコ
・ロクター・キリコの妹
・古和先生
・セガレ先生
・セガレ先生のマゴ
・ツユ子
・山田のおかみさん
・オオカミ娘
・メチル・チオウラ
・ママ
・ブジョク
・真仁子
・松本アヤ

あらすじ

無免許のブラック・ジャックいろいろな手術を成功させたくさんの人の命を救ってきた。さあ今回は、たくさんの人の命を救ってくれるのでしょうか。

発売日

一九七三年十一月十九日週刊チャンピオン（秋田書店）にて発売開始

名シーン

ブラックジャックが無免許なのに病人を手術する場面

Figure. 1: A participant's report about manga [13]

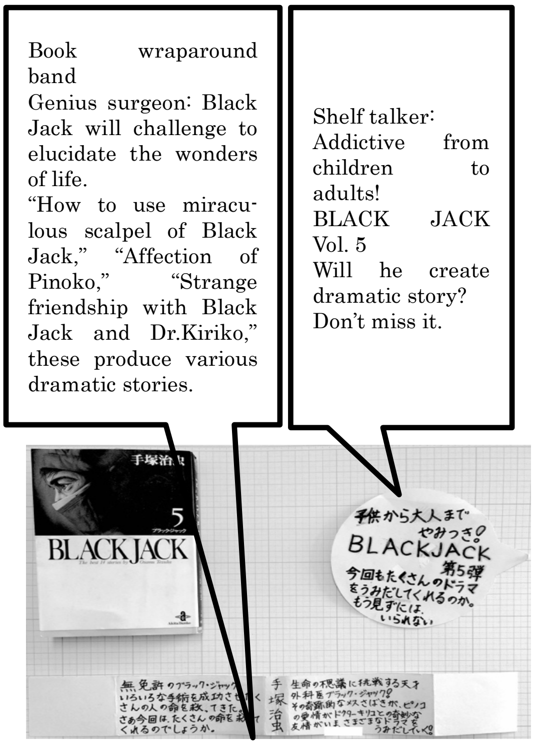
Book wraparound band
Genius surgeon: Black Jack will challenge to elucidate the wonders of life.
"How to use miraculous scalpel of Black Jack," "Affection of Pinoko," "Strange friendship with Black Jack and Dr.Kiriko," these produce various dramatic stories.
Shelf talker:
Addictive from children to adults!
BLACK JACK Vol. 5
Will he create dramatic story?
Don't miss it.
手塚治虫
5
BLACK JACK
子供から大人まで
やみつき!
BLACKJACK
第5弾
今回もたくさんのドラマをうみだしてくれるのか。
もう見ずにはいられない
無免許のブラック・ジャックいろいろな手術を成功させたくさんの人の命を救ってきた。さあ今回は、たくさんの命を救ってくれるのでしょうか。
手塚治虫
生命の不思議に挑戦する天才外科医ブラック・ジャック!
その奇跡的なメスさばきが、ピノコの愛情がドクターキリコとの奇妙な友情がいまさまざまなドラマをうみだしていく!

Figure. 2: Book wraparound band and shelf talker created by children [13]

Figure. 3: The children introduced the mangas they had read to each other [13]

Table 1 presents the objectives and lesson evaluation criteria and standards established by Okubo et al. [13]. The program was intended to use the "components of media literacy of the social media age" (7 elements and 21 items) proposed by Nakahashi [19]. A focus on "the ability to read, interpret, and appreciate manga" was chosen because it was one of the elements proposed by Nakahashi [19]. There are three learning objectives, and an evaluation-standard and criteria table measuring the children's achievement was created for each. The evaluation standards and criteria correspond to the levels of reading set out in the text comprehension model of van Dijk & Kintsch [15].

Objective A: "To be able to understand manga symbols." This objective targets the understanding of manga symbols, equivalent to surface level reading in the text comprehension model, i.e., understanding words and syntactic structure.

Table 1: Evaluating the ability to read, interpret, and appreciate manga

| | Learning objectives | Evaluation standards | Evaluation criteria | | | Evaluated works | Level in reading of comprehension model |
|---|---|---|---|---|---|---|---|
| | | | Level-1 | Level-2 | Level-3 | | |
| The ability to reading and interpretation and appreciation of manga | Learning objectives A<br>To be able to understand the manga symbols. | Read manga, to understand the outline (Character, place, period, Summary, and so on) of that. | That the information necessary to understand the outline of manga has not been summarized. | That the information necessary to understand the outline of manga has been summarized. | The information necessary to understand the overview of manga are summarized easy-to-understand by, for example, put the heading. | Report | Surface level |
| | Learning objectives B<br>To be able to understand the contents using the manga symbols. | Read manga, to understand the climax and impressive scene. | The impressive words and the scene have not been cited. | To summarize, the impressive scene and words are cited. | To summarize, the impressive scene and words are cited.<br>To write a sentence to recommend manga. | Book wrapround band | Text base |
| | Learning objectives C<br>To be able to interpret the message from author and the charm of the work, from what is depicted in the manga. | Read manga, to imagine the message and the charm of that. | Not writing about the messages from the manga, the charm of manga. | Message from manga, charm of manga those have been summarized in a few words. | Message from manga, charm of manga those have been summarized in a few words. That appeal to people who viewed. | Shelf talker | Situation model |

Objective B: “To be able to understand contents using manga symbols.” This objective targets the understanding of manga content, which is equivalent to the text-base level in the text comprehension model, i.e., the process of reading the story.

Objective C: “To be able to interpret the message from author and the charm of the work, based on what is depicted in the manga.” This objective targets the inference of information not explicitly stated in the works, equivalent to the situation model level of reading in the text comprehension model, i.e., the process of forming a higher-order representation.

Additionally, based on the reading process of manga suggested by Okubo et al. [18], the ability to meet learning objective A is considered to affect the ability to meet objective C as mediated by the ability to meet objective B. Okubo et al. concluded that the developed learning program was effective based on a comparison of results of pre- and post-activity surveys of ability ratings and evaluations of the reports, book wraparound bands, and shelf talkers created by the students in the experimental and control groups, which found significant differences [13].

# 6 Results

## 6.1 Relationship between content-reading levels and the comprehension model

In this section, we consider the learning activities that actually occurred in the program. Table 2 shows the learning content and corresponding objectives reported by Okubo et al. [13]. Learning activities that “read about the involvement of Osamu Tezuka and manga” and “summarize the way of life of Osamu Tezuka and describe impressions” occurred during the first and second lessons, respectively, and activities designed to “analyze whether the manga have been expressed by a combination of any symbol” occurred in the third lesson [13]. Based on the text comprehension model, the latter lesson addresses surface-level comprehension. Associated with teaching the analysis of symbols in this stage, students also summarized characters and locations, ages, and striking scenes in their reports. Contents other than the meaning of simple signs in the report also included the story synopsis, and characters; thus, the reports reflect not only comprehension at the surface level but also at the text-base level of reading. During the fourth lesson, students used the content of the manga they read to create a book wraparound band

Table 2. The learning content and objectives reported by Okubo et al.[13]

| Subject to read | Time | Learning objectives | Learning activities | Level in reading of comprehension model |
|---|---|---|---|---|
| Explanatory text | 1st (2h) | Japanese<br>（Interest and motivation）<br>To read the drawn biography about the life of Osamu Tezuka. | •Read the text while finding a thing of that they want to reference or a thing that they thought wow. | |
| | 2nd (4h) | Japanese<br>（Reading）<br>To read the text by paying attention to the part concerning the way of life of Osamu Tezuka. | · To summarize the thought of Osamu Tezuka.<br>•To reading the part about the way of life of Osamu Tezuka and to compare their thoughts and experiences. | |
| Manga | 3rd (3h) | Learning objectives A<br>To be able to understand the manga symbols. | •To analyze manga whether represented by a combination of any symbol<br>•Putting together a summary of manga (characters, place, period, summary, and so on) in the report | Surface level |
| | 4th (5h) | Learning objectives B<br>To be able to understand the contents using the manga symbols. | •Knowing about wraparound band that it intended to appeal the charm of manga in a limited space.<br>· To create a book wraparound band, in order to convey charm of manga | Text base |
| | | Learning objectives C<br>To be able to interpret the message from author and the charm of the work, from what is depicted in the manga. | •In order to know about shelf talker, watch the school broadcast program.<br>•Imagine the message that is drawn through manga, summarized in shelf talker. | Situation model |

to summarize the content of the manga and convey their impressions of the work, again reflecting text-base reading comprehension. In the second half of the fourth lesson, students completed an activity in which they imagined what the author wanted to draw through manga, summarized in a shelf talker using the students' own words. This learning activity was not based directly on the manga that students read, but it rather required the use of additional information and experiences to convey their understanding of the text, which is related to the situation model of reading comprehension.

Based on the above, it can be determined that the learning content reported by Okubo et al. corresponds to the three levels of van Dijk & Kintsch's text comprehension model and the corresponding manga comprehension model later developed by Okubo et al. [13][15][18]. Additionally, the program included the creation of an initial report that was designed to reflect both the surface and text-base levels of reading comprehension, as well as a second product (wraparound band) the design of which reflects the text-base level. Finally, the students' creation of shelf talkers addressed the situation model level of reading comprehension. Therefore, this learning practice can be regarded as a practical implementation of the manga comprehension model proposed in Okubo et al. [18].

### 6.2 Relationships among the evaluations of the children's work

Table 1 were used to evaluate the reports introducing manga, the book wraparound band, and the shelf talker children created. Based on the results of these evaluations, the lesson series appears to have been effective. As stated, the evaluation criteria considered the relationship between the learning activities and the three levels of the text comprehension model [15][18]. The works created by the children reflected reading comprehension at all three levels of model: the reports reflected the surface and text-base reading comprehension levels; the book wraparound band reflected the text-base level; and the shelf talker reflected the situation model level. According to van Dijk & Kintsch, comprehension of a sentence proceeds sequentially, beginning with understanding of the surface level, and then proceeding through text-base reading, and concluding with situation model construction [15].

The results of the correlation analyses demonstrated a significant positive correlations between the report and the book wraparound band scores ($r = .61$, $p <. 01$) and the report and shelf talker scores ($r = .53$, $p < .05$), as well as between the book wraparound band and shelf talker scores ($r = .50$, $p < .05$).

According to Okubo et al., it is to be expected that the same cognitive abilities are involved in the formation of text-base and/or situation models during manga reading and text reading [18]. Additionally, the report and wraparound band scores (hereafter referred to as the basic manga reading score), which aimed to reflect surface level and text-base processing, were expected to have some effects on shelf talker scores aimed at reflecting situation model construction. The results of the simple regression analysis confirmed the relationship between these variables by demonstrating a significant regression equation ($F(1,20) = 10.65$, $p < .01$) with an $R^2$ of 0.34. The basic manga reading score was found to be a significant predictor of shelf talker score ($\beta = .58$, $p < .01$).

## 7 Discussion

### 7.1 Learning content

In this study, we reanalyzed a learning program conducted by Okubo et al. to evaluate the relationship between the learning activities and the associated levels of van Dijk & Kintsch's text comprehension model [13][15]. The learning program developed by Okubo et al. was deployed in the following order: understanding of the surface level; formation of the text base; and construction of the situation model [13]. Because understanding proceeds sequentially, and because Okubo et al. also proposed that the reading comprehension process involved with manga involves the same levels, the lessons developed by Okubo et al. were developed in the same order as the text comprehension model [13][18]. The three tasks—creating a report, a book wraparound band, and a shelf talker—formed a summary of the children's learning activities. Okubo et al. reported that the children engaged in repeated re-reading while creating their projects, thus, learning in a manner aligned with the manga reading comprehension levels, and children produced assignments reflecting their comprehension at each level.

Consequently, it appears that the children's manga reading comprehension improved.

Based on these experiences, there appears to be at least one valid approach to using manga reading to teach reading comprehension: by expanding manga reading along the order of the three levels of textual understanding established by the text comprehension model and imposing challenges designed to engage reading comprehension at each level. Okubo et al. also reported that during the process of reading comprehension of manga, understanding of the symbol does not immediately affect the understanding of the context or suggest the need for learning activities to read manga precisely [20]. From the findings of Okubo et al., it can be speculated that the most effective means of learning about manga reading is for learners to begin by prioritizing addressing the symbols and representation techniques of manga, thought to correspond to the surface level and text-base processing [13]. The next step should involve repeatedly reading through the entire content to understand the story and its theme(s) more deeply, appearing to correspond to text-base and situation model processing. The final step would be to summarize the content to enrich situation model construction.

### 7.2 Evaluation of the works that the children created

A positive correlation was observed between the scores of the different works created by the children, which reflected reading comprehension at all three levels of the text and manga comprehension models [15][18].

However, because the two levels were both targeted in the report assignment, it was impossible to separate the surface and text-base levels when assessing these scores, and, thus, it was impossible to fully establish a causal relationship for the manga comprehension model in line with that demonstrated for the text comprehension model. However, a positive correlation was identified between the scores for the report and those for the wraparound band, and there was also a positive correlation between the scores for the book wraparound band and those for the shelf talker. Additionally, the regression analysis demonstrated that the average scores of the reports and wraparound bands significantly affected the shelf talker scores. This finding suggests that it is highly possible that during the manga reading process, understanding advances from the surface level sequentially through the formation of the text base to the construction of a situation model.

## 8 Conclusion and Future Work

This study considered the relationship between the lesson content developed by Okubo et al. and the levels of reading comprehension based on the text comprehension model and the manga reading process reported by Okubo et al. [13][18]. We performed a correlation analysis for the scores of the evaluation work that children created. Based on our analysis of the learning content, it appears that the order of learning content that Okubo et al. reported is the same as the process of text understanding in text comprehension model [13] [15].

Thus far, the use of manga in Japanese school education has been limited to briefly presenting it as an easy-to-understand representation format rather than as a target of reading comprehension. However, during Okubo et al.'s experimental study, students created reports, book wraparound bands, and shelf talkers after reading manga and proceeding through all three levels of text comprehension established in van Dijk & Kintsch's model [13] [15]. Similar learning activities that target reading at the sentence level have been conducted; however, practice for reading manga consisting of plural picture and text expression forms has not been reported yet. Okubo et al. demonstrated that the text comprehension model is also effective for learning to read and comprehend more complex works to learn reading in the same order as the reading process and summarizing contents [13]. Additionally, the results of the analysis of the assignment scores suggested the possibility that a plurality of comprehension levels is activated during the process of reading manga and a cause-and-effect relationship is established.

Considering the above findings together, we conclude that the process of comprehending manga, requiring complex reading skills, can be clearly understood in the context of van Dijk & Kintsch's text comprehension model [15]. This was the first study to attempt a verification of the practices and effects of Okubo et al.'s findings, and it confirmed that their developed method of learning reading in the order of the model's processes is also effective for learning manga reading.

Yamashita & Shimada pointed out that learning reading comprehension in Japan is often limited to continuous text; however, people often read texts that contain non-continuous text in everyday life and this skill should also be developed in schools [21]. We think that this suggestion applies not only to learning to comprehend non-continuous text but also to mixed texts that integrate a combination of continuous and non-continuous texts. Manga is regarded as a kind of a mixed text comprised of complex components, and Okubo et al.'s study findings indicate that this medium can be read deeply [13][18]. From the above, we consider that learning to read manga deeply is an effective means to support the Japanese education system's goal to enhance students' ability to comprehend a variety texts forms.

In this study, we used the scoring of the work that the children created as an indicator of manga reading comprehension. Our analyses of what they learned when creating each work confirmed that their learning achievement mirrored the different levels of reading in the text comprehension model. However, a limitation of this study is we cannot fully elaborate the causal relationship suggested by the text comprehension model because the children's reports reflected reading comprehension at both the surface and the text-base levels.

Based on the study by Okubo et al., it is expected that common cognitive abilities are involved between manga reading and text reading in the formation of text-base or the construction situation models [18]. It is necessary to clarify the similarities and differences of underlying cognitive processing between manga comprehension and sentence comprehension. Working memory is a significant element that influences reading comprehension of sentences, and it is important that future studies consider whether this capacity also has an effect on the reading comprehension of manga. By doing so, we would be able to clarify the similarities and differences of the skills needed for reading comprehension of manga and sentences. Prior studies have not adequately considered the abilities required in the process of reading manga. If these processes are made clear, it will suggest which abilities can be fostered by reading manga and facilitate the development of more diverse and effective teaching methods. As reading comprehension of a wider range of media becomes necessary, we can expect to see the emergence of new teaching methods for teaching reading comprehension.

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