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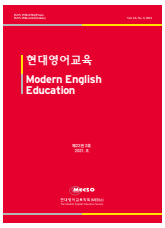

Development of an AI Chatbot-Based Teaching Model for English Picture Book Retelling Activities*

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ABSTRACT

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The aim of this study was to develop and apply an AI chatbot-based teaching model for English picture book retelling activities in elementary schools. Participants were 18 students of the 5th grade who performed the retelling activity with three English picture books. AI chatbots were built with Google Dialogflow API. The criteria for building them were developed based on previous studies. Results are as follows. First, the model was composed of two lesson periods. In the first period, learners read the story together and checked their comprehension. In the next period, a teacher modelled retelling to students and the AI chatbots mediated learners' retelling by asking questions. Finally, learners independently retold the story. Second, the criteria consisted of linguistic and affective perspectives, with four elements for each. Finally, students' productions showed that the design of the chatbots' prompts and scaffoldings partially affected students' production. Moreover, the chatbots' utterances should be sophisticatedly designed according to learners' levels to gradually elicit their productions. This study suggests that integrating AI chatbots into classrooms can mediate young learners' story retelling to partially support instructors who teach English reading skills in regular classes.

I. INTRODUCTION

After the revised 7th Korean English curriculum, the studies of story retelling activities have been conducted as a way of integrating reading and speaking skills due to the increasing interest in the Whole Language Approach among experts and teachers. Instructors and experts have recognized the effects of story retelling activities on English language learning (ELL), and as it has been studied different opinions about its methodologies have been put forth. The methodologies included story structures or story grammars in the activity by reflecting on various research

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(Morrow, 1985; Reutzel & Cooter, 1999; Stein & Glenn, 1979; Thorndyke, 1977). The studies on the story retelling have been performed actively starting from Morrow's research (1985) which facilitated young English language learners (YELLs)' acquisition of story structure concepts, critical thinking, and spoken English when they focused on the story structure while joining the activity (Benson & Cummins, 2000; Gibson et al., 2003; Morrow, 1985). There also have been many experimental studies and action research related to the field in South Korea since the early 2000s, and it has been found that the practice has had positive effects on YELLs' spoken English, comprehension ability, and interest in the activity (K. Y. Jung, 2013; M. S. Kang, 2003; S. Y. Lee, 2018; H. J. Oh, 2001; E. Y. Park, 2008).

However, as is true with all measures of English learning activities, teachers have faced several struggles such as the lack of instructors' pedagogical knowledge of the question, the limit of class time, the lack of teaching materials, and the gap between pupils English language abilities despite its positive effects on language learning (K. J. Park & H. R. Kim, 2017). In order to overcome these, a reliable and practical tool is desirable to assist teachers in facilitating the learners to effectively and efficiently participate in the retelling activity. In this trend, the research related to the application of the artificial intelligence (AI) chatbot on English language learning has been conducted among experts and teachers recently. The AI chatbot has been considered to be a valuable educational tool that is able to handle diverse challenges in English learning activities referring to the studies in the field of English education in South Korea (S. Y. Chu & D. G. Min, 2019; S. Lee, 2019; Shim et al., 2020; E. J. Song, 2020; Y. J. Yoo, 2021; K. Yun & U. Maeng, 2021). The chatbot algorithms have decision trees of questions and responses that deal with the diverse communicative situation with students and prompt meaningful production, with fast analyses of students' spoken English data. It could be efficient for teachers to use retelling activities within their class time, and pedagogically designed questions produced by the AI chatbot could encourage the learners to make differentiated utterances. Moreover, the various pedagogical and communicative functions of the chatbots would make the picture book retelling activity more reasonable than the present situation.

The purpose of the current study is, therefore, to develop both a new teaching model of the AI chatbot-based English picture book retelling activity and criteria for designing an AI chatbot which facilitates learners' story retelling in the activity. Moreover, this paper finds out how the activity affects the learners' production, and whether the AI chatbot building criteria and specific strategies are well implemented. For these the following questions guided the present study.

1) How should a teaching model of English picture book retelling activity mediated by AI chatbot and the criteria of building the AI chatbot be structured?
2) How is the discourse between learners and AI chatbots in a new teaching model of English picture book retelling?

II. THEORETICAL BACKGROUND

1. Story Retelling

There have been diverse positive effects of using storybooks in English language teaching. Referring to previous research, it helps learners acquire sophisticated English structures, activate their background knowledge, and increase their interest in reading (Bower, 1976; Chomsky, 1972; Cohen, 1968; Durkin, 1966). Moreover, active participation in literary experiences leads to the growth of comprehension, spoken English, and a sense of story structure (Blank & Frank, 1971; Bower, 1976). In response to such various effects, studies on methodologies related to using storybooks are being actively conducted. Story retelling is one of the methodologies which make learners reconstruct what they have understood and use target language creatively.

Morrow (1989) suggested that story retelling is the process of assimilation and reconstruction of story contents by a reader or listener. By retelling a story, kids reflect on what they have read and individually interpret the story according to their different experiences. Teale (1984) indicated that the interaction during story retelling is inter-psychological as a listener and a reteller reconstruct a story together, and intra-psychological as the reteller undertakes the retelling task and transforms the story by reflecting diverse experiences. In other words, to redefine the concept of the story retelling according to previous research, it is a narrative process by reconstructing a story that is appropriate for learners' English reading ability.

Aligning with the concept of the story retelling activities, there had been several productive effects on students' English learning. First, it helps pupils improve their understanding and perception of a story. Zimiles and Kuhns (1976) who had researched with children who were from six to eight years old reported that retelling after listening to a story enhanced learners' recalling of its contents compared to the students who didn't. Furthermore, Brown's research (1975) suggested that young learners' comprehension of a story got better when they are engaged in the reconstruction of it. Second, it helps children understand the story structure. According to Whaley (1981), retelling a story made students enhance their sense of the story structure. Lastly, it improves learners' language ability. Morrow (1985) reported that the story retelling activity got students to actively reconstruct the story and convey it to others so that it provoked the pupils to improve their spoken English, to enhance reading comprehension, and to form the concept of the story structure.

Given the elementary learners' English level and textbook construction of South Korea, picture books with kids-friendly pictures and texts could be regarded as appropriate educational tools rather than the stories only made up of texts. Therefore, this study selected picture books to facilitate the students to readily join retelling activity.

2. Story Structure

As research participants of the current study are young language learners of elementary school, making them just read picture books and retell independently may cause high cognitive struggles. Therefore, it would be better if the acquisition of the story structure concept were preceded. This is because a well-formed story that readers appreciate without any cognitive huddle is constructed with solid structures and story grammars (Mandler & Johnson, 1977; Morrow, 1985; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977). According to prior research, well-designed stories have certain structures. The specific notions of the structure elements are explained in Table 1.

TABLE 1
Notions of Story Structure Elements

Elements	Notions
Setting	Time, place, and characters
Theme	A beginning event that causes the main character to react and form a goal or face a problem
Plot episodes	Events in which the main character attempts to attain the goal or solve the problem
Resolution	The attainment of the goal or solution of the problem and the ending, which may have long-term consequences

Improving a sense of the story structure to strengthen comprehension has been an issue among instructors and experts. Understanding the story structure has a positive effect on the growth of diverse literacy skills. For example, knowledge about the story structure makes learners know what to focus on and what is essential in a story. Consequently, it helps them interpret and reconstruct the story readily and effectively (McConaughy, 1980; Sadow, 1982; Whaley, 1981). McConaughy (1980) indicated that kids were able to recall and retell certain kinds of story structure elements more readily than others as the kids contributed more directly to meaning.

Consequently, there are some aspects that the sense of the story structure has on decoding the story. First, it provides some clues to learners to make them better grasp the stories. Second, it helps pupils deduce some missing parts or information about a story while they retell the story. Third, it plays a scaffolding role to make students recall the contents without hindrances by comprehending the overall story. To summarize, the concept of the story structure facilitates learners to reconstruct a story systematically in a sequence, unless they would remember the account irregularly without any logic.

3. Teaching Model of Story Retelling

The teaching model of story retelling has been continually studied and developed as the positive effects of story retelling have emerged. According to the study by Reutzel and Cooter (1999), understanding story structure and elements would make kids develop reading comprehension and fluency of the oral language. Consequently, they emphasized story mapping by creating a graphic organizer of a story to interpret its structure and contents. Benson and Cummins (2000) suggested several things be considered given the developmental level when retelling activities are planned: support, responsibility, and form of text. When it comes to support, instructors should decide specific strategies depending on how much support learners need. In addition, the retelling activity is divided into four kinds depending on the level of responsibility: modeled retelling, shared retelling, mediated retelling, and independent retelling. Lastly, there are several ways of presenting text depending on the level of students' language, a story text, the literary objective of the story, etc.

There has been a variety of research related to story retelling for young English language learners of an elementary school in South Korea. Most of these developed teaching models referring to the theory and globally preceded studies (M. S. Kang, 2003; S. Y. Lee, 2018; H. J. Oh, 2001; E. Y. Park, 2008; S. Yu, 2010). The research of Oh (2001) designed a story retelling model to study the effect of the activity on students' comprehension and interest. This introduced a step where learners use their mother tongue to retell a story. Park (2008) suggested a teaching model based on preceded research that significantly followed the theory of Reutzel and Cooter (1999), where a retelling activity is divided into four parts depending on the level of responsibility.

4. Grice's Maxims

Discourse is the speakers' collaborative process of meaning transfer and meaning construction. Grice (1975) explained the discourse systematically by constituting the cooperative principle, a universal framework of the discourse. Grice's maxims, suggested upon the principle, are composed of four elements of discourse. The summary of each component is in Table 2.

TABLE 2
Grice's Maxims (Panfili et al., 2021)

Quantity	Make your contribution as informative as is required for the current purposes of the exchange. Do not make your contribution more informative than required.
Quality	Try to make your contribution one that is true, specifically: Do not say what you believe to be false; do not say that for which you lack adequate evidence.
Manner	Be perspicuous, and specific: Avoid obscurity; avoid ambiguity; be brief; be orderly.
Relevance	Make your contributions relevant.

Since Grice proposed the cooperative principle, many linguists have analyzed and subdivided the effect of the guide according to the speech act or the sociolinguistic phenomenon in the discourse process. They let the maxims be changed diversely, and it has been questioned whether they can cover the overall discourse in the viewpoint of the universal pragmatics, which refers to the way of inter-comprehension within various kinds of communication (Lindblom, 2001; Panfili et al., 2021). However, Kitis (1999) indicated that relevance, one of the maxims, serves as a super-maxim that constitutes the correlation among adjacency pair, context, and contents of the discourse and exerts control of the pragmatic definition of truth. As a result, relevance has been a core concept that constrains the application of the other three maxims to allow the whole maxims to receive attention again as communication components.

Significantly, the maxims are gradually being expanded in the field of AI chatbot building strategy. It is particularly studied for evaluation criteria to select the winner of the Loebner Prize given to a chatbot that conducts the most similar human-like conversation in the contest every year. Furthermore, as a result of the maxims-based analysis of the dialogue between Alexa, the chatbot developed by Amazon, and a human, the dialogue proceeded systematically. It has structured the discourse logic for the AI chatbot to perform more developed dialogue and suggests the meaningful usability of Grice's maxims in the AI chatbot building process.

5. AI Chatbot Building Criteria

The experts and the instructors of elementary English education in South Korea have recently begun studying the usability of the AI chatbot to find its educational effect on young English language learners. The AI chatbot continuously provides real-time conversation opportunities, gives feedbacks tailored to the learners' production and motivates them by using meaningful negotiation in communicative tasks (S. Y. Chu & D. G. Min, 2019; Fryer & Carpenter, 2006; H. Kim, 2018; S. Lee, 2019). Although various research on the usability of the AI chatbot for English language teaching (ELT) has been conducted, few studies have related to scientific criteria of building AI chatbots for ELT.

AI chatbots developed thus far were based on the evaluation metrics of international AI chatbot competitions, such as the Turing test or the contest for the Loebner Prize, rather than standardized criteria or strategies. Starting from this, many researchers have developed evaluation rubrics appropriate for a specific field in which chatbots are used, have built and tested the chatbot abiding by the rubrics, and have explored their effectiveness (Chakrabarti & Luger, 2012; Hung et al., 2009; Kuligowska, 2015; Peras, 2018).

Notably, Chakrabarti and Luger (2012) designed a framework from a linguistic perspective to evaluate chatbot conversations based on conversation semantics and content representation concepts. It was suggested based on Grice's Maxims. Peras (2018) indicated five perspectives for the chatbot evaluation framework by adding a business perspective to preceded frameworks of Russell-Rose (2017). The proposed views are described in Table 3.

TABLE 3
The Chatbot Evaluation Framework (Peras, 2018)

Perspective	Detail	Category
User experience perspective	Analyze the quality of a chatbot based on the user's experience and feeling against the chatbot.	Usability
		Performance
		Affect
		Satisfaction
Information retrieval perspective	Analyze how well the chatbot meets the information needs of the users.	Accuracy
		Accessibility
		Efficiency
Linguistic perspective	Analyze the level of the linguistic accuracy of chatbots and the ability to return an appropriate response.	Quality
		Quantity
		Relation
		Manner
		Grammatical accuracy
Technology perspective	Analyze the ability of a chatbot to express human-like behavior.	Humanity
Business perspective	Analyze the business value, which is the difference between the effectiveness and the costs of the chatbot.	Business value

III. METHOD

1. Participants

Eighteen elementary school children, nine of whom were male and nine of whom were female, participated in this study. All of the participants spoke Korean as their first language. The children were drawn from a single fifth-grade classroom, and the school was located in an old suburb of a low-income neighborhood in Seoul, South Korea. The students carried out a diagnostic test, consisting of 25 items, which was presided over by the district office of education, where the participants' school belongs. The diagnostic test results were classified into three levels, with 14 students at the upper level, two students at the intermediate level, and two students at the lower level. However, since the test used in the study was made for all schools in the district to which the school belongs, the difficulty level could be moderate. Before the experimental study, the participants' English learning

data was collected from a pre-survey taken during the first week of the experiment. Table 4 shows the information in detail.

2. Instruments

1) Text Selection

There are numerous frameworks and theories that can be considered when choosing text for young language learners. In the present study, two of them were mainly considered. First, MetaMetrics, the U.S. educational measurement and research organization, devised the Lexile framework, a system to measure the text complexity of reading materials on the same developmental scale. Second, Vardell et al. (2006) suggested four elements to consider choosing story and genre for language learners: content accessibility, language accessibility, visual accessibility, and genre accessibility. Considering the textbook's content, the Lexile scale, and the four elements of Vardell et al. (2006), the researcher analyzed the textbook to select appropriate picture books that contain what the leaners had learned, and three picture books were selected as Table 5.

2) Dialogflow API

The AI chatbots that facilitate learners' retelling activity in the current study were built by using the Dialogflow API ES version. This interface is a graphical user interface, provided by Google, to build a rule-based chatbot based on natural language processing (NLP) technology

TABLE 4
Results of the Pre-Survey

Questionnaires	Responses	N (%)
1) When did you start to learn English?	Before school/The first grade	9 (50%)
	The second grade	3 (17%)
	The third grade	6 (33%)
2) What is your way of learning English outside of school? (multiple responses allowed)	Academy/Welfare center	11 (61%)
	Workbook	1 (6%)
	TV/Internet	3 (17%)
	Tutoring	1 (6%)
	Nothing	4 (22%)
3) What is your favorite learning activity of English class at school?	Story book/Picture book	4 (22%)
	Chant	0 (0%)
	Watching a video clip	2 (11%)
	Role-play	0 (0%)
	Game	12 (67%)
4) What are you most confident in: listening, speaking, reading, or writing in English?	Listening	3 (17%)
	Speaking	2 (11%)
	Reading	4 (22%)
	Writing	4 (22%)
	None	5 (28%)
5) How long have you read or learned English with story book or picture book?	None	5 (28%)
	Once or twice	4 (22%)
	1-2 months	4 (22%)
	3-5 months	2 (11%)
	More than 6 months	3 (17%)
6) Have you had a talk with AI chatbot?	Yes	4 (22%)
	No	14 (78%)

TABLE 5
Picture Books for the Experiments

Experiment	Picture book	Lexile scale	Text styles	Related chapter of textbook
1st	My Cat Likes to Hide in Boxes (Even Sutton & Lynley Dodd)	G1 (200L - 400L)	Cumulative picture book	Lesson 1. Where Are You From?
2nd	Farmer Duck (Martin Waddell)	G2 (300L - 500L)	Picture book	Lesson 8. She Has Long Curly Hair
3rd	Little Beauty (Anthony Browne)	G2 (300L - 500L)	Picture book	Lesson 7. What Did You Do During Your Vacation?

in a linear procedure. The rule-based chatbot is one that interprets a human's oral language by comparing the sentence patterns spoken by a human and the patterns archived in the agent's database. Hence, a builder's role is critical in building the AI chatbot as the developer should set key patterns from each sentence by predicting students' remarks to make the chatbot understand them.

3. Experiment Procedures and Data Analysis

1) Experimental Lesson Design

The teaching model of English picture book retelling mediated by AI chatbot has been developed by referring to the previous research of K. Y. Jung (2013), Morrow (1985), H. J. Oh (2001), E. Y. Park (2008), Reutzel and Cooter (1999) and modifying their models aligned with the purpose of the current study. A pilot study had been performed to find the participants' specific characteristics and unexpected variables to sophisticate the experiment. The draft version of its model was advised by the expert committee consisting of three faculties of English education to become the finalized version.

The model took two lesson periods in a row, a total of 80 minutes, and was performed in non-face-to-face online distance class through the Zoom video communications program. Due to the school rules for protecting the learners from the COVID-19 pandemic, instructors taught their students mainly through non-face-to-face online distance classes, and the participants attended face-to-face class only twice a week. Therefore, each experiment was conducted once a week for a total of three times. The learners were put in groups of four and carried out the retelling activity with their group members in an additional subordinate meeting room of the platform.

2) Experiment Procedures

The overall procedures of this study are as follows. First, the research topic was defined, and the underlying theories and previous studies were examined. Second, the draft versions of the teaching and the criteria of building the AI chatbot were developed and advised by the expert committee. Third, following the teaching model, the experimental study was conducted once a week, three times. Fourth, the students' retellings were digitally recorded for production analysis. The Dialogflow API provides the function, which transcribes a speaker's sayings automatically by using speech-to-text (STT) technology. The process of learners' retelling was also video-recorded, and the examiner ensured accuracy in the transcript by verifying the video recording. Fifth, the learners' transcripts were analyzed qualitatively. After the experiments, two students from each proficiency level in a range of three where the diagnostic test classified, were interviewed by the researcher to find out what could not be answered from the transcripts.

IV. RESULTS AND DISCUSSION

1. Teaching Model of English Picture Book Retelling Activity Mediated by AI Chatbot

Designing the teaching model included reviewing underlying theories and prior research to determine core perspectives and specific activities. The goal during development was to design a teaching model that would reflect and fit the characteristics of the AI chatbot and the young EFL learners in South Korea. The premise was that the concept of story structure would facilitate the students' narrating and retelling to the AI chatbot. The researcher determined three perspectives by referring to the previous studies to develop the model as shown in Table 6.

A draft teaching model was developed based on the perspectives in Table 6. As explained above, the expert committee advised the draft model. As a result of collecting advisory opinions from the experts, the changes made in the model based on the feedback were made in activities in the second period. Initially, the last activity of the second period was independent rewriting, where students rewrite the story in groups. However, the committee suggested that the activity be changed to align with the main activity in the retelling model. In response, the activity was transformed to independent retelling. In this section,

TABLE 6
Perspectives of the Retelling Model Mediated by AI Chatbot

Perspective	Detail
Story reading	- Learners learn words and patterns which are used in a story. - Teachers and learners talk about a story before reading the story. - Comprehension of a story should be checked after story reading.
Comprehension of story structure	- A graphic organizer is needed to recall a story and understand its story structure. - Pictures of a story need to be provided to help learners comprise a story structure. - Keywords for each picture should be given as scaffolding to facilitate the learners' reconstruction.
Story retelling	- Learners retell a story sequentially being mediated by an AI chatbot. - An AI chatbot elicits the retelling from the students through providing prompts related to the story structure.

TABLE 7
Final Version of the Teaching Model of English Picture Book Mediated by AI Chatbot

1st period **Story reading (Distance class with Zoom video communications interface)**	
Activity	Detail
Learning words and patterns of the story	- The learners learn words and patterns of the story by using Quizlet, a goal-oriented e-tool. - The frequency of word exposure is controlled equally to every learner.
Motivation	- The teacher motivates the learners by talking about book cover, pictures, etc. - The learners guess the story, and write it down in a simple sentence (The composition of the story and spelling does not matter). - The learners compare the predicted story to the original one, and guess some words or phrases from the original story.
Story reading	- The teacher reads aloud the story twice. - The learners listen to the teacher's reading and read the picture book.
Confirmation of comprehension	- The learners confirm their story comprehension by using comprehension checks composed of ten items by Google Form within ten minutes.
2nd period **(Distance class with Zoom video communications interface)**	
Comprehension of structures and contents	
Activity	Detail
Modeled retelling	- The teacher models retelling to make learners recall the story. - The patterns, used when retelling, are typified consistently to let learners get used to them. - The teacher fills in the blanks of a graphic organizer, and the learners follow the teacher. - The teacher writes down keywords under each picture of the story, and the learners follow the teacher.
Retelling	
Activity	Detail
Mediated retelling	- Using the graphic organizer and pictures made in the previous activity, the learners perform retelling by answering an AI chatbot's prompts.
Independent retelling	- After enough mediated retelling, learners retell the story independently without the AI chatbot.

learners independently retell the picture book after doing mediated retelling with the AI chatbot.

A committee member advised considering the addition of independent retelling between the first and second periods to support learners to conduct mediated retelling effectively. However, according to the pre-survey before the experiments, the majority had little experience learning English with storybooks or picture books. Therefore, the researcher decided to maintain the existing style given this issue to minimize the learners' stress and allow them to focus on mediated retelling. As a result, the final version of the model has been made and is presented in Table 7.

The model consists of two lesson periods in a row and takes 80 minutes in total. Due to the school curriculum to conduct distance learning for preventing students from COVID-19, the model was planned to be executed through the Zoom online video communications platform. In the first period, learners preview the words and patterns of the story through a goal-oriented e-tool called Quizlet. The period and frequency of word exposure were controlled equally to every learner. Secondly, the teacher motivates learners and stimulates their background knowledge by talking about the book cover as well as pictures of the story. Thirdly, the teacher reads aloud the story twice, and the learners read the picture books by listening to the story reading. After that, the learners confirm their story comprehension by undergoing comprehension checks composed of ten items through the Google Form within 10 minutes.

In the second period, learners seize the story structure and retell the story to the AI chatbot. To begin with, the teacher models retelling by comprising a graphic organizer and writing down keywords under eight pictures of the story to make learners recall the story. The instructor also typifies the patterns used for retelling consistently to have learners get used to them. Meanwhile, the learners interpret the story structure by composing a graphic organizer and writing down keywords under each picture of the story with the teacher. On top of that, learners use the graphic organizer and images made in the previous activity to individually retell the picture book to the AI chatbot by answering its prompts. Finally, the learners independently retell the picture book after mediated retelling with the AI chatbot.

2. Criteria of Building the AI Chatbot for English Picture Book Retelling

Creating the criteria for building the AI chatbot started with reviewing existing theories and research related to the AI chatbot evaluation rubrics. Chakrabarti and Luger (2012) developed a framework with a linguistic point of view to evaluate the chatbot's remarks by considering conversation semantics and the content representation concepts which Grice suggested. Peras (2018) designed an integrated AI chatbot evaluation rubric, including linguistics and user experience, which can be utilized in various departments. Dörnyei (2001) suggested 20 motivational facets that can be variously applied to a wealth of motivational techniques available for teachers. Among them, the researcher selected four elements directly related to the AI chatbot for facilitating students' retelling and their learning motivation.

By synthesizing and reorganizing the theories and the research, two perspectives were established to constitute the criteria: the linguistic perspective and the affective perspective. Firstly, the linguistic perspective refers to how the AI chatbot educationally initiates and proceeds a conversation with young language learners. According to the perspective, a chatbot should provide proper production amounts and prompt the learners to retell the gist of a picture book. Furthermore, its articulation must be related to the picture book in a clear and linguistically correct form. Therefore, the discourse with the students needs to be semantically connected. Secondly, the affective perspective alludes to how motivational the AI chatbot is in the retelling process. Based on the standard, it has to lower the learners' affective filter and increase their expectancy of success. Moreover, the chatbot is required to adjust its speaking level to learners' English proficiency. Lastly, the pupils take control of the overall process of the activity and perform retelling autonomously.

Draft building criteria were organized based on the perspectives explained thus far, and specific strategies composing each perspective were operationally defined for this study. The draft version was also advised by the expert committee. As a result, the propriety of the word 'perspective' in the framework was questioned, and they recommended the word 'criteria' to substitute for the word 'perspective'. However, as the researcher has already used the word 'criteria' for naming the framework of building the AI chatbot, 'perspective' was kept to represent the notion. In addition, prior research, examined as references, named the notion as 'perspective' as well. In this sense, the draft criteria were determined as the final version in Table 8.

TABLE 8

Final Version of Criteria of Building the AI Chatbot for English Picture Book Retelling

Perspective	Strategy	Operational definition	Reference
Linguistic perspective	Quantity	The amount of the AI chatbot's articulation related to a picture book is proper in the aspects of information retrieval and prompts of learners' speech, thus the chatbot guides the students' retelling appropriately.	Grice, 1989; Chakrabarti & Luger, 2013; Peras, 2018
	Quality	An AI chatbot facilitates learners to adequately retell the gist of a picture book by using keywords.	
	Relation	A chatbot's productions and prompts are closely related to the picture book's theme, and the discourse between the chatbot and learners is semantically connected to construct minimal pairs.	
	Manner	The level of meaning delivery, clarity, and structuring of chatbot utterances is appropriate, and the expressions are correctly constructed in a linguistic form.	
Affective perspective	Support	An AI chatbot provides scaffolding and positive feedback to learners in the discourse, and makes a supportive atmosphere to lower the learners' affective filter.	Dörnyei, 2001, 2009
	Experience of success	By designing the chatbot to understand various types of learner's utterances and give appropriate answers, it makes the learner increase the chance of success and motivates the learner by raising expectations for success.	
	Appropriateness of language level	By using a language format and topic suitable for the learner's level, the learner's cognitive burden is reduced, and communication with the chatbot is made enjoyable.	
	Autonomy	In the process of communication with the chatbot, learners take control of the learning process so that they can autonomously continue retelling at the desired stage even though they stopped in the middle.	

3. The Algorithm of the AI Chatbot

The AI chatbot used in the current study was developed following the algorithm in Figure 1. A detailed description of the chatbot is as follows. First, the chatbot asks the number of a student. This is because the chatbot automatically transcribes the conversation it has with the counterpart so that the researcher can analyze the discourse later. Therefore, the utterance of each student can be distinguished as the number of each student is recorded on the discourse. Second, the chatbot asks the student to retell the next scene by checking which scene has been retold among the eight scenes of a picture book. Third, if the student retells a specific stage correctly, the chatbot asks the student to retell the next one; otherwise, it keeps asking further questions until the counterpart succeeds in retelling the scene gradually. For example, if the student fails to retell the second scene, the chatbot judges whether the learner has said some keywords of the scene or not. If some keywords are uttered, the agent asks the pupil to tell the rest by providing corrective feedback. On the other hand, if the speaker says 'I don't know' not saying any keyword, the chatbot retells the scene instead and moves to the next stage. Additionally, if the student does not say anything, the chatbot asks the speaker to rephrase.

4. Qualitative Analysis of Discourse between Learners and AI Chatbot

1) Analysis of the Learners' Productions

The interaction between the AI chatbots and the learners showed four characteristics during the retelling activity, as shown in Table 9. The examples of the exchange are in Table 10.

TABLE 9
Four Characteristics of AI Chatbot-Learner Interaction

Case 1	An AI chatbot elicits a learner's retelling well.
Case 2	An AI chatbot does not recognize a learner's retelling and keeps providing related prompts though the learner recalls appropriately.
Case 3	An AI chatbot responds to a learner by determining that the student retold adequately, though the learner does not fully recall a specific part of a story.
Case 4	An AI chatbot does not recognize a learner's production as the student's pronunciation is ambiguous.

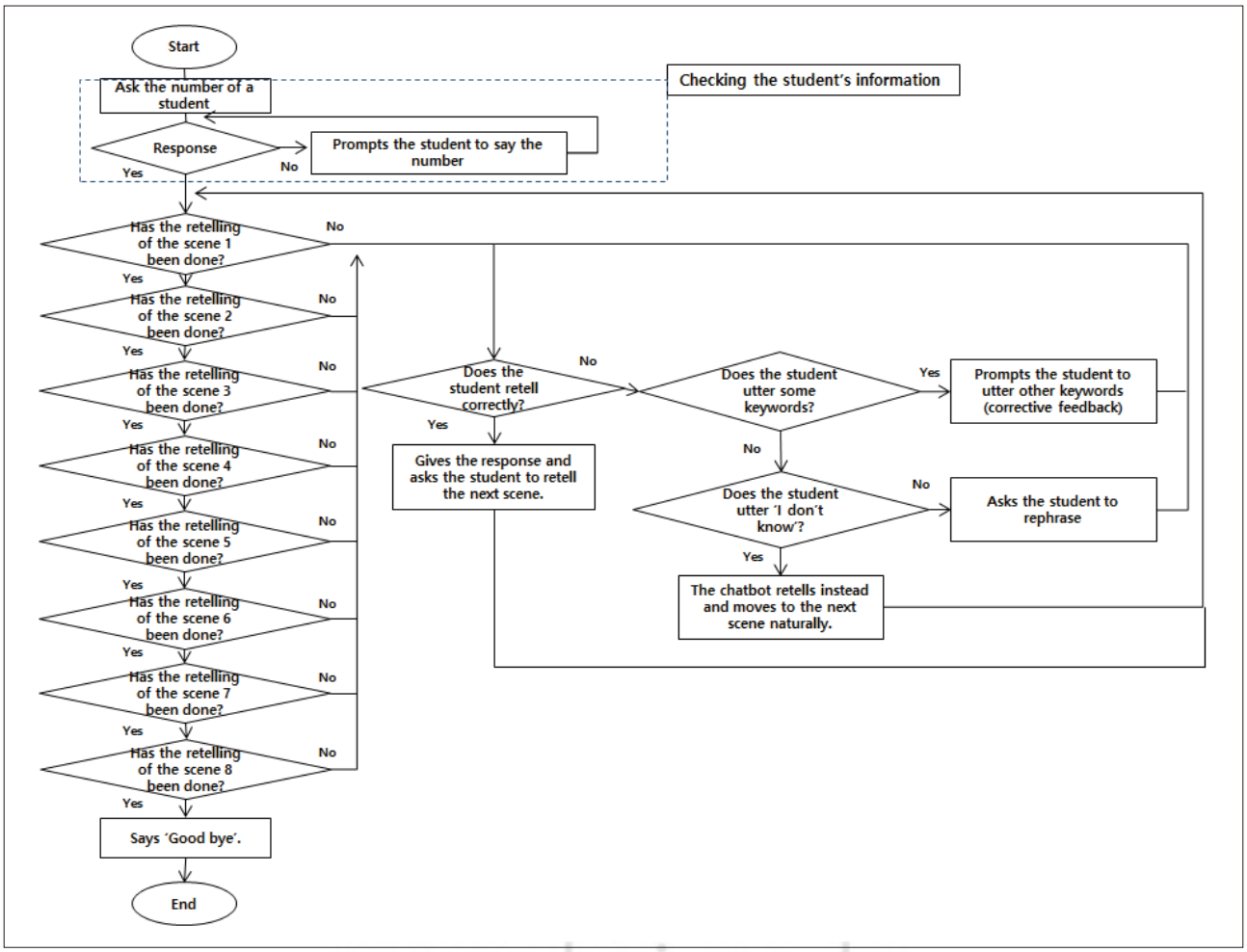

FIGURE 1 Algorithm of the AI Chatbot

TABLE 10
Examples of the Interaction Between AI Chatbots and Learners During Retelling Activity

Case 1 2nd experiment (Farmer Duck)	C: Tell me about the picture 3. C: How did the duck feel? C: How did the duck feel, sleepy or happy? C: The duck was sleepy and tired. What a poor duck.	L: Duck was tired. L: Hens help. L: Duck is sleepy.
Case 2 1st experiment (My Cat Likes to Hide in Boxes)	C: Tell me about the picture 7. C: What did the cat catch? C: What did the cat catch? C: What did the cat catch?	L: The cat from Brazil caught a very bad chill. L: Very bad chill. L: Chill.
Case 3 2nd experiment (Farmer Duck)	C: Tell me about the picture 2. C: The duck brought the sheep from the hill, and put the hens in their house.	L: Duck.
Case 4 1st experiment (My Cat Likes to Hide in Boxes)	C: Tell me about the picture 4. C: What did the cat do? C: The cat flew what? C: What did the cat fly, an airplane or a kite? C: What did the cat do?	L: From Spain flew an airplane. L: Spain. L: Airplane (The learner pronounces 'p' as /f/ sound). L: Airplane (The learner pronounces 'p' as /f/ sound). L: Airplane (The learner pronounces 'p' as /f/ sound).

Note. C: chatbot; L: learner

To begin with Case 1, the chatbots provided diverse prompts regarding story structures to the students and properly made them retell the picture books in detail during a gradual process.

Next, when it comes to Case 2, the chatbots did not recognize the pupils' utterances though the learners spoke appropriately, and they repeatedly gave prompts, as shown in Table 10. Due to COVID-19, the study was conducted in a non-face-to-face remote method. As the learners' production was delivered from the students to the AI chatbots through electric devices, the utterance recognition of the AI chatbots depended on the clarity of the students' microphones and their performance. Furthermore, the chatbots did not recognize some voiceless words such as 'cat', 'duck', and 'upset' appropriately. Therefore, when the current situation due to COVID-19 has been relieved, and face-to-face activities are possible, further research is needed on the recognition degree of students' speech by AI chatbots in this regard.

Thirdly, in Case 3, the chatbots tended to respond to the learners by judging that the students spoke correctly, even if the children did not fully articulate. This was because of the chatbots' design, which were developed to recognize the keywords related to target expressions which the participants should produce. Hence, the chatbots gave a response when a student uttered only keywords. In the example discourse of Case 3 shown in Table 10, the keyword coded in the chatbot for the scene was limited to 'Duck'; therefore, it responded even though the student did not say any further words. Typically, if a student cannot say keywords of an expression, the chatbots provide additional questions as prompts to make the student say the keywords of the expression. Therefore, more keywords should be coded in chatbots systematically for each scene so that the agents can scan learners' utterances more sensitively and provide additional questions if needed, rather than giving a response. However, too many keywords, coded in chatbots, could disturb the learners' production of those who have low proficiency of English ability, as it will provide excessive prompts to them. Thus, the number of keywords for each scene should be differentiated depending on end-users English ability, and additional in-depth research is necessary for this issue.

In Case 4, AI chatbots sometimes did not recognize learners' sayings as the speakers' pronunciation was unclear or inaccurate. For example, several students were confused about saying words with /f/ sounds and /p/ sounds. In addition, some of them did not speak accurately, not considering the intonation of certain words such as 'gorilla' and 'upset'. According to the present voice recognition level of the AI chatbot built by the Dialogflow API, it is regretful that it does not discriminate Korean YELLs' specific pronunciation like a human teacher. Despite the technical limitation, it suggests that the role of human teachers in English education is still desperately needed.

2) Results of Interview Regarding the Linguistic Perspective of AI Chatbot Building Criteria

As mentioned previously, two students from each of the three proficiency levels (upper, intermediate, and lower) were interviewed by the researcher to verify whether the AI chatbot building criteria developed in the current study were well implemented. The responses of the learners were analyzed based on the elements of the linguistic perspective.

First, the learners with upper-level English proficiency answered that the amounts of information conveyed by the AI chatbot were proper to comprehend. On the other hand, the students with intermediate and lower English

proficiency responded that it was hard to understand what the chatbot said. The chatbot delivered too many sentences, and the words were not easy to interpret. In this sense, to fulfill the quantity considering the learners in different levels, the number of the sentences spoken by a chatbot in every turn should be controlled to two. The words composing its utterance ought to be appropriate to the learner's level. Moreover, activities such as learning words are recommended before the actual retelling activity to help the students comprehend the picture book sufficiently.

Second, regarding the question related to the quality, all kids, except for one with lower-level English proficiency, replied that they could recall the picture books effectively by answering the prompts given by the chatbots when they were struggling to remember the stories. However, the vocabularies used in the prompts should be accustomed to the learners' English ability.

Third, there were different opinions regarding the relation of the chatbots' remarks to what the learners spoke. The pupils with upper-level English ability said the questions and answers spoken by the chatbots were closely related to their remarks. A child with intermediate level felt that the utterances of each other were well connected when a chatbot reorganized and spoke the contents retold. In contrast, the other child with the same level and a learner with a lower level replied that there was a lack of relevance when a chatbot sometimes gave responses that were not related to the end-users sayings. Additionally, the other student with lower English ability also mentioned the low relevance, but she attributed this to her low English proficiency. The phenomena were further analyzed through recorded videos. It was confirmed that the disconnection was caused by the recognition rate problem of the chatbot due to the voice delivery quality of speakers and microphones. This was because the activity was performed through the Zoom program in the pandemic situation. Thus, a detailed study is required when the learners and the chatbot can communicate in face-to-face circumstances.

Lastly, to analyze the participants' responses concerning the manner, it was found that the words spoken by the chatbots did not match the different levels of the learners, so it was difficult for them to grasp the meaning. The reason for this was expected to be due to the picture books that did not fit the learning contents of textbooks. The learners might struggle to comprehend the words in the English picture books written for native young learners, as the participants were educated according to the Korean English language curriculum, which is tailored to the EFL environment. Therefore, if the retelling activity goes on with enough vocabulary learning in a regular class with enough duration, not in a controlled experimental class, the problems regarding the issue could be alleviated.

As analyzed thus far, the Gricean maxims have been partially transformed to focus on goal-oriented dialogue against its original purpose, which is to facilitate phatic and private communication. However, there have been few studies and theories regarding the design of an AI chatbot talk, and the maxims were devised based on the cooperative principle. By considering them, it is reasonable enough to utilize Grice's theory to build the discourse between an AI chatbot and a young learner as the mediated retelling activity is a collaborative work between the chatbot and the learner.

3) Results of Interview Regarding the Affective Perspective of AI Chatbot Building Criteria

Examining whether the detailed strategies of the affective perspective were meaningfully implemented is as follows. First of all, it was evaluated that the chatbot reorganized the learners' utterances well by grasping their intention, despite their incomplete production, and waited sufficiently until they initiated. Moreover, a respondent said he felt like having a dialogue with a native speaker during the communication with the AI chatbot, and gained confidence in the process of improving his English for better conversation. In this sense, it could be judged that the AI chatbot played a significant role in supporting and giving an experience of successfully speaking English. However, the chatbot sometimes provided responses or prompts during a speaker's utterance. It was expected that the phenomenon was due to the learner's unclear utterances, which were interrupted or not adequately delivered to the chatbot because of the distance learning environment, and additional research is needed in the offline environment. Secondly, a student said that he would like the AI chatbot to understand even if his pronunciation was not perfect. Considering the response, the gradual collection of the Korean YELL's spoken English data is necessary to improve the AI chatbot's recognition rate towards the non-native speakers. However, it is not easy in the present situation. Third, the AI chatbots used in the study were designed to reorganize a specific part of a story and proceed with a conversation smoothly if a learner could not remember or retell the part. The researcher considered the experience of success by making the chatbot naturally handle dialogue in situations where the communication broke down, and several students responded that cognitive burdens were relieved in the process. In contrast, some of the respondents required the chatbot to provide prompts or scaffolding to retell at least slightly rather than skip the step. Hence, when designing an AI chatbot for a retelling activity, coding various keywords and prompts is recommended to gradually elicit a learner's production. Fourth, the students, except for the ones with upper-level English ability, answered that the language level of the chatbots was difficult, mainly due to demanding words. Thus, the level of words composing a retelling chatbot should be aligned with the pupils' general English ability by considering the element of the chatbot building criteria, which is the appropriateness of language level. Finally, students evaluated the chatbot positively for its function to continue the retelling activity on a picture by saying the number of the picture where they stopped when it unexpectedly exited. This was because it could be hard for them to remember what they had retold if they had to restart from the first picture, and it

was more efficient to continue from the image where they stopped. Upon their opinions, it may be confirmed that the learner's autonomy of the affective perspective was well implemented by allowing the participants to control the retelling activity partially, and its effect was also affirmative.

V. CONCLUSION

The current study has developed a teaching model of English picture book retelling activities mediated by an AI chatbot and a chatbot building criteria for creating the mediating chatbot. The discourse between the YELLs and the AI chatbots was analyzed qualitatively. The results are as follows.

First, the teaching model was constituted into two lesson periods. The vocabulary and pattern learning was necessary to make YELLs prepare sufficiently to comprehend a story structure and its contents. Moreover, the pictures and the graphic organizers related to the story were required to be given to the learners. They supported and facilitated the learners to retell the story well. The criteria for building the AI chatbot consisted of two main perspectives: a linguistic one and an affective one. There were four elements in each perspective. For the linguistic perspective, there were quantity, quality, relation, and manner. When it comes to the affective perspective, there were support, the experience of success, the appropriateness of language level, and autonomy.

Second, the productions of the students during the retelling activity were analyzed qualitatively with the transcripts and in-depth interviews. Although there were cases where the chatbots guided well and elicited the learners' retelling by providing prompts, there were some cases where they interrupted student's retelling by not recognizing the learners' utterance or pronunciation and responding to the students' inappropriate words. Also, there were different opinions toward the chatbots depending on the respondents' levels of English proficiency. This was because of the delivery problems of voice devices due to the distance learning environment that disturbed their communication with the chatbot. Moreover, the level of the words and the sentences that the chatbots use should be controlled according to the moderate level of the learners. Lastly, various keywords of target expressions are required to be coded sophisticatedly to gradually elicit the end-users utterances rather than just skipping a particular part by giving general responses. Hence, there needs to be an additional in-depth study in this regard when the pandemic situation becomes stable.

Although various issues were found in the study which could support further research upon the AI-mediated retelling, several limitations appeared due to the environmental characteristics of the current study. To begin with, the non-face-to-face situation because of the pandemic circumstances has brought about many unexpected incidents during the communication between the chatbots and the learners. Thus, in-depth research about chatbots' recognition during the retelling, chatbot-student interaction, including many other factors, is needed after the current circumstances improve by controlling what interrupted this study. Furthermore, the teaching model developed in the current study should be applied to other students by different teachers. As a result, the instructors' opinions about the model are necessary to be collected to supplement the model. Next, as the participants were 18 students of a metropolitan city, we should be cautious about generalizing the results of this study to all elementary school students in South Korea.

Nevertheless, this study suggested the possibility of using AI chatbots in the classroom to mediate and facilitate the picture book retelling activities for child learners, and based on this, the following suggestions can be made. First, the teaching model developed in the current research needs to be practiced in an ordinary offline environment without the hindrances of the pandemic situation. In addition to this, there needs to be various communities where teachers study together to develop and apply AI chatbots on teaching reading skills. Second, instructors need to perceive that AI chatbots are not something to be rejected but rather something to work with to provide effective and efficient education. Thus, the AI chatbot would be a collaborator rather than a competitor. Finally, for a chatbot to communicate at the same level as a human or to understand the ambiguous pronunciation of young Korean learners, additional research is needed to improve AI chatbots and natural language processing technologies by collecting the data related to the features that appear only in Korean child learners' speech. Considering the various points discussed thus far, it is expected that this study could be of partial support for teachers who have been conducting traditional English reading-related classes.

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