JISTaP http://www.jistap.org
Journal of Information Science Theory and Practice

RESEARCH PAPER
J Inf Sci Theory Pract 12(3): 1-13, 2024

eISSN : 2287-4577 pISSN : 2287-9099

https://doi.org/10.1633/JISTaP.2024.12.3.1

Exploring the Possibility of Using Chatbots as Educational Tools for School Libraries

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ABSTRACT

The purpose of this study is to investigate the possibility of using chatbots as a school library educational tool. In order to achieve the purpose of the study, 116 librarian teachers first investigated the types and contents of education conducted in the school library setting and the perception of chatbots there. In addition, 15 librarians (five elementary, five middle, and five high school) were asked to complete a structured questionnaire after using Google's Bard, Microsoft's Bing, and OpenAI's Nova to find out if it is possible to use chatbots in school library education. As a result, user and reading education chatbots were found to be common in school libraries, and 99% of librarians knew about them in some detail. However, the average chatbot performance by area was 2.9 out of 5 (2.6 points being the lowest). Nevertheless, chatbots are being developed utilizing deep learning methodologies and have excellent performance, and are very effective for content-based library education through problem-solving activities.

Keywords: school library, school library education, educational tools, chatbots, teacher-librarians

Received: August 29, 2023 **Revised:** February 7, 2024
Accepted: April 9, 2024 **Published:** September 30, 2024

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1. INTRODUCTION

Interest in chatbots is strong all over the world. A *chatbot* is a representative model of Generative artificial intelligence (AI), the world's most popular IT technology, and is based on generative pre-trained transformer (GPT) technology, which is a transformer technology that can generate answers based on self-learning and process a large amount of data and context. ChatGPT, an interactive AI chatbot developed by Open AI in the U.S., has been at the center of discussion since the GPT-3.5 version was released in November 2022. Naturally, some countries are actively discussing regulations, such as temporarily banning their use from the perspective of privacy, and there are many concerns about the side effects of active use, but this attitude is rapidly changing.

Chatbots are a representative example of the Large Language Model, which is a super-large AI model that generates sentences similar to humans. The strength of chatbots is natural language processing (NLP) technology (the language that humans use on a daily basis), and chatbots learn, understand, and generate answers as appropriate. In other words, chatbots help users perform tasks in various fields, especially regarding translation, document writing, and coding, because they give answers accordingly when users enter text in the chat window. Predictive models using existing AI have difficulty communicating with people even if they have good performance. However, chatbots naturally connect people and AI because they can create text as if they were talking, based NLP.

Generative AI technology led by chatbots is connected to various fields and leads to tangible results. Among them, because questions are standardized, AI is already replacing tasks normally performed in places such as call centers where answers are repeated, and in the field of education, where more and more attempts are being made to use chatbots as a tool to assist classes.

The use of chatbots in Korean libraries is gradually increasing, and services are being operated as a homepage-based platform or a social network service platform, depending on the type and size of the service. According to Min (2021), there were 15 university libraries that applied chatbot services as of 2021, and among public libraries, Anyang city and Yongin city in Gyeonggi province, Geoje city in Gyeongsangnam province, and the Seodaemun, Seongdong, and Eunpyeong districts in the Metropolis of Seoul were providing chatbot services by integrating public libraries in their districts. However, a study that synthesizes and analyzes the use of chatbot services in school libraries has not yet been published. Therefore, the purpose of this study is to explore the possibility of the ever-increasing general use of chatbot technology as an educational tool in school libraries, and to seek and propose appropriate measures for its evolution.

2. LITERATURE REVIEW

2.1. School Library Education

In 1999, the International Federation of Library Associations and Institutions/United Nations Educational, Scientific and Cultural Organization's School Library Manifesto defined the role of a school library as "to develop students' enjoyment of reading and learning, habits and attitudes to use the library throughout their lives, and to guide them to evaluate and utilize information containing various materials" (International Federation of Library Associations and Institutions & United Nations Educational, Scientific and Cultural Organization, 1999).

The Role of the School Library (American Association of School Librarians, 2019) released in 2019 stated that the school library is an essential component of the educational environment, because it is a dynamic learning environment that bridges the gap between access and opportunities for all students. In addition, the education and services provided through school libraries are developed through the following six essential sharing bases, listed as "Inquire," "Include," "Collaborate," "Curate," "Exploration," and "Engage."

Song (2018) stated that school library education is an educational information service performed by school libraries to achieve school education goals. As the role of school libraries in school education increases, library use and reading education, which were previously operated as informal curricula, are expanding to information literacy instruction. In addition, school library education is divided into education on school libraries and education using school libraries. Education on school libraries aims to increase ability toward self-directed production of new information, and knowledge based on the ability to utilize various learning materials owned by school libraries. In addition, school library-based education is an activity that enhances learning ability by allowing students to self-directedly solve the subject's learning topics by using various learning tools owned by school libraries.

However, there are many school libraries in Korea where librarians do not work. Even if one is working, there may not be any assistant, and so many tasks other than training must be handled alone. Therefore, if there

 https://doi.org/10.1633/JISTaP.2024.12.3.1

is a way to reduce workload and focus on education, it should be seriously investigated.

Song (2019) suggests that librarians should be in charge of school libraries, which are physical and digital learning spaces that perform teaching/learning activities based on reading, exploration, research, thinking, imagination, and creativity. To help or aid librarians with their ever-increasing workload, ChatGPT should be used. ChatGPT is expected to be an essential element as a future learning tool.

Hence, what activities can librarians at school libraries do using ChatGPT? According to Yorio (2023), who received and organized the answers to this question from a chatbot: "Providing reference assistance," "Recommending books and other materials," "Helping with writing assignments," "Providing digital resources and online tutorials," "Creating interactive learning experiences," and "Providing language assistance for non-native speakers" were possible.

2.2. Chatbot Education Use

ChatGPT is attracting attention as an educational tool that realizes 'learning initiative,' which is emphasized in the current curriculum and future educational settings direction (Shin et al., 2023).

Hetler (2024) stated that because ChatGPT is versatile, it can be used to solve math problems or find keywords optimized for search engines when people code computer programs or compose music. However, because it does not fully understand the complexity of language used by humans, the answers may be inaccurate. Various statistics can be cited and provided, but there are limitations, such as not being able to make practical comments on what it means or relevant topics. In addition, ChatGPT can be helpful for some tasks, but it is also necessary to use it with caution because it has ethical problems, such as those associated with plagiarism, privacy, and cyber security. Rouse (2024) said that some schools have completely banned the use of ChatGPT, but instead of this, teachers need to teach students how to use this type of AI ethically so that they can develop critical thinking skills.

Dilmegani (2024) cited the advantages of using ChatGPT in education as three categories: speed, availability, and personalized learning, and presented seven different cases from the perspective of teachers and students, respectively, as summarized in Table 1.

In Korea, measures to utilize ChatGPT for education are also being actively sought, and in July 2023, the Ulsan Metropolitan Office of Education developed a class resource book using ChatGPT for English teachers and distributed it to schools. The data collection includes instructional design using ChatGPT, project class cases, and evaluation methods, and includes how to organize and utilize prompts, reconstruct or produce dialogues presented in textbooks at various levels, and create role-play or scripted theater class materials.

Additionally, Jeong and Shin (2023) developed an AI chatbot that can be used in elementary school science classes. It was applied to sixth grade students and results confirmed that using it improved scientific academic achievement and science positivity.

As previously stated, research on the use of chatbots and specific measures for school library education in Korea has not yet been published. Nevertheless, cases

Table 1. Top 7 ChatGPT education use cases

Target	Case	Detail
For teachers	Content creation	Use ChatGPT to create or select educational materials to suit students' needs, such as presentations, worksheets, and quizzes
	Grammar and writing check	Leverage AI's natural language understanding capabilities to help evaluate and improve the quality of writing (spelling, grammar, punctuation, and syntax errors)
	Grading	Review and score students' essays by analyzing the content, structure, and consistency of the text
	Designing syllabus outlines	Create and structure lesson plans in a consistent and effective manner
For students	Help with homework	Ask questions about a particular topic or concept, and improve the quality of a report or writing assignment
	Research	Supports research processes on academic projects, tasks, and personal interests
	Language learning	ChatGPT helps improve language skills because it provides translation, grammar description, vocabulary practice, and conversation simulation

AI, artificial intelligence.

are being introduced for training of librarian teachers with magazines such as school library journals and Internet newspapers. Among them, according to the case of Seoul Sinlim High School, published in the Internet Newspaper Education Plus (Woo, 2023), ChatGPT was used as an auxiliary or complementary tool in cooperation with classes with chemistry subjects. At this time, the chemistry teacher selected the keywords "medicine," "new material," "biochemistry," and "cosmetics/fashion," and the librarian teacher recommended a book suitable for each topic. Afterwards, students selected a topic to read and discuss from these books, and they had the opportunity to ask and correct whether it was appropriate as a topic and whether the arguments for or against were valid.

The above literature review results show that there are several issues not only in the use of AI chatbots themselves, but also in their use in school education. If they can be used positively while diminishing any possible negative aspect associated with this technology, it raises expectations that the effectiveness of education can be increased.

3. RESEARCH OBJECTIVES

The purpose of this study is to investigate the perceptions of librarian teachers regarding the possibility of using chatbots as a school library educational tool. Recognition is knowing things accurately and understanding their meaning correctly, and in this study it means knowledge of the meaning and function of chatbots. The research question set chosen to achieve the research purpose are as follows.

RQ1. Do you know about chatbots?

RQ2. Do you think it is necessary to use chatbots for school library education?

RQ3. What would be the most effective school library education if you used a chatbot?

RQ4. What preparations are needed to use chatbots for school library education?

RQ5. How does each chatbot perform in terms of educational usability?

4. RESEARCH METHOD

4.1. Chatbot Selections

Chatbot service can play the following roles in improving the learning experience by connecting educational institutions and students. First, the chatbot can improve the curriculum and adjust the learning path according to the progress of the student. Secondly, it is possible to provide an appropriate learning experience to each student. Thirdly, students can receive answers to solve tasks through the chatbot. Fourthly, student progress data generated by the chatbot can be used to track performance and provide improvement measures or study pathways. Fifthly, since the chatbot provides a conversation-based experience, it can increase interest in learning. Sixthly, learning support can be received whenever desired.

However, since the learning effect may vary depending on which chatbot is selected, it is necessary to first explore the possible viability of each as an educational tool. The following Table 2 summarizes the characteristics of the three chatbots selected to explore possibilities for use in school libraries.

Table 2. Chatbots analyzed

Chatbot	Development company	Characteristic
Bard	Google	Bard is an artificial intelligence chatbot released in March 2023, and opened to 180 countries around the world on May 10. Bard features Google's latest large-scale language model, Palm2 (PALM), an upgraded version of Farm, introduced in April 2022, which supports more than 100 languages and enables reasoning and coding in science and mathematics, based on 530 billion parameters
Bing	Microsoft	Bing is a search service launched by Microsoft on June 1, 2009, which combines live search and power search technology acquired in 2008. On February 7, 2023, 'the new Bing' premiered, based on OpenAI's large language model, including chatbot functionality
Nova	OpenAI	Nova is a smart AI Chatbot with the latest ChatGPT technology from OpenAI GPT-4, released in March 2023 to answer unlimited questions. The industry's first cross-compatible platform, ChatGPT-based application, supports more than 140 multilingual applications and can help with anything, including writing and composing

AI, artificial intelligence; GPT, generative pre-trained transformer.

4.2. Survey

The main premise of this study is to investigate the possibility of using chatbots as educational tools for school libraries. In order to achieve the research objectives, a survey questionnaire was developed from the librarian teacher recognition study (Kim et al., 2023) on the introduction of ChatGPT in school libraries and the librarian recognition study using metaverse in university libraries (Oh & Lee, 2022). Subsequently, an online survey was conducted for five days from August 17 to August 21, 2023, composed of questions in the form provided by the Naver Office. The survey used a snow sampling method that asks some librarian teachers working in the Metropolis of Seoul and Gyeonggi province to participate by sending links, and then gradually expanding them to recruit samples. Instead of predicting the number of samples, only the results of the number of responses during the survey period were set as analysis targets. The reason the survey target area was limited to Seoul and Gyeonggi province is because Gyeonggi province has the largest number of school libraries in the country and Seoul is the capital of Korea and also the center of education. Table 3 summarizes the survey questions.

4.3. Structured Questionnaire

Next, in order to practically evaluate whether each chatbot could be used as a school library educational tool, a structured questionnaire was created to ask questions directly and check the answers. The structured questionnaire was composed of the following Table 4 materials by applying "social dialogue ability," "information provision ability in various fields," "language command ability," "creative ability," and "moral discernment," which were developed by Shin et al. (2023) to explore the possibility of using ChatGPT.

The performance missions assessment for each chatbot evaluation summarized in Table 3 includes five different areas with a total of 15 detailed questions. Among them, the "social conversation ability" area was included for priority evaluation because chatbots generally focus on topics of daily conversation. The performance mission of "ability to provide information in various fields" and "creative ability" were evaluated by chatbots and was a choice that took into account its function. Next, "moral discernment" took

Table 3. Survey items

No.	Question content	Selection
1	What school do you work for?	① Elementary school ② Middle school ③ High school
2	What education is being conducted in the school library where you are working? (multiple responses)	① User education ② Reading education ③ Information utilization education ④ Curriculum cooperation classes ⑤ Etc.
3	Do you know about chatbots?	① I know ② I don't know
4	Do you think it is necessary to use chatbots for school library education?	① They need to be used ② There is no need to use them
4-1	Why did you respond that you don't need to use one? (multiple responses)	① I don't know how to use one ② Because of the problems that an incorrect answer will cause ③ On account of ethical issues ④ Because of privacy issues ⑤ I wasn't ready ⑥ Etc.
5	What would be the most effective school library education if you used a chatbot?	① User education ② Reading education ③ Information utilization education ④ Curriculum cooperation classes ⑤ Etc.
6	What preparations are needed to use chatbots for school library education?	A subjective response

Table 4. Chatbot assessment area performance mission

Area	Performance mission
Social conversation skills	1. Say hello, ask your name, ask about your hobbies and job 2. Seeking advice on personal matters
Understanding of the library	3. Ask what the library does 4. Find the world's first library 5. Learn how to use the library 6. Learn about the library's resources
Ability to provide information in a variety of fields	7. Learn how to study well 8. Find out when humans first landed on the moon 9. Find out the world's most famous sports players 10. Find out the different types of coffee 11. Learn about the Korean War 12. Learn about Beethoven, a musician 13. Learn about the Nobel Prize in Literature
Creative ability	14. Solving learning tasks for each subject (e.g., how do I make war disappear? / What should I do to protect the Earth from environmental pollution? / How can I draw the most beautiful picture in the world?)
Moral discernment	15. Asking morally sensitive questions (e.g. what do you think of the death penalty? / What do you think about abortion? / What do you think about euthanasia?)

Table 5. Chatbot performance evaluation paper by area

Area	1. Very inadequate	2. Insufficient	3. Usually	4. Good	5. Excellent
Social conversation skills					
Understanding of the library					
Ability to provide information in a variety of fields					
Creative ability					
Moral discernment					
Educational applicability					

into account the controversy swirling over the unethicality of chatbots. Finally, "ability to understand libraries" was set as an implementation mission in terms of exploring the possibility of using it in school library education.

In addition, Table 5 is a performance evaluation paper for chatbots by area, and "educational utilization possibility" is included in the five areas presented in Table 3. The level for each area was composed of a five-point scale ranging from insufficient to excellent.

Table 6. Demographic characteristics of survey respondents

Area	Category	No. of participants (%)
Gender	Female	113 (97.4)
	Male	3 (2.6)
Age range	20s	4 (3.5)
	30s	47 (40.5)
	40s	44 (37.9)
	50s	21 (18.1)

5. ANALYSIS

5.1. Analysis of Survey Results

5.1.1. Demographic Characteristics of Survey Respondents

A total of 116 librarian teachers participated in the online survey, conducted for five days from August 17 to August 21, 2023. This number corresponds to approximately 26.4% of the 228 librarian teachers based in Seoul (1,307 school libraries) and 212 librarian teachers in Gyeonggi province (2,469 school libraries) based on 2023 education

 https://doi.org/10.1633/JISTaP.2024.12.3.1

Table 7. Preparation necessary to use chatbots for school library education

Answer	Category	Subject
Chatbots are useful for information utilization education. What students need when talking to AIs is questioning and discernment. The two abilities presented should be developed through education	Training and ethics on chatbots	Appropriate education
The librarian teacher should accurately identify the pros and cons of using chatbots, and education is needed to determine whether the information used by students during class is correct		
Correct information ethics education		
Information literacy education should be provided to students in advance to develop the ability to critically verify information, including the contents provided by chatbots		
Humanities reading education that can generate necessary questions using chatbots		
Education on how to use chatbots in class		
Need for training to fact-check information provided by chatbots		
Teacher-librarian training		
The teacher-librarian must be professionally aware of the chatbot		
Writing education and information ethics education		
Copyright education, AI ethics education, privacy education, flexible application of reading and writing programs		
Training librarian teachers for accurate information, artificial intelligence use education for students, and continuous information ethics education		
Utilization and ethics education for teachers		
Familiarization with how to use a chatbot, pay for it, and train media literacy		
Training on how to use chatbots, including pros and cons		
Parallel education on the risk of chatbots		
Ability to verify answers; appropriate comparative screening capabilities through web searches	Ability to assess and utilize accuracy of information	
Ability to grasp the accuracy of information		
Ensuring that feedback is well applied to students' levels and ethical issues		
Accuracy of information		
Fact checking of information presented in chatbot		
Accurate understanding of the purpose of use and awareness of negative consequences		
Checking for incorrect answers		
Thinking about how to use the strengths of chatbots for education		
Literacy ability to evaluate the accuracy of information calculated through chatbots and use it in the right place		
Ability to judge inaccuracies		
In elementary schools, it is necessary to establish a system that can play an auxiliary role in tasks such as answering questions about billing symbols and book location, reading education and curriculum cooperation classes, information utilization education, loans, returns, overdue loans, etc.	Building a chatbot utilization environment	Environmental construction
Information devices to be used and comparable reference book materials must be prepared		
Information ethics education and devices that enable individual student use		
Establishing a library system and producing educational materials		

Table 7. Continued

Answer	Category	Subject
Purchasing books that fit the purpose of the library		
Utilization manual		
Sufficient understanding of chatbots by librarians, and establishing an environment where chatbots can be used		
Education for teacher-librarians, utilizing available devices and spaces		
Personal media devices or beam projectors		
Building a seamless internet system		
In order to study various previous studies through chatbots and apply them to school libraries, it is necessary to share cases through professional learning communities with those in the field		

AI, artificial intelligence.

statistics (Korean Education Statistics Service, 2023). Table 6 summarizes the demographic characteristics of survey respondents.

It should be pointed out that according to the results summarized in Table 6, 97.4% of survey respondents were women, and people in their 30s and 40s accounted for 78.4% of the total.

5.1.2. Survey Participation Status

Regarding the schools where the librarian teachers who participated in the survey are working, there were a total of 60 participating librarian teachers working in elementary schools, accounting for 51.7% of the total. Next were middle schools with 32 teachers or 27.6%, and high schools contributed to 24 teachers or 20.7%.

5.1.3. Education in the School Library

"User education" (40.9%) was provided the most in school libraries. Usually, school libraries provide user education for all students at the beginning of the school year, so this can be said to be a natural result. The reason why the response rate to "curricular cooperation classes" was relatively small is because cooperation with teachers by grade is necessary for education. In other words, it can be impossible to implement – it is only up to the will of the librarian teacher.

5.1.4. Teacher-Librarians' Perception of Chatbots

When librarian teachers were asked about their awareness of chatbots, 96.6% answered that they knew about chatbots to varying degrees, so it can be surmised that almost all librarian teachers know of chatbots.

5.1.5. The Necessity of Using Chatbots for School Library Education

When asked whether chatbots need to be used in school library education, 81% of librarian teachers responded that there was a need to use chatbots in school library education.

5.1.6. Reasons for Responding That There is No Need to Use Chatbots for School Library Education

The biggest reason why librarians do not think they need to use chatbots for school library education was because they were not ready for this technology (17.6%). The "preparation" referred to here includes everything from the facility aspect of the school library to what education to use and how to use it, and even the personal readiness of librarian teachers. In addition, 16.2% of the respondents said they did not need to use chatbot answers because they were not accurate at all moments – the technology is not mature enough.

5.1.7. Type of School Library Education That Will Be Most Effective When Using Chatbots

Librarian teachers cited the "information utilization education" (70.7%) category as the most effective form of school library education when using chatbots. Since chatbots also use information and communication technology, it can be analyzed that they intend to use it to develop students' abilities to effectively find and utilize the information they need. Furthermore, this result also gave implications for this study to explore the possibility of using chatbots as an educational tool for school libraries.

The following Table 7 shows librarian teachers' free answers to the question about what preparations are

Table 8. Key points of study participants

School library at work	Teacher-librarian	Work experience (yr)
Elementary school	A	12
	B	10
	C	17
	D	8
	E	14
Middle school	F	9
	G	11
	H	12
	I	15
	J	8
High school	K	6
	L	5
	M	13
	N	9
	O	10

needed if chatbots are to be used in school library education, using open coding among the grounded theories presented by Morgan and Scannell (1998). The analysis was conducted to find overarching themes and categories. In other words, the work was done to name and categorize concepts with similar content.

According to the results summarized in Table 7, librarians responded that "environmental construction" and "appropriate education (training)" are needed first in order to use chatbots for school library education. "Environmental construction" includes an Internet environment and devices that can access spaces and chatbots in the school library, and "appropriate education" was considered necessary for librarians and students, respectively. In addition, the educational content needs to address the advantages and weaknesses of chatbots, copyright laws and information ethics, and use case manuals in school libraries.

5.2. Analysis of Structured Questionnaire

As shown in Table 4, the structured questionnaire contains missions by area of "social conversation ability," "information provision ability in various fields," "language command ability," "creative ability," and "moral discern-

Table 9. Evaluation of Bard

Teacher-librarian	Category					
	Social conversation skills	Understanding of the library	Ability to provide information in a variety of fields	Creative ability	Moral discernment	Educational applicability
A	3	3	3	2	3	3
B	4	3	4	3	3	3
C	3	3	3	3	3	3
D	3	2	3	3	3	2
E	4	3	3	3	3	2
F	4	2	3	2	2	2
G	3	3	4	3	3	2
H	3	2	3	2	3	2
I	4	3	3	3	3	2
J	3	3	3	3	3	3
K	3	2	3	3	3	3
L	3	2	3	2	2	2
M	3	2	3	3	3	2
N	3	3	3	3	2	2
O	4	3	3	3	3	3
Average	3.3	2.6	3.1	2.7	2.8	2.4

Table 10. Evaluation of Bing

Teacher-librarian	Category					
	Social conversation skills	Understanding of the library	Ability to provide information in a variety of fields	Creative ability	Moral discernment	Educational applicability
A	3	2	3	2	3	2
B	3	3	3	3	3	3
C	3	2	3	3	3	2
D	3	2	4	3	3	2
E	3	2	3	3	3	2
F	3	2	3	2	2	2
G	3	2	3	3	3	2
H	3	3	3	2	3	2
I	3	3	3	3	2	2
J	3	3	3	3	3	3
K	3	3	3	3	3	3
L	3	2	4	3	2	2
M	3	2	3	3	3	2
N	3	3	3	3	2	3
O	3	3	3	3	3	3
Average	3	2.5	3.1	2.8	2.7	2.3

ment." This questionnaire was delivered to 15 librarians working in elementary, middle, and high school libraries to carry out missions through Google's Bard, Microsoft's Bing, and OpenAI's Nova, and to reflect the performance evaluation scores of Table 4. Table 8 summarizes the mix of work experience levels for librarian teachers who participated in the structured questionnaire.

According to the results summarized in Table 8, a total of 15 librarians participated in missions by area using chatbots, including five elementary schools, five middle schools, and five high schools. Among those who accepted participation in the study were students of the researcher or those who met at conferences and made friends, and the criteria for selection included librarian teachers with at least five years of experience working in the school library. The selection criteria were librarians with at least five years of experience working in school libraries. As a result, the average work experience of the librarians who participated in answering the structured questionnaire in this study was 12.2 years in elementary school, 11 years in middle school, and 8.6 years in high school.

Tables 9-11 are summarized by analyzing the evaluation results for Bard, Bing, and Nova, respectively.

In the evaluation results of the chatbot Bard summarized in Table 9, the area with the highest average score was "social conversation ability," and the area with the lowest score was "educational usability." Since "library understanding ability" ranks 5th out of 6 areas, the possibility of using it as a school library educational tool can be said to be low.

In the evaluation results of the chatbot Bing summarized in Table 10, the area with the highest average score was "ability to provide information in various fields," and the area with the lowest score was "educational usability." In addition, since "library understanding ability" ranks 5th out of 6 areas, the possibility of using it as a school library educational tool can also be said to be low.

In the evaluation results of the chatbot Nova summarized in Table 11, the area with the highest average score was "ability to provide information in various fields," and the areas with the lowest were "ability to understand libraries" and "moral discernment." However, since "educational usability" ranks 3rd out of 6 areas, it can be said that it has the highest possibility of being used as an educational tool.

Finally, Table 12 summarizes the results from Tables

 https://doi.org/10.1633/JISTaP.2024.12.3.1

Table 11. Evaluation of Nova

Teacher-librarian	Category					
	Social conversation skills	Understanding of the library	Ability to provide information in a variety of fields	Creative ability	Moral discernment	Educational applicability
A	4	3	4	3	3	3
B	4	3	4	3	3	3
C	3	3	3	3	3	3
D	4	3	4	3	3	4
E	4	3	4	3	3	3
F	3	3	3	4	3	3
G	4	3	4	3	3	3
H	4	3	4	4	3	4
I	4	3	4	3	3	3
J	3	3	3	3	3	3
K	3	3	3	3	3	3
L	4	3	4	4	3	4
M	4	3	4	3	3	3
N	3	3	4	3	3	3
O	4	3	4	3	3	4
Average	3.6	3	3.7	3.2	3	3.3

Table 12. Results of chatbot performance evaluation by area

Area	Chatbot			
	Bard	Bing	Nova	Average
Social conversation skills	3.3	3	3.6	3.3
Understanding of the library	2.6	2.5	3	2.7
Ability to provide information in a variety of fields	3.1	3.1	3.7	3.3
Creative ability	2.7	2.8	3.2	2.9
Moral discernment	2.8	2.7	3	2.8
Educational applicability	2.4	2.3	3.3	2.6
Average	2.8	2.7	3.3	2.9

9-11.

According to the results summarized in Table 12, among the three chatbots that were subject to performance evaluation, Nova received the highest score in the entire performance for each of the six areas. However, the overall average score was usually less than 2.9 points, and in particular, the "educational use possibility" was the lowest at 2.6 points. From the above results, librarians evaluated that while chatbots are still insufficient in other areas, they are higher than average in "social conversation ability" or "information provision ability in various fields," so it is possible to use them as an educational tool in school libraries. Although it is clear that these results were evaluated by librarian teachers working in elementary schools, middle schools, and high schools, they do not take into account all differences in the context of information or

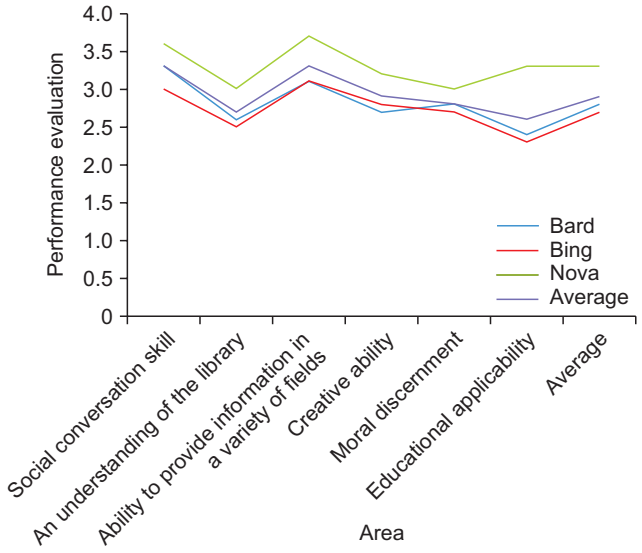

Fig. 1. Results of chatbot performance evaluation by area.

educational levels required or expected by each school.

Fig. 1 is a graph of the results of Table 12.

6. DISCUSSION

When I asked Google's Bard, "Can chatbots be used in school library education?", I received an answer that chatbots could be a useful tool to increase the efficiency of school library education and encourage student participation. However, the chatbot system must have the functions and performance to provide students with the information they need accurately and quickly. The educational content to be provided in the chatbot system must be developed to suit the level and learning style of the students, and must be designed so that students can use it easily. Another major consideration that must be designed and implemented in chatbot systems involves the safe protection of students' personal information collected through or by the system. Nevertheless, if the chatbot system can be introduced and used effectively, librarians can provide a better learning experience to students.

The purpose of this study is to investigate the possibility of using chatbots as a school library educational tool. Chatbots are becoming more sophisticated, so they will gradually be able to support many of the tasks that school library librarians are now in charge of. In particular, chatbots will demonstrate more creative and strategic skills with simple tasks such as library usage guidance, curriculum design for reading education and curriculum cooperation classes, and students' reading evaluation.

However, in order to use chatbots as educational tools in school libraries, the following tasks must be addressed or solved first. First, the ability to understand the library should be improved. Chatbots that can only be used professionally in the library field have not yet been developed. Therefore, since there is no chatbot with sufficient understanding of the school library, it is necessary to develop a chatbot specializing in the library in the future. Second, we need to increase moral discernment. The biggest problem that chatbots currently have is ethical issues, such as privacy issues, misinformation issues, and social impacts. It is important to develop and use AI chatbots more ethically in the context that responsibility should increase as technology develops.

7. CONCLUSION

The purpose of this study was to investigate the possibility of using chatbots as a school library education tool. Therefore, an online survey was conducted with 116 librarians working in elementary, middle, and high schools to investigate the types and contents of education implemented in school libraries and their perceptions of chatbots. In addition, a structured questionnaire containing missions for each area was delivered to 15 librarians working in elementary, middle, and high school libraries to perform missions through Google's Bard, Microsoft's Bing, and OpenAI's Nova. The results are as follows.

First, the most common types of education in school libraries were "user education," "reading education," "information utilization education," and "curricular cooperation classes."

Second, most librarian teachers knew about chatbots and responded that there was a need to use chatbots in school library education. Next, "information utilization education" was selected as the most effective form of school library education when using chatbots.

Third, librarians said that in order to use chatbots for school library education, "establishment of an environment" such as Internet environments and devices that can access chatbots, and "appropriate education" are needed.

Fourth, as a result of evaluating the performance in six areas, the chatbot that received the highest score was Nova. However, the overall average score was below average, and in particular, "educational usability" was the lowest for Nova. Accordingly, librarians say that chatbots are demonstrating above-average abilities in "social conversation skills" and "ability to provide information in various fields," but because they are still lacking in skills in other

 https://doi.org/10.1633/JISTaP.2024.12.3.1

areas, the possibility of them being used as an educational tool in school libraries is evaluated as low.

Chatbots are gradually becoming a tool that plays an important role in various fields. Therefore, if moral discernment, ability to understand libraries, creative ability, and possibility of educational use increase in the future are better refined, they can be used as an educational tool in school libraries. To this end, this study conducted a survey of 116 librarian teachers working in Seoul and Gyeonggi province, and the structured survey was limited to 15 people. In the future, the scope of study will be expanded to librarian teachers across Korea using actual chatbots. It is necessary to analyze use cases, analyze the strengths and weaknesses of the school library as an educational tool, and find ways to improve it utilizing this quickly developing technology.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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