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Reference Citation in High School Student Papers

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Abstract

Recently, the adoption of inquiry-based learning has grown in high schools, increasing student-led research activities. However, concerns remain about whether students are citing sources appropriately. This study investigates the actual state of reference citations in high school students' papers. The methodology involved collecting papers from high school students and analyzing the references in the bibliography. The survey targets were papers written by high school students from Super Science High Schools certified by Japan's Ministry of Education, Culture, Sports, Science, and Technology. The targets included citations of journal and E-journal Papers, books, web pages, and magazine articles. Findings revealed that only 4.0% of submissions included all essential bibliographic information. Citation deficiencies varied by the type of media referenced, and longitudinal comparisons indicated no significant improvement even after the introduction of new educational guidelines promoting inquiry-based learning. These results suggest that the current emphasis on inquiry does not necessarily enhance students' citation competence. The findings imply that many high school students cite sources without fully understanding their purpose or value in academic writing. Hence, this study highlights the need to systematize practical instruction in academic writing, provide continuous feedback during the research process, and strengthen collaboration with school libraries.

Keywords: inquiry-based learning, research activities by high school students, reference citation, bibliographic identification

1 Background and Purpose

According to Inagaki et al., inquiry-based learning is an activity where "students set problems, develop their ideas through information gathering, research, and experiments, and aim to solve the problems."[1]

The revised educational guidelines for Japanese high schools, announced in 2018 and implemented in 2022, have shifted emphasis to inquiry-based learning in high schools. Hence, the subject previously known as "comprehensive study time" was now called "comprehensive inquiry time," and new subjects were added, such as "science and mathematics inquiry, classical inquiry, and geographical inquiry" [2][3]. Additionally, the content emphasized proactive, interactive, and deep learning in all subjects.[3] This revision made inquiry-based learning man-

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datory for all high schools. Furthermore, in recent years, high school students have increasingly engaged in more advanced research activities such as paperwork and presentations at academic conferences, which go beyond the scope of inquiry-based learning defined by educational guidelines. In other words, the research activities previously undertaken by university students are currently being conducted by high school students.

When writing papers in research activities, properly citing sources is an essential practice. Given the increase in research activities among high school students and the necessity to include sufficient bibliographic information for bibliographic identification when writing a paper, there is a crucial fear that references will not be adequately cited in the high school students' research activities. Ono and Uda [4] point out many examples of incorrect reference citations used by high school students.

To solve the problem of improper reference citation in high school students' research activities, it is crucial to improve and deepen the instruction on this topic in schools. Furthermore, it is necessary to identify the specific details of the problem. This includes analyzing the composition of references students use, the ratio of appropriate to inappropriate citations, and other trends of bibliographic items that are easily omitted.

Therefore, this study aims to clarify the actual state of reference citations in high school students' papers. This study posed the following three research questions. RQ1 is “Are references written in a manner that allows their bibliographic information to be identified in papers written by high-school students engaged in inquiry-based learning?”, RQ2 is “What types of incorrect references are often found in papers written by high school students engaged in inquiry-based learning?”, and RQ3 is “ Are there differences in the notation of references across different years in high schools that conduct inquiry-based learning?”.

2 Previous Research

2.1 Previous Research on Reference Citation in High School Students' Papers

There have been studies analyzing the bibliographies of high school students' papers since around 1980, such as Mancall [5] and Craver [6].

Ono and Uda (2020) [4] conducted a survey targeting the bibliographies of papers written by Japanese high school students. Their findings noted that the reference citations written by high school students contained many descriptions that could not be identified bibliographically, such as missing or incorrect bibliographic information, making bibliographic identification difficult. However, no comprehensive study has been conducted based on detailed breakdowns or comparisons between years or to gain a thorough understanding of the actual situation.

2.2 Previous Research on Resource Collection for Inquiry-Based Learning

To the best of our research, no previous research has been conducted in Japan regarding the notation of references in high school students' inquiries and research activities. The following are examples of previous studies on collecting materials for inquiry-based learning.

Inagaki et al. (2024) [1] pointed out the need for teachers to support inquiry-based learning and provide guidance during the literature collection stage. The report points out that now each stu-

dent can use their digital device, the amount of information that students are exposed to when engaging in inquiry-based learning has increased, and the amount of information that teachers need to provide support has also increased dramatically, stating that support and feedback are essential for improving the quality of inquiry-based learning. In addition, when guiding students in the resource-collecting stage of inquiry-based learning, it is necessary to provide instruction during the learning process of collecting resources rather than giving ex-post instruction on the literature list, which is the learning outcome.

Niwai et al. (2024) [7] stated that students use five resources in inquiry-based learning: books, magazines, newspapers, Internet information, and other resources. Moreover, they suggested that to teach junior and senior high school students how to use appropriate information resources in inquiry-based learning, a system is needed to make them aware of the reliability and difficulty of the materials.

Both studies have focused on inquiry-based learning, including in elementary and junior high schools, and no research has been conducted that focuses on the more specialized activities of high school students. Furthermore, these studies examined the process of collecting resources for inquiry-based learning, and no research has been conducted from the perspective of bibliographic reference citations.

Therefore, in this study, to clarify the actual state of reference notations among high school students, we designed a survey based on three perspectives: whether bibliographic identification is possible, what types of incorrect reference notations occur often, and whether there are any differences in reference notations between different years.

3 Methodology

This study collected papers from high school students and analyzed the references in the bibliography. The survey targets and methods used in this study are as follows.

3.1 Survey Targets

Before collecting papers written by high school students for use as research subjects, the year the papers were written was decided. First, the most recent version of the educational guidelines, the 2018 revision, will be implemented in schools; therefore, the first target year was set to 2022. Furthermore, to investigate differences from the previous revision of the educational guidelines, it was decided that 2013 would be the second target year.

Next, to select the papers written by high school students that were the subjects of this study, we first selected high schools that published collections of documents written by high school students. First, the school had to be certified as a Super Science High School (hereafter referred to as SSH school). SSH School is a high school certified by Japan's Ministry of Education, Culture, Sports, Science, and Technology. They provide studies and development in technology, science, and mathematics education. SSH schools implement educational content that goes beyond the framework of curriculum guidelines. It is also believed that they are adopting more advanced approaches to inquiry-based learning that go beyond example inquiry activities, and it is expected that many high schools will publish collections of student papers. Second, we selected high schools continuously selected as SSH schools between 2013 and 2022. This study investi-

gated the difference in reference citations between the two sets of years. Therefore, it was necessary for the target high school to continuously engage in the SSH school initiative during these two years, hence this criterion was established. The third criterion is whether a high school has an open resource for collecting research papers online. We surveyed the websites of high schools that met the above criteria and investigated high schools that had published collections of student papers online. It is possible that schools may store Student's paper only within the school, but in this study, a survey was conducted limited to those that are open resources. To compare the reference citations between the two years, we selected high schools that published collections of papers in both 2013 and 2022. Consequently, nine schools met these criteria. We collected two collections of student papers from the nine selected high schools, one in 2013 and one in 2022, for 18 collections. The research targets will be the reference citations in the reference list at the end of each paper.

3.2 Define Survey Items

Next, we formulated survey items for reference citations. The survey items were developed using the following process.

3.2.1 Formulation of Survey Items for Research Question 1

To clarify RQ1, we determined whether the document notation contained sufficient bibliographic information to identify it. The extracted bibliographic information was used as the research item, and a survey was conducted.

Therefore, based on SIST02[8] documents, we extracted essential bibliographic information for identification. SIST02[8] is a document published by the Japan Science and Technology Agency [JST] as the standard for writing references in Japan. There are various formats for writing references, but we adopted SIST because it is a format that has been published as a public standard that can be used regardless of academic field, academic society, or association, making it easy to extract information that is commonly expected to be included in papers in any field. Based on the reference writing style described in SIST02[8], we extract only the bibliographic information required for each resource type. We investigated whether each of the essential bibliographic items extracted through this manipulation was included in the literature.

3.2.2 Survey of Media Types Used: Preliminary Survey

We conducted a preliminary survey to formulate survey items. The purpose of this survey was to examine the types of media listed by high school students in their bibliography. The survey method involved reviewing two papers randomly selected SSH schools and creating a list of the types of media that appeared. From the types of media that emerged in the preliminary survey, we extracted media with items from SIST02[8]. Additionally, we added papers by seniors at the same school, characteristic of high school students' papers, as an independent category. We used them as the types of media in the survey. Regarding alumni paper, we decided to treat them the same as journal papers in SIST02[8] and used the same required bibliographic information as journal papers in the survey.

The media types used are as follows: journal paper, e-journal paper, alumni paper (paper by seniors at the same school), books, web pages, magazine articles.

3.3 Conducting the Survey

A survey was conducted on 729 papers—314 from 2013 and 415 from 2022— of 18 collections. Finally, we summarize these characteristics and generate code.

4 Results

The findings of this study are as follows. All percentages are rounded to the second decimal place.

4.1 Breakdown of Document Types by References Citation of References

The total number of bibliographical references listed at the end of the collected papers was 2,130.

Table 1: Breakdown of Media Types Used for Referencing

	Journal Paper	E-journal Paper	Alumni Paper	Books	Web Pages	Magazine Article	Unknown Media Types	Others	Total
References Citation	280	151	78	538	924	9	55	95	2130
Each Media Percentage (%)	13.1	7.1	3.7	25.3	43.4	0.4	2.6	4.5	100.0

4.2 Counting of Essential Bibliographic Items

4.2.1 Missing Essential Bibliographic Items

Of the 729 papers surveyed, only 2 (0.3%) had no missing of essential bibliographic items in the reference descriptions. Furthermore, among the 1,980 reference citations excluding unknown and other notes, 80 (4.0%) lacked essential bibliographic details. The table below shows the breakdown by media type. The proportion of complete reference citations varied by media type. The results are shown in Table 2.

Table 2: No Missing Essential Bibliographic Items for Each Media Type

	Journal Paper	E-journal Paper	Alumni Paper	Books	Web Pages	Magazine Article	Total
Reference Citations	280	151	78	538	924	9	1980
No missing Essential Bibliographic Items	51	3	6	10	7	3	80
Percentage of All Citations Without Missing Items (%)	18.2	2.0	7.7	1.9	0.8	33.3	4.0

4.2.2 Counting the Number of Missing Essential Items

Next, we present the survey results (number and percentage) on missing essential bibliographic items. The required bibliographic information varies depending on the media type, so the results are presented in a table organized by media type.

Table 3: Journal Paper: Results by Essential Bibliographic Items

	Author Name	Paper Title	Magazine Title	Publica-tion Year	Number of Volumes	Number of Issues	Page Number
Number of Missing	16	36	124	43	180	224	170
Percentage of Missing Items in Journal Paper (%)	5.7	12.9	44.3	15.4	64.3	80.0	60.7

Table 4: E-journal Paper: Results by Essential Bibliographic Items

	Author Name	Paper Title	Magazine Title	Publica-tion Year	Number of Volumes	Issue number	Page Number	URL	Accessed Date
Number of Missing	56	12	126	97	140	143	141	7	114
Percentage of Missing Items in E-journal Paper (%)	37.1	7.9	83.4	64.2	92.7	94.7	93.4	4.6	75.5

Table 5: Alumni Paper: Results by Essential Bibliographic Items

	Author Name	Paper Title	Magazine Title	Publication Year	Number of Volumes	Issue number	Page Number
Number of Missing	37	7	9	58	75	78	59
Percentage of Missing Items in Alumni Paper (%)	47.4	9.0	11.5	74.4	96.2	100.0	75.6

Table 6: Books: Results by Essential Bibliographic Items

	Author Name	Book Title	Edition	Publisher	Publication Year	Total Number of Pages
Number of Missing	82	2	496	106	195	528
Percentage of Missing Items in Books (%)	15.2	0.4	92.2	19.7	36.2	98.1

Table 7: Web Page: Results by Essential Bibliographic Items

	Author Name	Web Page Title	Website Title	URL	Accessed Date
Number of Missing	765	332	492	108	718
Percentage of the Missing Items on Web Page (%)	82.8	35.9	53.2	11.7	77.7

Table 8: Magazine Article: Results by Essential Bibliographic Items

	Author Name	Paper Title	Magazine Title	Publication Year	Number of Volumes	Issue Number	Page Number
Number of Missing	3	2	2	3	5	8	6
Percentage of Missing Items in Magazine Article (%)	33.3	22.2	22.2	33.3	55.6	88.9	66.7

4.3 Patterns of Incorrect Reference Notation

Next, we present the survey results of typical patterns of incorrect reference citations. We compiled a detailed list of characteristic patterns of reference notation. Additionally, for each pattern concerning bibliographic details, a tag in the form [item name] was added at the top of the pat-

tern. For other cases, an [others] tag was assigned.

4.3.1 Results by Media Type

A table of bibliographical notation patterns expressed by media type is presented along with the codes.

Table 9: Patterns of Reference Citation in Journal Paper

Exposed Pattern	Number
[Page Number] Only the First Page Number is Displayed	27
[Magazine Title] Instead, Write the Name of the School	5
[Paper Title] Incorrect Paper Title	3
[Magazine Title] Instead, the Name of the Magazine Section is Displayed	2
[Author Name] The Names of Co-Authors are Not Listed, Nor Does It Say 'Et Al.'	2
[Magazine Title] Instead, Write the Name of the University	2
[Magazine Title] Instead, Write the Award Name That the Paper Won	1
[Author Name] The Order of the Lead Author and Co-Authors are Switched	1
[Author Name] Last Name Only	1
[Others] Only the Title of the Special Feature Is Displayed Without Listing the Reference Name	1

Table 10: Patterns of Reference Citation in E-journal Paper

Exposed Pattern	Number
[Paper Title] Do not Include a Subtitle	8
[URL] The URL is the Access Link to the File on the Student's Device	5
[URL] Show Download Link for the PDF File of the Literature	5
[Magazine Title] Instead, Write the Name of the University	3
[Magazine Title] Instead, Write Only E-journal Platform Name	3
[Author Name] Instead, Write the Name of the School	3
[Page Number] Only the First Page is Displayed	2
[URL] URL of the Institutional Repository Website	2
[Others] The URL Leads to a Different Paper	2
[URL] Show the URL of the E-journal Platform	2
[URL] The URL is not Stated, and the Title of the Referenced Article is Directly Hyperlinked	1
[Others] List the Contents of the Literature without Listing the Name of the Literature	1
[URL] Show URL Shortened Using a URL Shortening Service	1
[Author Name] Last Name Only	1

Table 11: Patterns of Reference Citation in Alumni Paper

Exposed Pattern	Number
[Magazine Title] Write the School Name Instead	3
[Author Name] Last Name Only	2
[URL] URL of Shared Cloud File in the School	1
[Author Name] Instead, Write the Name of the School	1
[Magazine Title] Instead, the Name of the Award that the Paper Received is Displayed	1
[Others] The URL is Indicated in Parentheses after the File Name	1
[Others] Indicate the URL and the Date You Accessed It	1

Table 12: Patterns of Reference Citation in Books

Exposed Pattern	Number
[Publisher] List the Name of the Paperback or the Company Division	34
[Others] List Multiple Volumes of the Same Book Title Side by Side	7
[Publisher] Indicated by Abbreviation	2
[Others] Display Only the Series Name	2
[Others] Add ″etc.″ to the End of the Reference	1
[Publication Year] Only the Last Two Digits are Displayed	1
[Author Name] Show Only the Co-author Name	1
[Publication Year] The Western Year is Written as XX-XX	1
[Author Name] Show Only the Translator Name	1
[Author Name] Change the Order in the Author Name	1

Table 13: Patterns of Reference Notation Expressed in Web Page

Exposed Pattern	Number
[Web Page] Display the Website Instead of the Web Page	197
[URL] Discrepancy Between the Title of the Web Page and the URL	138
[Web Page] Typo	46
[Others] Show the Contents of the Web Page	44
[URL] Missing and Omissions of URL Scheme and Host Name	28
[Website Name] Typo	16
[Accessed Date] Either the Date, the Month, or the Year is Missing	12
[Accessed Date] The Accessed Date is Displayed at the Top of the Reference List	11
[Others] “Various…”, “Other…” are Grouped Together under These Headings	7
[URL] Show URL Shortened Using a URL Shortening Service	6
[Author Name] Typo	4
[Others] The Format is ″Title of Web Page: Name of Website ″	4
[URL] URL of the Image	3
[Others] Writing Keywords in Web Research	3
[Others] Indicate When in the Research the Reference was Used	3
[Others] Multiple Web Pages from the Same Web	2
[Author Name] Instead, Use the Name of the Newspaper	2
[Author Name] Show Website Title as Author Name	2
[URL] Display the Download Link for the PDF File of the Document	2
[URL] Show Search Engine Redirect Links	2
[URL] The Numbers in the URL are Full Width	2
[Author Name] Instead, Show the Name of the School	2
[Others]Author Name is Interchanged with Other References in the Same Bibliography	2
[URL] The URL is Cut Off Because of Overlapping with the Text Box	1
[URL] The URL is Not Specified, and the Name of the Web Page is Hyperlinked	1
[Others] The Accessed Date is Hyperlinked to Another Document	1
[Others] The Cited Source is Replaced with a Different Reference Notation in the Same Reference List	1
[Author Name] Last Name Only	1
[URL] The Part Before the Top-level Domain is a “/” Instead of a “.”	1
[URL] Instead, Display the File Name of the PDF File	1
[Author Name] Change the Order of Author Name	1
[URL] Contains Query Parameters	1
[Author Name] Only the Author’s Seminar Name is Displayed	1
[URL] Write the Domain Name in Parentheses After the File Name	1

Table 14: Patterns of Reference Notation in Magazine Article

Exposed Pattern	Number
[Page Number] Only the First Page is Shown	2
[Author Name] Do Not List the Names of Co-authors or Write "et al."	1

4.4 Generated Results for the Overall Code Table

Summarizing the above results, the patterns were replaced with generalized expressions, and a code chart was created to provide an overview of the mistakes commonly made by high school students (Figure 1).

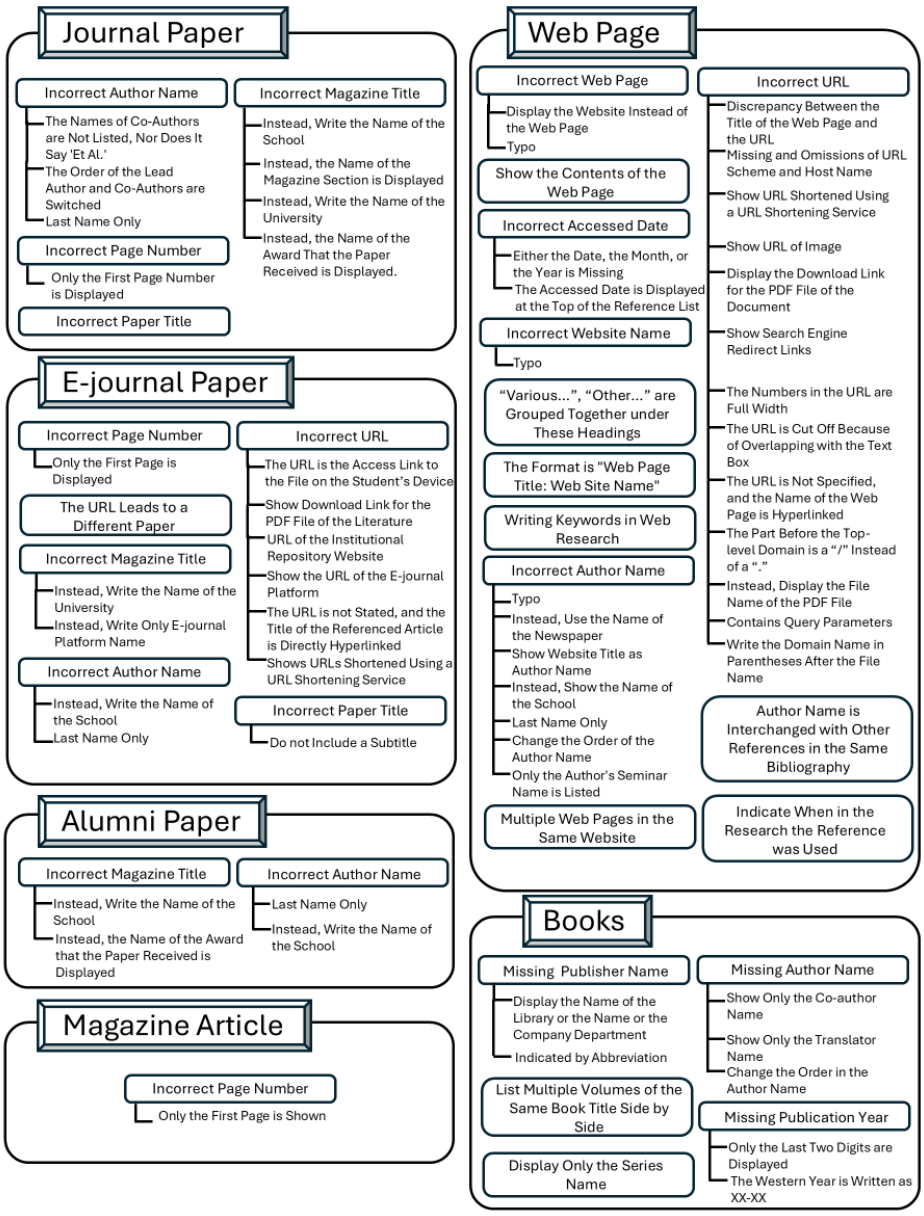

Figure 1: Chart of Analysis Results: Codes for Reference Notation Mistakes Made by High School Students

4.5 Differences Between the Two Years

Next, we show the differences in survey results between the two years. Significant differences existed in the number of papers and reference notations for each year. Therefore, comparisons were made based on the percentages of the whole.

4.5.1 Comparison of the Number of References Media Types

The number of reference notations collected from papers in 2013 was 699, and the number of reference notations collected from articles in 2022 was 1,431. The table below shows the breakdown of References Citation by media type, the percentage of media types in the total citations for each year, and the difference in percentages between 2022 and 2013.

Table 15: References Citations and Their Percentages by Media Type for 2013 and 2022

<2013>	Journal paper	E-journal Paper	Alumni Paper	Books	Web	Magazine Article	Unknown Media Types	Others	Total
References Citation	50	16	10	287	268	5	24	39	699
Percentage of 2013 (%)	7.2	2.3	1.4	41.1	38.3	0.7	3.4	5.6	100
<2022>	Journal paper	E-journal Paper	Alumni Paper	Books	web	Magazine Article	Unknown Media Types	Others	Total
References Citation	230	135	68	251	656	4	31	56	1431
Percentage of 2022(%)	16.1	9.4	4.8	17.5	45.8	0.3	2.2	3.9	100
Percentage of (2022 - 2013) (%)	8.9	7.1	3.3	-23.5	7.5	-0.4	-1.3	-1.7	

A notable result was observed for the proportion of books, which decreased by 23.5% in 2022. Additionally, there was an increase of approximately 8% in papers published in journal paper, e-journal paper and web pages, and a 3.3% increase in alumni paper. As for magazine articles, unknown media types and others, references decreased by approximately 1%.

4.5.2 Comparison of Results of Missing Essential Bibliographic Items

A comparison was made between the number of completely essential bibliographic items for each year.

A total of 314 papers were collected in 2013, of which only one lacked essential bibliographic information in the reference notation, accounting for 0.3% of the total number of documents collected in 2013. A total of 415 papers were collected in 2022, of which one had essential bibliographic information in the reference notation. This represents 0.2% of the total number of documents collected by 2022.

As a percentage of the total number of papers collected in each fiscal year, there was a decrease of 0.1% in 2022. However, the number of papers with no missing essential bibliographic information remained unchanged at one in both years.

Next, we compared the reference citations. Of the 699 reference notations collected from papers in 2013, excluding those of the unknown type and others, 636 reference notations were complete with essential bibliographic information, of which 22 were missing, accounting for 3.5%. Additionally, of the 1,431 reference notations collected from papers in 2022, excluding those of unknown type and others, 1,344 reference notations did not contain essential bibliographic infor-

mation, of which 31 were found, accounting for 2.3%. Compared to 2013, 2022 saw a decrease of 1.2%, with no significant difference between the two years. The table below shows the citations of complete references for each year by media type and the percentage of each type's total reference citations.

Table 16: Number and Percentage of References with No Missing Essential References Citation Information by Media Type in 2013 and 2022

＜2013＞	Journal paper	E-journal Paper	Alumni Paper	Books	web	Magazine Article	All Media
References Citation in the Media without Missing Items	8	0	1	10	1	2	22
Percentage of 2013 Reference Citation (%)	16.0	0.0	10.0	3.5	0.4	40.0	3.5
＜2022＞	Journal paper	E-journal Paper	Alumni Paper	Books	web	Magazine Article	All Media
References Citation in the Media without Missing Information	16	3	5	0	6	1	31
Percentage of 2022 Reference Citation (%)	7.0	2.2	7.4	0.0	0.9	25.0	2.3
Percentage of 2022 - Percentage of 2013 (%)	-9.0	2.2	-2.6	-3.5	0.5	-15.0	-1.2

5 Discussion

5.1 Is the Description Identifiable in the Bibliography?

Two of the 729 papers surveyed contained all the required bibliographic information, accounting for 0.3%. In addition, out of the 1,980 references cited, excluding Unknown and Others, 80 had all the necessary bibliographic information, accounting for 4.0% of the total reference citations. Given that essential bibliographic information is extracted as necessary for bibliographic identification, these results show that very few references can be identified bibliographically among papers written by high school students. This suggests that there may not be enough opportunities for high school students to learn bibliographic notation when writing papers or to have practical practice. It also appears that high-school students lack awareness of the importance of bibliographic information and why it is necessary regarding reference notation.

When looking at media types, the results showed that journal paper and e-journal Paper were more likely to have missing information, such as volume and page numbers. Simultaneously, articles on the web were more likely to have missing information, including Author Name and Accessed Date. This is thought to be related to the fact that the environment in which high school students gather literature relies heavily on information on the Internet, not just on paper. Information on the Internet can be difficult to transcribe correctly because the author's name is not clearly stated, and the update date varies depending on the article. Likely, the high school students themselves do not fully understand "at what level a web page should be treated as literature," "how to write a URL," or "why it is necessary to write the accessed date."

5.2 Patterns in Incorrect Reference Notation

This study demonstrates that many specific mis notations were found, such as "pasting a local file path or a PDF download link on a student's device in the URL field of an e-journal paper," "only writing the name of the paperback or the name of a company's department in the publisher field of a book," and "omitting or show incorrect URL" In, there were a large number of incorrect for the web page, as well as a wide variety of other mistakes, such as omissions of "http(s)://" or "www." at the beginning of a URL, and cases in which web page name and actual URL differed.

The background to these issues seems to be that when high school students conduct re-search activities, they view citations as merely a formality and do not fully understand the importance of ensuring the accuracy and reproducibility of the content. For example, if you save the PDF of a paper obtained from the Internet on your device and then copy and paste the link, there is a concern that it may become inaccessible if the access rights or the network environment change. In cases where the "Magazine Title" is not written accurately and is replaced with the name of a school or university, this is presumably due to a lack of awareness, as people do not bother to check which magazine it is, or confuse the "Magazine Title" with the name of the institution.

Furthermore, the phenomenon of students citing the top pages of entire sites as references rather than the web pages themselves suggests that they do not know how to deal with articles on the web or are unaware of the titles and publishers of articles. In general, there is a weak awareness of bibliographic identification, i.e., "writing in a way that uniquely identifies the source," which is thought to be the reason for the inconsistent notation in the same reference list.

Considering the above, to correct common patterns of incorrect bibliographic notation, it is necessary to clarify "which parts are necessary as bibliographic information" for each media type and provide guidance by presenting specific examples of mistakes made by high school students. Given that high school students are increasingly meeting information sources on the Internet, it is necessary to repeatedly point out specific points of caution that are specific to Internet information, such as the accurate transcription of URL and the distinction between a web page and an entire website. What is needed is a teaching method that makes it possible to visualize patterns of incorrect citations and their underlying causes, allowing students to understand why a particular citation is insufficient.

5.3 Comparison of Bibliographic Notations by Year

Although the educational guidelines were revised in 2022 to emphasize inquiry-based learning, there was no significant difference in the number of references with all the required bibliographic information in both years. This suggests that instruction and feedback on bibliographic notation did not improve at the same time as the educational guidelines were revised. That instruction on bibliographic notation has not been fully incorporated into the inquiry-based learning framework. The output of inquiry-based learning is not limited to reports and presentations; it can also be developed into a paper format, as in this case. In such cases, insufficient reference citations could reduce the reproducibility of the research, making it difficult to properly demonstrate the value of high school students' research activities. Therefore, it is desirable to establish and disseminate a method for teaching bibliographic notation to overcome the current situation.

6 Conclusion and Future Prospects

This study aims to clarify the actual state of reference notation in high school students' papers, considering the spread of inquiry-based learning in high schools and the increase in research activities by high school students. The survey yielded the following key findings. First, among all the papers written by high school students, very few references completely included all the required bibliographic information. The percentage of references with all the necessary bibliographic information among all the collected references was only 4.0%, and when viewed paper-by-paper, papers with no missing information accounted for 0.2%. This suggests that in many cases, papers written by high school students do not adequately demonstrate the relevance of their research to previous research achievements or the literature that forms the basis of their research, making bibliographic identification difficult. Second, when looking at media types, there were many omissions specific to each type. In addition, there are many notable typographical errors typical of web pages. Third, even after revising the educational guidelines to emphasize inquiry-based learning, the proportion of missing bibliographic items in papers in 2022 did not improve significantly, and the accuracy of reference notations in inter-year comparisons was limited. This shows that the institutional reform of revising educational guidelines did not directly lead to improved accuracy in reference notation.

The following three points can be cited as future challenges. The first is the systematization of practical instruction in document notation. This study shows many deficiencies in how high school students write their references. Especially, there is a need to create a system that allows students to learn how to write bibliographical items step-by-step, which can be identified and properly handled on the Internet. Second, continuous feedback was provided during the data collection stage. As mentioned in previous studies, there are cases where citation errors are difficult to correct, even if a paper is checked all at once just before submission. Therefore, it is necessary to create a format for guiding inquiry and research activities, such as by taking measures to make students aware of bibliographic notation from the material-gathering stage of their inquiry activities and by establishing a system in which students submit a bibliographic list of the materials they used in interim reports. Appropriate advice and correction instructions from teachers, head librarians, and school librarians will improve the accuracy of the final bibliographic notation. The third is collaboration with schoolbook libraries. This survey also revealed issues such as how to set a Magazine Title when publishing a collection paper unique to a high school and how to cite papers by senior high school students. By strengthening collaboration with schoolbook libraries, more specialized and continuous support can be established in these areas. Further, teachers and school librarians can take the lead in establishing standards for document notation and strengthening the framework for sharing instructional guidelines using advanced examples as models.

Through such efforts, our future challenge is to advance the inquiry-based learning of high school students and create an environment in which their research results are properly evaluated.

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