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Aims and scope

Science Editing (Sci Ed) is the official journal of the Korean Council of Science Editors (http://kcse.org) and Council of Asian Science Editors (http://asianeditor.org). It aims to improve the culture and health of human being by promoting the quality of editing and publishing scientific, technical, and medical journals. Expected readers are editors, publishers, reviewers, and authors of the journals around the world; however, specially focused to those in Asia. Since scholarly journals in Asia are mostly published by the academic societies, universities, or non-profit organizations, Sci Ed is sought to play a role in journal development. The number of publications from Asia is increasing rapidly and overpass that of other continents; meanwhile, the number of international journals and highly appreciated journals is yet to be coming forward. It is task of Asian editors to pledge the journal quality and broaden the visibility and accessibility. Therefore, its scope includes the followings in the field of science, technology, and medicine.

- Policy of journal editing
- Data mining on the editing and publishing
- Systematic review on medical journal publishing and editing
- Research ethics and medical ethics including clinical registration, statement of human and animal health protection, and conflict of interest
- Publication ethics: fabrication, falsification, plagiarism, duplicate publication, and authorship
- CrossCheck
- Legal issue in journal publishing
- Peer review process
- Reporting guideline for medical journals
- Medical and scientific literature databases
- Advanced information technology applicable to journal editing and publishing including PubMed Central schema, journal article tag suite schema, Digital Object Identifier, CrossMark, FundRef, ORCID, datacite, QR code, and App
- International standard of journal editing and publishing including International Committee of Medical Journal Editors' Recommendations
- Reference styles including Vancouver (NLM) style, APA style, IEEE style, and ACS style
- Digital publishing in the web and App
- Education and training of editors, reviewers, and authors
- Manuscript editing
- Journal evaluation
- Bibliometrics and scientometrics
- Finance of journal publishing
- History of scholarly journal
- Copyright and Creative Commons License
- Open access and public access approaches

Its publication type includes original articles, reviews, case studies, essays, editorials, meeting reports, book reviews, announcement, correspondences, and video clips. Other types are also negotiable with the editorial board. All unsolicited articles are subject to peer review. Commissioned articles are reviewed by the Editorial Board

About the journal

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Editorial

Can we improve the peer review system?

Kihong Kim

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I guess many authors have experience of receiving careless, erroneous, or unfair reviews for their papers. A careless review does not contain anything useful or relevant to the paper. Occasionally one finds the reviewer is clearly not an expert in the topic under discussion, but still makes a faulty argument to reject the paper. Maintaining the high quality of peer reviews is an all-important task for scholarly journals. In recent years, however, there have been many warnings that the current peer review system may not be sustainable [1]. Both the number of scholarly journals and that of published research papers have been increasing rapidly. In addition, many journals are under great pressure to shorten review times. All these factors contribute to making it more difficult to secure appropriate reviewers and maintain a fair and thorough review process, especially when the journal is not a prestigious one.

Could there be a solution to this problem? There have been many attempts to fix the peer review system. In the conventional system, there is almost no reward for anonymous reviewers. Careful review of a research paper requires a lot of effort and time. One primary motivation for reviewing a paper is a sense of responsibility for the academic community to which the reviewer is belonged. A good reviewer is usually a good researcher and a good author. Many researchers value carrying out their own research higher than anything else and do not like to spend too much time reviewing someone else's work, unless it is directly relevant to their research. In the current environment, there is a great difficulty in motivating researchers to review papers. In some journals, they have attempted to provide additional incentives, such as giving continuing medical education credits [2,3]. Though I have doubts about the real effect of giving out this kind of credits, I think it is one of the right directions to fix the peer review system. I do not think it is appropriate to appeal just to the sense of responsibility of reviewers to spend such a large amount of time and effort with almost no reward. Reviewing a paper has much similarity with reviewing a research proposal. In Korea, reviewers of research proposals receive their fees in cash from funding agencies, and I have never heard anyone complaining about it. In a similar spirit, I think it is not a bad idea to pay a suitable amount of money to the reviewers of journal papers. The usual responses to this kind of idea are that it will actually deteriorate the quality of peer review and peer review should not be done for material gain [4]. I agree with the latter point and think the monetary compensation should not be large, because otherwise it would attract bad reviewers who do the review mainly for money. I think, however, that this problem can be minimized by a careful management and an appropriate amount of compensation for reviewers will enhance their sense of responsibility for performing a good review and facilitate the peer review process.

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Another direction for improving the peer review system is to modify the conventional review process by adopting some new ideas. There have been discussions for open peer review, a form of which involves many reviewers participating in the review process openly. This has some similarity with online discussions of news articles in websites. I think this method will have similar problems as those online discussions, namely the more vocal people can influence the review process more strongly. In a recent essay, Goldstein [5] strongly advocated the method of the open access journal *eLife*, where a small number of reviewers and the editor make an online discussion to arrive at a single consensus report. I think this is a good idea, even though the reviewer workload can be larger than in the conventional procedure. In the conventional system, there is not much discussion or interaction among the participants, namely, the authors, the editor, and the reviewers. Providing an avenue for more interaction will be better. I think combining this method with the payment of reviewer fees might be a useful option to consider.

The peer review system is one of the corner stones of modern scholarly journals. In the United States and in Europe, intense discussions about fixing the problems of the current peer review system have been going on. In Korea, however, there has not been much discussion on it. I think it is time to start thinking about it.

Conflict of Interest

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

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Review

Quality open access publishing and registration to Directory of Open Access Journals

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Abstract

With the fast development of open access publishing worldwide, Directory of Open Access Journals (DOAJ) as a community-curated online directory that indexes and provides access to high quality, open access, peer-reviewed journals, has been recognized for its high criteria in facilitating high quality open access scholarly publishing and used as the portal for accessing quality open access journals. While the numbers of journal application to be inclusion in DOAJ in Asia are kept increasing dramatically, many editors of these journals are not very clear about the idea or concept of the open access which have been embedded in the application form containing 58 questions falling into several different criteria categories. The very commonly seen misunderstanding of the required item, inaccurate or vague or incomplete and even missing information, poorly organized website, non-transparent process of publishing, especially no open access statement and copyright statement, or conflicts between the policy statements would cause much more communication between the reviewer and the editor and delay the completion of the review. This article gives an in depth introduction to DOAJ criteria and detailed introduction to the general process on how to register to DOAJ, suggestions based on application review also is given for journal editors to better prepare for this application. And it is the most important for editors to keep in mind that to be indexed by DOAJ is not just about filling a form, it is about truly change and adapt to best practices in open access publishing.

Keywords

Basic requirements; Best publishing practice; Directory of Open Access Journals criteria; DOAJ Seal; Open access publishing

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Introduction

The open access scholarly publishing is booming in recent years. Research shows that open access movement is now disruptive and is traversing the scientific, technical and medical pub-

lishing industry with the speed and force of a tsunami [1]. This is also could be proved by the numbers of journals indexed by The Directory of Open Access Journals (DOAJ) which is the world recognized portal for quality open access journals. DOAJ was launched in 2003 at Lund University in Sweden with 300 open access journals indexed in the very beginning, the number of journals included in DOAJ has already increased dramatically and it contains more than 9,417 open access journals covering all areas of science, technology, medicine, social science and humanities.

The aim of DOAJ is to increase the visibility and ease of use of open access scientific and scholarly journals, thereby promoting their increased usage and impact. Also DOAJ aims to be comprehensive and cover all open access scientific and scholarly journals that use a quality control system to guarantee the content and thus to be the one-stop shop for users of open access journals [2]. Science Europe requires scientists to publish in DOAJ, Scopus, or Web of Science listed journals for European Union funded research [3]. On July 29, 2015, Scopus launched an open access indicator for journals indexed in Scopus. This indicator will allow users to easily identify open access journals within Scopus and journals are registered as being open access journals only if they are registered as gold open access or Subsidized open access at one or both of the following sources: DOAJ and the ROAD (Directory of Open Access Scholarly Resources) [4]. Here gold open access refers to those journals in which all peer reviewed scholarly articles are online available without any restrictions and for which an article processing charge (APC) has been paid while Subsidized open access do not charge an APC and are instead subsidized by other means, for example, by university, government, agency, corporate, sponsorship etc.

As DOAJ is very strict on and promoting the transparency and best practices of scholarly publishing [5], registration to DOAJ would not be just a procedure of filling the application form. The form itself is on the website of DOAJ at https://doaj.org/application/new [6]. Especially for those publisher who is new to DOAJ criteria, before starting to fill into the form, the publisher shall be clear and prepared to meet the requirements of DOAJ.

As the current higher criteria for indexing into DOAJ has been launched in March 2014, some publishers are required to do the reapplication which started from January 2015, in this reapplication project all journals indexed before March 2014 need to reapply to be indexed in DOAJ [7].

The application form now is both used for new application and reapplication. Only Journals which meet the criteria of DOAJ would be regarded as qualified open access journals and be indexed into DOAJ. Although the application form itself is very self-explanatory with guides in different languages, necessary explanation to key question items, and guidance and tutorial provided on the DOAJ website, journal editors might still feel there is some difficulties for them to complete the form. Inaccurate information, missing information or malfunctioned webpage links provided in the application form also caused extra time for reviewers to complete an application. For each of the successful application into DOAJ, generally there would be quite many emails communication between the reviewer of DOAJ and the journal editor to help improve their publishing practice.

This article will go through the application question by question to deeply explain the DOAJ criteria based on the application form, to clarify the quality open access publishing principals and suggestion will also be given to help journal editor better deal with different situation which may occur.

Evaluation Criteria and the Application Form

DOAJ is worldwide recognized for its high standard criteria of inclusion journals. In June 2015, the Committee on Publication Ethics, the DOAJ, the Open Access Scholarly Publishers Association and the World Association of Medical Editors updated their joint statement, originally published in 2013: the principles of transparency and best practice in scholarly publishing [5]. These principles were to a considerable extent derived from the criteria for the admission of journals into DOAJ that were expanded, updated and put into practice in March 2014 [3]. DOAJ also updated its criteria as a response to the maturing open access arena, the greater demands made on open access publishing by questionable journals and publishers, and to retain DOAJ's relevancy and importance in open access publishing in 2014.

The new DOAJ criteria, as presented in the application form, are divided into 5 sections: (1) basic journal information with 35 questions (2) quality and transparency of the editorial process, from question 36 to question 43, (3) openness of the journal in question 44, (4) content licensing from question 45 to question 51, and (5) copyright and permissions from question to 52 to question 54 [3]. And the form is followed by 3 extra questions asking about the name and email address information of the person who filled the form.

Among all the 54 questions to be answered in the application form in the 5 sections mentioned above, they are generally falling into three categories, the general questions to collect information, basic requirements for entry into DOAJ and the recommendations of best practices of which if qualified a DOAJ Seal will be awarded.

For general questions, accurate information is required, if not applicable, it could be left blank as the answer, but the number of this general questions are very few in the applica-

tion form. The basic requirements questions have to be answered with accurate information and also have to meet the criteria, all the basic requirements need to be met at the same time. In this article, all the basic requirement questions will be marked up. The third category is the best practice of which if a journal don't have the setting or such practice, it is still acceptable.

General Questions and Basic Requirements

Failed to meet any basic requirement will lead to failure to be included in DOAJ. These "must have" requirements generally includes an open access statement which comply with the Budapest Open Access Initiative (BOAI) definition, a peer-review process, an editor/editorial board with clearly identifiable members, licensing and copyright information, aims and scope of the journal, and the number of articles published per year shall be at least 5 per year.

Basic journal information

The journal title filled in for question 1 shall be exactly the same to what is shown on the journal website. Uniform resource locator (URL) of your journal's website for question 2 shall be accessible and it is the link to the dedicated website of the journal other than to a collection of journals or any other services. Whether the URL is a dedicated domain or a subdomain does not matter, but the journal must have an online space dedicated for it only. The Title and URL of journal are among the basic requirements for entry into DOAJ. Question 3 is asking for an alternative title, this would be a good place to fill in the journal title in your local language other than in English or a translation of the journal title. Question 4 is for print version of journal International Standard Serial Number (ISSN) and question 5 is for online version ISSN, there must be a validate ISSN for a journal. The ISSNs shall be clearly shown in the webpage of the journal. If a journal has both print ISSN and eISSN, that is preferable, but if a journal has only one of them, it is acceptable as well. This is the basic requirements for entry into DOAJ. The ISSN information will be verified automatically by DOAJ via issn.org. Application from a journal with an unrecognized or not confirmed ISSN will be immediately rejected (Fig. 1).

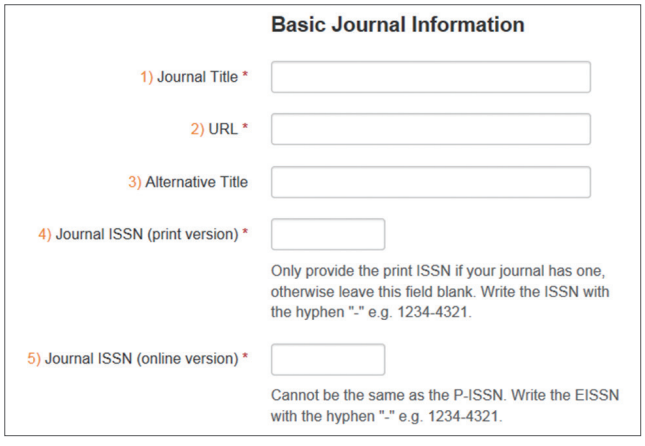


Fig. 1. Part sample of Directory of Open Access Journals application form.

Question 6 is for the name of the publisher, this should be responded with clear and accurate information. This is the basic requirements to entry into DOAJ. Question 7 is asking if there is any society or institution who is running the journal, if there was not, then leave it blank. Question 8 is about platform, host or aggregator, and also the form shows three samples for it as OJS, HighWire Press, and EBSCO, leave this item blank if it is not applicable to your journal, for example, your journal is hosted by your own website.

From question 9 to question 11 are the information about the contacts, this is very important as all the communication will go to the email provided here as contacts email address. Make sure the name of the contact is from a real person and that person is always reachable by emails. These 3 questions are basic requirements. Question 12 is asking in which country is the publisher of the journal based in. In case the journal is a joint venture between an institute in one country and an international publisher based in another country and the publisher is running the journal, then the name of the country of the publisher shall be filled in question 12. For example, this happens a lot in China as there are more and more collaborative newly created open access journals in international publisher's platform and be released in their packages as well, then the country of the publisher other than China shall be filled in for question 12. This question is one of the basic requirements.

Question 13 to question 20 are about article processing charges and submission fees. Some journals charge for APCs or submission fee and some not. In either case, the statement about charging shall be clearly stated on the journal website as URL shall be filled in the form containing information on this. If you answer "Yes" to question 13 and 17, then more questions will pop out asking you to fill in specific number of these APC and submission charge. These are basic requirements for entry into DOAJ.

Sometimes the editor indicated "No" to these questions in the application form and there is actually no such declaration on their website as they think if they don't mention any charges on website then this should be interpreted as "No charge" by people, but it is very important to make a clear statement even though there is not any charges to the authors during the publication process. For example it could be stated as "This

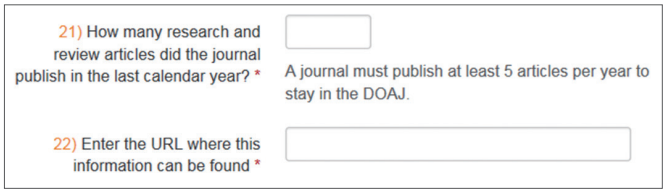


Fig. 2. Information of articles published.

journal does not charge APCs or submission charges". This is essential to the transparency of the publishing system.

There are also cases that the editors filled article processing charge per article in the application form but in practice they announced their charged based on each page on the website, in this case, the editor shall calculated an average charge per article and fill in that number in the application form. If a journal has different APCs per article then the highest charge must be entered into the application. Also attention shall be paid to choose the correct currency.

Question 21 and 22 refer to the number of articles published in the last calendar year, the minimum requirement for inclusion in DOAJ is to have at least 5 articles per year, and these articles shall be of the research article and review articles. For question 22 the URL could be the webpage of the archive. This is the basic requirement for entry into DOAJ (Fig. 2).

And question 23 is asking if there is a waiver policy for fees for developing country authors and if you answer "Yes" to question 23 then question 24 will pop up asking for a URL containing the waiving policy information. If you answered "No" to question 14 and 17 indicating the journal does not charge APC or submission fee, then choose "No" for question 23.

Question 25 and 26 are about digital archiving policy and they are not among the minimum requirements, these two questions will be explained in DOAJ Seal section in this article. In Korea, KoreaMed Synapse (https://synapse.koreamed.org/) and ScienceCentral (http://www.e-sciencecentral.org/) would be applicable as a digital archiving policy for question 25. Question 27 is very plain, if a journal allows software to automatically crawl the journal content, then choose "Yes", otherwise "No".

Question 28 and 29 are not among the basic requirements for being accepted in DOAJ, these two questions will be explained in the DOAJ Seal section in this article. Question 30 and 31 are about the article download statistics, if a journal don't have this setting, then choose "No", if "Yes", then the URL where this information can be found shall be provided in question 31.

Question 32 is asking the first calendar year in which a complete volume of the journal provided online open access content to the full text of all articles. This is applicable to the established journals who changed to online version. For new journals just fill in the year of establishment of the journal. This is the basic requirement for entry into DOAJ.

Question 33 is about the formats of the full text, fill in this item according to a journal's practice, tick all that apply. Generally PDF and HTML are two often used formats. This is the basic requirement for entry into DOAJ.

Question 34 is the item to state the keywords which best describe the scope of your journal. Please not to use the words like "international journal" or "good academic journal" as the keywords. All the keywords shall be input in lower case letters except they are names of people and places, and the maximum number of keywords are 6 and must be in English. This is the basic requirement for entry into DOAJ.

Question 35, input the languages that apply to your journal, multiple language allowed. The language here refers to the language used for your articles, not of those for the abstract and for your website.

Quality and transparency of the editorial process

DOAJ values the quality publishing and emphasize and the quality and transparency of the editorial process. The journal must have an editorial board, at least 5 of its members must be easily identified (with their affiliation information) and have a good reputation. In the case of Arts and Humanities, it is acceptable that there is no editorial board, but there shall be at least two editors doing the editorial review. An URL for the Editorial Board page shall be filled in question 36. This is a basic requirement for entry into DOAJ.

Question 37 and question 38 is about specification of the review process and for this question there is a drop down list containing the following options: editorial review, peer review, blind peer review, double blind peer review, open peer review and none. If there is no peer review process for a journal, it will failed to be included in DOAJ.

For this question, the common seen problem is that the option chosen in the application form doesn't match to the statement of peer review process in the journal website. For example, in question 37 "Double blind peer review" was picked but after in all the instructions on the website there is no such a "double blind" statement, in this case, for example, if the publisher mentioned peer review, then it have to be changed from "Double blind peer review" to "Peer review" to make sure information are consistent. "Editorial review" is normally only valid for Humanities journals. This is a basic requirement for entry into DOAJ.

Statements about aims and scope should be clearly visible on the website. Question 39 is asking for the URL for the journal's aims and scopes. This is a basic requirement for entry into DOAJ. Instructions to authors shall be available and easily located on the website, this is the Question 40 in the applica-

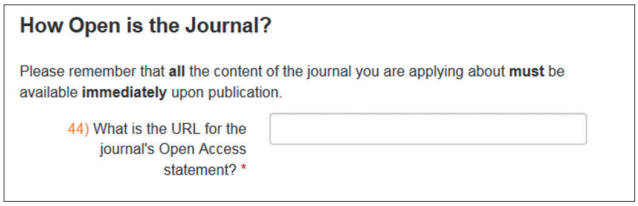


Fig. 3. Openness of the journal.

tion form. This is a basic requirement for entry into DOAJ.

Journals must state what measures they use to check for plagiarism before publication and this must be stated at the URL provided to question 41 in the application form, if "Yes" has been ticked then question 42 will pop out asking the URL where the information of screening for plagiarism can be found.

Time from submission to publication will concern authors. Question 43 is asking the average number of weeks between submission and publication. It should be noted that it is the number of weeks not the number of months.

How open is the journal?

In this section, there is one statement "Please remember that all the content of the journal you are applying about must be available immediately upon publication. Any journal with an embargo period will not be accepted in DOAJ, also DOAJ does not include hybrid journals. This is one of the basic requirements for entry into DOAJ (Fig. 3).

Question 44 is asking for the URL for the journal's open access statement. DOAJ is requiring there must be an open access statement in the website of the journal, which shall adhere to the BOAI definition which is quoted as below [8].

By "open access" to [peer-reviewed research literature], we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Here is an example of an open access statement, fitting the DOAJ criteria, that could be published on the publisher's website [9]:

This is an open access journal which means that all content is freely available without charge to the user or his/her institution. Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author. This is in accordance with the BOAI definition of open access.

Content licensing

From question 45 to question 51 are the questions related to the content licensing, and this might be the most difficult part for publishers. There are many cases in the application that there is no content licensing information at all, this might due to the different understanding of "open access" as publisher think the freely online available articles are "already" open access.

Quite often that a journal would be qualified on other DOAJ criteria but there is no licensing statement, then emails communication would be in place to suggest the publisher to adopt on license policies and it was very positive that most of the publisher will take action to make a license statement. Starting from question 45, it is asking "Does the journal embed or display simple machine-readable CC licensing information in its articles?". This is not one of the basic requirement for entry into DOAJ, it is one of the criteria for DOAJ Seal (refer to the DOAJ Seal section in this article).

DOAJ requires that in all instances the journal web site must state clearly and precisely the terms of use and reuse that readers and authors have when they submit an article or use the published content, particularly if the journal is not using a Creative Commons license (CC license, for more information, please refer to https://creativecommons.org/licenses/). This is a way of showing that the journal is sharing the published material to support a greater global exchange of knowledge. It is also a way of protecting the journal material from illegal use, for example, if the journal is stating that they prohibit reproduction or commercial use of your articles [9]. Thus it is notable that in question 47, there is no such an option as "None" among the list. All the available choices are CC BY, CC BY-CN, CC BY-NC-ND, CC BY-NC-SA, CC BY-ND, CC BY-SA and "Other" followed by an input box (Fig. 4).

If a journal is using a CC license and chose any option from one of the CC licenses, then you need to enter the URL on your site where your license terms are stated, for question 49. If a journal publisher does not employ a CC license, then you have to choose "Other" as an option and then fill in your application form specifying what other usage terms apply, and then question 48 will pop up asking "Which of the following does the content require?" with options listed as attribution, no commercial usage, no derivatives, and share alike. These keywords are helping to describe your license statement. Here "Other" might be a contract, publishing agreement, publisher-

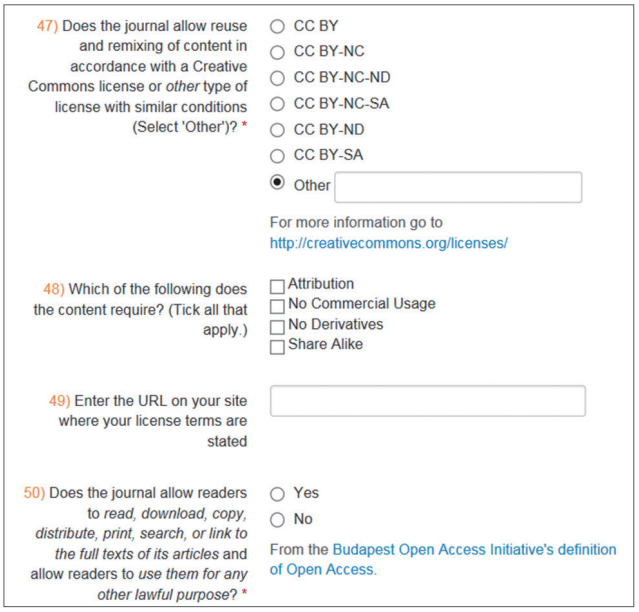


Fig. 4. Licensing the content.

specific license and these terms must be equivalent to the terms of the CC licenses that are listed in order to be accepted into DOAJ. When writing the journal's own license, DOAJ strongly advise publishers to get legal advice before adopting a standard text or constructing their own. You must make sure that you use the correct legal language. The information provided here does not constitute legal advice [9].

In both the two cases, either the journal have a CC license in place, or use their own licensing statement, DOAJ editors or reviewer of the application will visit your website and read the statement of your license to check if your choice of CC license in the application form is identical to what has been stated in the website. Changes might be made to your choices in order to make sure the consistence of the information. This is one of the basic requirements for entry into DOAJ.

The application of a CC license is encouraged but is not actually required for acceptance, it is currently one of the best practices and a journal using some of CC license would be applicable for a DOAJ Seal (refer to the "Reuse and remix of content" section in "DOAJ Seal" in this article).

Question 50 is asking "Does the journal allow readers to read, download, copy, distribute, print, search, or link to the full texts of its articles and allow readers to use them for any other lawful purpose?", this should also be align with the journal open access statement. If "No" has been chosen as an answer to this question, that means that this journal is not an open access journal and obviously will be rejected by DOAJ, as DOAJ is including open access journals only. This is one of the basic requirements for entry into DOAJ. Question 51 is

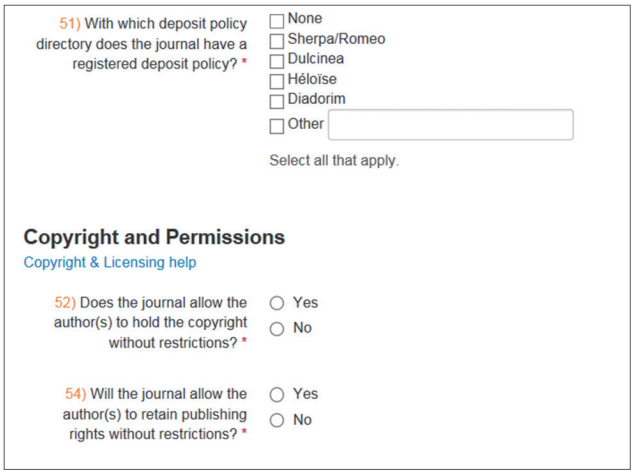


Fig. 5. Copyright and permissions.

one of the best practices which DOAJ is encouraging, refer to the DOAJ Seal section in this article for more information (Fig. 5).

Copyright and permissions

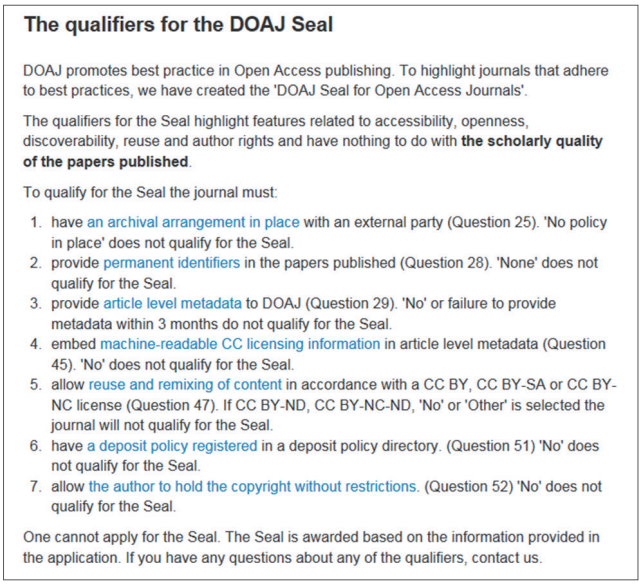
There is only two questions in this section, but they are very crucial and important questions and must be answered. Question 52 is one of the best practices for DOAJ Seal. Question 54 is asking "Will the journal allow the author(s) to retain publishing rights without restrictions?", the answer to this question do not have to be "Yes", but if "Yes", this answer shall be identical with the license statement of the journal which shall be found in the webpage provided in question 49. If the licensing statement actually means restricted publishing rights for authors, the answer to question 54 will be changed to "No".

Best Publishing Practice and DOAJ Seal

DOAJ promotes best practice in open access publishing. To highlight journals that adhere to best practices, DOAJ Seal for open access journals has been created. It shall be noted that a publisher shall not apply for DOAJ Seal as this is awarded based on the information provided in the application [6]. All these 7 items are not "must have" requirements for a journal to be accepted in DOAJ (Fig. 6).

Long term digital archiving policy

To make sure the journal content will not disappear in case of unstable internet access or problems with the availability of the journal website, it is a best practice to have an archival arrangement in place with an external party so that the content will not disappear when the service of publisher stopped. This requirement is reflected as question 25 "What digital ar-



The qualifiers for the DOAJ Seal

DOAJ promotes best practice in Open Access publishing. To highlight journals that adhere to best practices, we have created the 'DOAJ Seal for Open Access Journals'.

The qualifiers for the Seal highlight features related to accessibility, openness, discoverability, reuse and author rights and have nothing to do with **the scholarly quality of the papers published**.

To qualify for the Seal the journal must:

1. have an archival arrangement in place with an external party (Question 25). 'No policy in place' does not qualify for the Seal.
2. provide permanent identifiers in the papers published (Question 28). 'None' does not qualify for the Seal.
3. provide article level metadata to DOAJ (Question 29). 'No' or failure to provide metadata within 3 months do not qualify for the Seal.
4. embed machine-readable CC licensing information in article level metadata (Question 45). 'No' does not qualify for the Seal.
5. allow reuse and remixing of content in accordance with a CC BY, CC BY-SA or CC BY-NC license (Question 47). If CC BY-ND, CC BY-NC-ND, 'No' or 'Other' is selected the journal will not qualify for the Seal.
6. have a deposit policy registered in a deposit policy directory. (Question 51) 'No' does not qualify for the Seal.
7. allow the author to hold the copyright without restrictions. (Question 52) 'No' does not qualify for the Seal.

One cannot apply for the Seal. The Seal is awarded based on the information provided in the application. If you have any questions about any of the qualifiers, contact us.

Fig. 6. The qualifiers for the DOAJ Seal.

chiving policy does the journal use?" in the application form. If "No policy in place" was chosen as an answer, it does not qualify for the Seal, but it is acceptable for inclusion in DOAJ. Other choices for this question includes digital preservation systems such as LOCKSS [10], CLOCKSS [11], PORTICO [12], PubMed Central (PMC)/Europe PMC/PMC Canada [13], these are all international collaborative efforts in archiving literature. Also a national library could be accepted as a digital depositing policy as the national library would generally be strong enough to exist for the long term, but a university repository would not be acceptable as a university level project may not be sustainable.

Article identifiers

The question 28 in the application form states as "Which article identifiers does the journal use?". If the journal publisher provide permanent identifiers in the papers published, this would meet one of the criteria for DOAJ seal. If the answer to this question is "None" then it does not qualify for the Seal. Among the choices, "DOI" stands for digital object identifier, the DOI system provides a technical and social infrastructure for the registration and use of persistent interoperable identifiers, called DOIs, for use on digital networks [14]. Also "Handles" is another infrastructure component in managing digital objectives [15]. "ARK" is the abbreviation for archival resource key and ARKs are URLs designed to support long-term access to information objects [16].

Article level metadata

The journal publisher provide article level metadata to DOAJ, this is the question 29 "Does the journal provide, or intend to provide, article level metadata to DOAJ?" in the application form. "No" or failure to provide metadata within 3 months do not qualify for the Seal.

Machine readable CC license

It is a best practice that the journal embed machine-readable CC licensing information in article level metadata, as today most people are downloading and reading in the article level, so the CC license in the article will make it more easy and clear to the users on the copyright issues. This is reflected as question 45 stating "Does the journal embed or display simple machine-readable CC licensing information in its articles?" in the application form. "No" does not qualify for the Seal. If "Yes" has been chosen then question 46 will show up asking for URL of an example page, this could generally be the URL of a specific journal article.

Reuse and remix of content

Question 47 states as "Does the journal allow reuse and remixing of content in accordance with a CC license or other type of license with similar conditions". If the publisher has one of the CC licenses or a similar conditions as their copyright statements, this would qualified as one of the minimum requirements. It is the best practice that the publisher allow reuse and remixing of content in accordance with a CC BY, CC BY-SA or CC BY-NC license, this will allow unrestricted copyright and publishing rights for people to use it. While the more limited conditions such as CC BY-ND, CC BY-NC-ND, "No" or "Other" is selected the journal will not qualify for the Seal.

Deposit policy directory

Question 51 is asking "With which deposit policy directory does the journal have a registered deposit policy?". The publisher have a deposit policy registered in a deposit policy directory. SHERPA/RoMEO is a service run by SHERPA to show the copyright and open access self-archiving policies of academic journals [17] and it accepts publishers from all over the world. Duclinea is only for Spanish scholarly journals [18]. Héloïse is only for "francophone" publishers [19]. Diadorim is only for Brazilian scientific journals [20]. "No" does not qualify for the Seal.

Unrestricted copyright for authors

The publisher allow the author to hold the copyright without restrictions and this is the question 52 "Does the journal allow the author(s) to hold the copyright without restrictions?" in the application form. "No" does not qualify for the Seal. If there is a copyright statement which is responding to question 47, then the unrestricted copyright for authors should be

clearly stated. It is quite often seen that the editors chose "Yes" to question 52 but in their copyright statement, they say the publisher owns the exclusive copyright and in this case the answer to question 52 shall be changed to "No" or the publisher shall change their copyright statement.

Frequently Asked Questions During the Application Process

There are some key issues frequently appear during the process of an application and these issues are crucial to be good publishing practices and would be beneficial to the authors and users of the journal.

The first one is the website. All the necessary journal business information pages, including the journal's aims and scope, the editorial board, the instructions for authors, the description of the quality control system, the open access statement, the plagiarism policy, and the licensing terms, must be hosted on this same site and not be held centrally on another web site, or must be prominently linked to from the journal's homepage. This is a basic requirement for entry into DOAJ. Sometimes a journal is distributed in different sites and it could be seen that URLs filled in the application form are from different domain names, this should be definitely avoided. Everything should be in one dedicated, integrated and well organized dedicated website for the journal. Even for those publishers who own multiple journals, this principal shall be implemented to each of their journals. Archive materials shall also be integrated in the dedicated website of the journal as well.

It is important to identify any possible contradictions between your open access policy and your copyright policy, or any incompatibilities between your copyright policy and CC licensing. Sometimes there is an open access statement but the copyright license still indicating "all rights reserved by the publisher", or CC BY license has been stated but there is this wording like " by accepted for publication, the author transfer exclusive rights to the publisher" in the license statement.

Publishers may choose to use a non-CC license but then need to make sure their content license shall be similar or equivalent to a CC license so that licensing terms in some form are always available on the site. Other publisher-made specific licensing terms will be judged on an individual basis. Sometimes the publisher will choose "Other" as the answer and then wrote in the input box saying something like "We don't have a license policy at this moment, but we are going to have one in the future" , this would be perceived as there is no licensing conditions exist that explicitly allow reuse and remixing of the content, thus the journal will not be accepted into DOAJ.

Publishers who restrict the re-use of content in line with any of the CC licenses are all still eligible for indexing in DOAJ. However, DOAJ has a strong preference for the use of CC licenses, especially the least restrictive: the Creative Commons CC BY license (Attribution). Under the terms of a CC BY license "you must give appropriate credit, provide a link to the license, and indicate if changes were made". "You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use" (from http://creativecommons.org/licenses/by/4.0/) [9].

It is also often seen in the application form that nearly all the options have been ticked probably to make the application looks more qualified. Especially for question 25 all digital archiving policies have been selected and for question 51 all deposit policy director has been selected while this is obviously not possible in practice. This might due to the lack of knowledge of these items and also would possibly make the publisher seem not serious in the application. Being straightforward with accurate information in the application form will definitely facilitate the review process of the application by reducing the unnecessary work for the reviewers to check the information given.

It should be avoided to use one URL which quite often be the URL of homepage for all the questions, as editor may think this is the start page for everything. To fill in the form, the very specific URL for the questions are expected, as this would be recorded in DOAJ and used by the public after inclusion in DOAJ. Using one URL for all question will give an impression of not being serious for the application and no need to say this will caused extra effort for the reviewer to find correct URL when review the application form.

Last but not least, the contact person of the publisher shall pay attention to the email box about the notification or communication emails sent from an editor or reviewer from DOAJ. In general, during the review process, comments and suggestion for improve would be sent to the journal contact and it is expected that there would be response to these comments or suggestion. If no answer has been received then a rejection decision would have to be made in case the journal are not qualified at this moment. So it would benefit both sides if journal contact would keep an eye on the emails and respond as fast as possible.

Conclusion

Being listed in DOAJ is the basic action as editors or publishers of open access journal. Although it is not mandatory to be listed in DOAJ, it is the best window to find the open access journals by authors and readers. Therefore, I urge all open access society journal editors and publishers especially in Asia

to register their journals in DOAJ. I remind again that the most important point is the genuine open access journal policy adopted by the journal. I hope above explanation be helpful for registration.

Conflict of Interest

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

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Original Article

Increased number of papers co-authored by professor and his students in humanities and social sciences journals published in Korea

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Abstract

Humanities and social sciences studies in Korea have remarkably low rates of co-authorship between professors and students. We chose a bibliometrics-based approach to characterize changes in the ratio of joint authorship between professors and students. Articles classified in the humanities and social sciences sectors that were published in journals registered in the Korean Citation Index during 2 phases over a 10-year period—2004 to 2006 (phase 1) and 2011 to 2013 (phase 2)—were used as the main source for the analysis. The study results can be summarized as follows: first, the overall number of co-authored articles drastically increased from phase 1 to phase 2; the percentage of co-authorship articles increased from 34.8% to 47.7%, and the percentage of co-authorship between students and professors rose from 9.9% to 20.7%. This trend was particularly noticeable in the social sciences, such as accounting, social welfare, and economics/business administration. Second, papers written by scholars from Seoul National University, Yonsei University, and Korea University were often published in high-impact factor journals. Among those articles, the rate of professor-student co-authorship increased by 21.6% for 7 years. Third, the increase in professor-student co-authored articles published in high- impact factor journals was even sharper. These findings indicate that perceptions of professor-student co-authorship have changed in the humanities and social sciences. In the near future, positive perceptions toward joint research and joint authorship between professors and students are expected to become more widespread.

Keywords

Authorship; Bibliometrics; Humanities; Republic of Korea; Social sciences

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Introduction

In science and engineering, single-authored papers are rare, and co-authored papers are common. Joint research with co-authorship is in general superior in terms of scope and quality compared to individual research and single-authored papers, and thus, has the advantage of leading to results with greater influence. Additionally, by going through the process of discussion with other authors, research process can be better monitored and results can be better analyzed. Since distortions in results analysis and presentation can also be better excluded through this process, co-authorship is a desirable study method in the sense that it helps guarantee research integrity. Meanwhile, a student under the guidance of a professor should be recognized as a co-author in a paper if the student collected research materials and data that were used in the write-up of the paper. In many cases, though, professors complete the final version of a paper by improving the logic of what the student writes as a first draft. The process of producing the final version requires the professor to play the role of exploring and including novel research ideas, which is not an easy task. Through all these processes, the supervising professor and the student become not only partners but co-owners, or in other words, co-authors of the article. The responsibility for the content of the paper rests upon both co-authors as well.

However, many academic areas in the humanities and social science have only a small number of professor-student co-authored papers compared to the number of papers co-authored by professors and/or researchers. Accordingly, improvements must be made in the awareness of joint research culminating in professor-student co-authorship. In this study, we researched changes in the number of articles co-authored between professors and students between 2 phases—2004 to 2006 (3 years) and 2011 to 2013 (3 years)—and used articles from humanities and social science journals as resources. The reason for excluding the natural sciences and engineering fields in this paper is the stark difference in the co-authorship rate between the social sciences (12%) and the natural sciences and engineering (93%), which has been discussed in previous research [1]. While joint research and joint authorship are generally accepted in the natural sciences and engineering, they are not commonly found in the humanities and social sciences. This study, hence, aimed to assess the current state of co-authorship between professors and students in the humanities and social sciences.

Methods

The academic journals analyzed in this study were the 36 highest-ranked journals by Korean Citation Index (KCI) impact factor (IF) (search criteria: IF, impact factor; 'as of 2012', 'five-year period') and 20 lower-ranked journals, drawn from the humanities and social sciences journals indexed in the KCI (Suppl. 1). The lower-ranked journals were chosen based on having similar fields and similar numbers of published articles to the selected high-ranked IF journals; therefore, they do not comprise the 20 journals with the absolute lowest IFs. Following the classification of the KCI, these journals were categorized into 13 research areas and were analyzed accordingly: accounting, social welfare, economics/business administration, sociology/social sciences, administrative science, political science and diplomacy, education, law, policy science, regional development, history, linguistics, and Korean and Korean literature. In this study, research areas in which surveys and experimental approaches are commonly used were included. The fields of the humanities—in particular, literature, history, and philosophy—were scarcely included. For this study, 10,930 articles from 56 journals during the 2 phases—2004 to 2006 (phase 1, 3-year period) and 2011 to 2013 (phase 2, 3-year period)—were chosen. Among those articles, there were 4,820 co-authored articles, and the articles were divided into professor-student co-authorship and other types of co-authorship. Moreover, articles were classified by the institutional affiliation of the authors. Articles with corresponding authors from Seoul National University, Korea University, and Yonsei University were considered to be 'SKY university articles' (1,123 papers), and other articles were considered to be 'non-SKY university articles' (3,697 papers). The number of professor-student co-authored articles was counted in each group. Likewise, among the articles published in high-IF and low-IF journals (7,772 articles from 36 high-ranked journals and 3,158 articles from 20 low-ranked journals), the number of professor-student co-authored papers was aggregated and compared. In most cases, whether the article was co-authored was checked by searching students' dissertations. In the cases of search failures, including cases of incomplete dissertations, inquiries were made by phone to college departments. If the student was already working as a full-time instructor or as a professor in another university at the time of publication, then the co-authorship was not considered to be between a supervising professor and student, but between a professor and a professor, and such articles were therefore excluded from the count of articles co-authored by professors and students.

Results

Changes in professor-student co-authored journal articles in the humanities and social sciences

Among the 56 journals in 13 research areas of the humanities

and social sciences, we examined the co-authorship of articles published during the first and second phases in the journals with the highest IFs in each field. We categorized co-authorship as professor-student co-authorship if an article was co-authored by a professor and student from the same department, while other co-authored articles were considered to be examples of general co-authorship, and we investigated changes in co-authorship over the period of our study.

Between the first and second phase, the total proportion of co-authored articles increased by 15.9 percentage points, from 34.7% to 50.6%. The percentage of articles with general co-authorship increased from 34.8% to 47.4%, and the percentage of professor-student co-authored papers increased from 9.9% to 20.7%. In most academic fields, the ratio of both general co-authorship and professor-student co-authorship increased similarly in the second phase (Fig. 1). Co-authorship was already widespread in the fields of accounting, social welfare, economics, business administration, education, policy studies, and regional development, with a co-authorship rate of more than 50% of articles. Within the 10-year period encompassed by our study, the ratio increased even more, and in the case of accounting, general co-authorship accounted for 85% of all articles and professor-student co-authorship accounted for 44%. In contrast, in the field of law and history, the ratio of co-authorship was very low in the first phase, and even in the second phase, the 2 types of collaboration were only present in 3.5% and 1.8% of articles, respectively. In history, among the investigated articles (57 from the first phase and 45 from the second phase) from a Korean archaeological journal, the number of articles with general co-authorship decreased from 7 to 6 and number of professor-student co-authored articles decreased from 3 to 1. It is difficult to consider this a representative result due to the small sample size. However, the increase in professor-student co-authorship in comparison with the increase in general co-authorship did not reach statistical significance. The relative increase of profes-

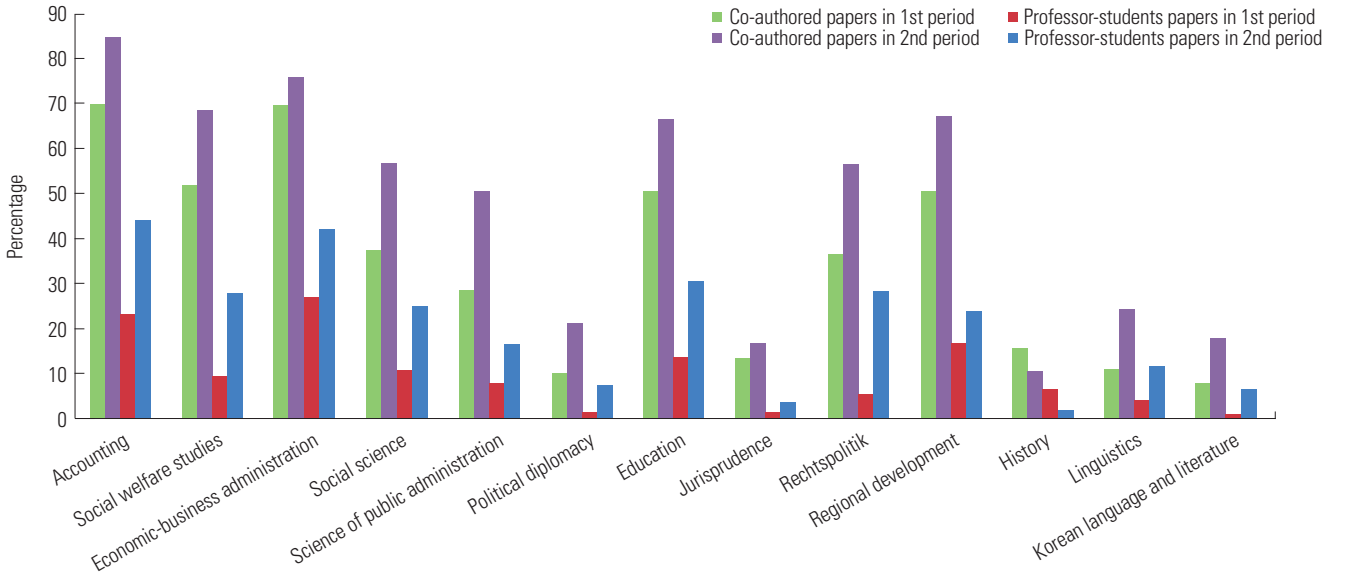

Fig. 1. Percentage of co-authored papers in different academic fields during periods 1 and 2 of the study.

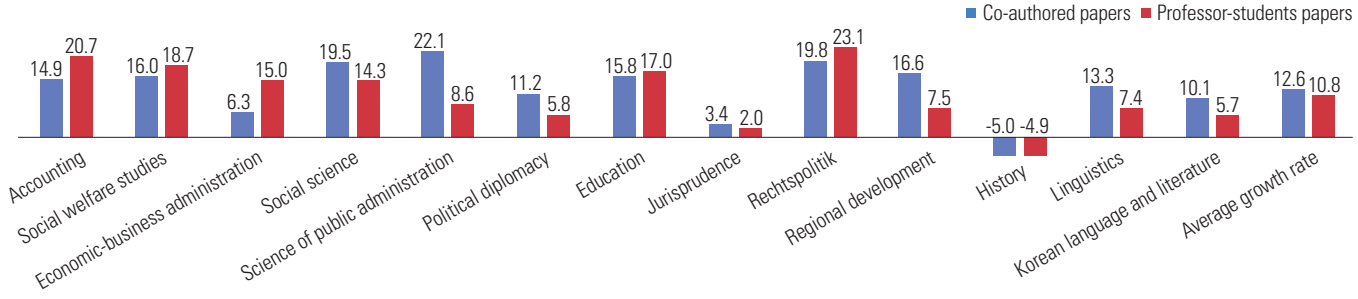

Fig. 2. Changes in the percentage of co-authored papers during periods 1 and 2 of the study.

sor-student co-authorship was the largest in economics and business administration, with an increase of 2.4 times, but there were also cases where the increase was by less than 1 article (Fig. 2). However, this result does not weaken the significance of the general increase in co-authorship.

Ratio of student-professor co-authored articles by researchers at Seoul National University, Korea University, and Yonsei University

Next, we attempted to determine how the change in the ratio of professor-student co-authorship was related to excellence in research and research systems. First, we examined changes in the ratio of professor-student co-authorship among articles with corresponding authors from Seoul National University, Korea University, and Yonsei University (SKY articles) and other articles (non-SKY articles). The reason for comparing these 2 groups was not based on the assumption that the human resources of Seoul National University, Korea University, and Yonsei University and their students are superior, but instead on the assumption that these universities may have a higher graduate student ratio and more research funding, and therefore be characterized by research excellence stemming from this research system. This is partly supported by the following facts. In all of the investigated humanities and social science fields, more articles were published in the 36 high-IF journals during the second phase by professors from these 3 universities than by the other group. For example, in accounting, 32% of the total 396 papers (127 papers) were published by professors from these 3 universities. In addition, in 19 journals, corresponding more than half of the 36 high-ranked journals, more than 10% of the articles were by professors from these 3 universities, with an average share exceeding 30%. In contrast, the proportion of SKY articles in 80% of the 20 low-IF journals (16 journals) did not exceed 10% (Table 1).

Our analysis showed that the share of SKY articles across the humanities and social sciences somewhat decreased in all journals (by 2.0% in the high-IF journals and 1.1% in the low-IF journals). However, the ratio of professor-student co-authorship in the SKY articles increased by 21.6 percentage points (Fig. 3). In the non-SKY articles, the ratio of professor-student co-authorship increased, but the increase was relatively low, at 9.5 percentage points. In most fields the ratio of professor-student co-authorship in SKY articles increased by more than 20 percentage points (more than 30 percentage points in social welfare, economics, business administration, education, policy studies, regional development, and linguistics), but the ratio in non-SKY articles increased by less than 20 percentage points (Fig. 3).

Changes in the ratio of co-authorship in the high-IF and low-IF journals

Next, we compared trends in professor-student co-authorship in the 36 high-IF journals and the 20 low-IF journals. We need to add a few words to avoid misunderstandings that may

Table 1. Changes in the percentage of the papers co-authored in general, by professors and students, and by SKY professors and students

Journals according to KCI IF	Increase in the number of co-authored papers (general)	Increase in the number of papers co-authored by professors and students	Increase in the number of SKY papers	Increase in the number of papers co-authored by SKY professors and students
Top 36 journals	15.9%	13.0%	-2.0%	21.6%
Lower 20 journals	22.2%	11.5%	-1.1%	19.8%

SKY, Seoul National University, Korea University, and Yonsei University; KCI, Korean Citation Index; IF, impact factor.

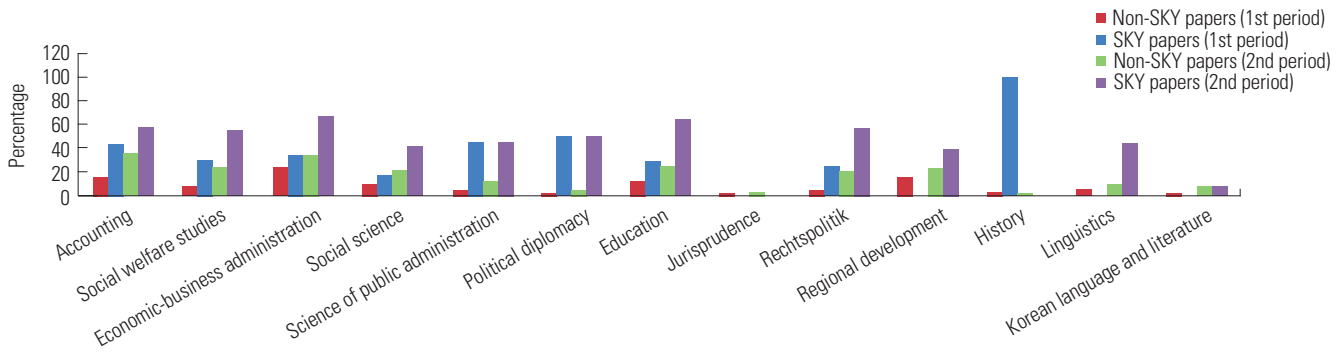

Fig. 3. Percentage of professor-student co-authored papers from researchers at Seoul National University, Korea University, and Yonsei University (SKY papers) and non-SKY papers.

arise about the selection criteria. First, although a high IF does not always indicate a better academic journal, it can be used as an effective index to filter academic journals above a certain level, and therefore it is possible to use IF to distinguish higher-ranked and lower-ranked groups of journals. The high-IF journals had a KCI IF of 2.00 on average, and the low-IF journals had an average KCI IF of 0.16, indicating a considerable difference in the level of domestic journals indexed in the KCI (Table 1).

Co-authorship in high-IF journals increased by 15.9 percentage points, and by 22.2 percentage points in low-IF journals. This suggests that the proportion of co-authorship in the low-IF journals was very low, but has recently become more similar to the high-ranked journals. However, professor-student co-authorship increased by 13 percentage points in the high-IF journals and 11.5 percentage points in the low-IF journals. As such, a greater increase was observed in the rate of professor-student co-authorship than in the rate of general co-authorship in high-IF journals. In addition, professor-student co-authorship in the SKY articles increased by 21.6 percentage points in high-IF journals and by 19.8 percentage points in low-IF journals (Table 1). This also shows a positive correlation between the excellence of the research and the tendency for professor-student co-authorship.

Discussion

In the humanities and social sciences, a significant change has occurred in the ratio of professor-student co-authorship, with an increase of more than 10 percentage points over the 10-year period from 2004 to 2013 (Figs. 1, 2). This change can be attributed to greater collaboration between existing researchers and new generations of researchers, and an increase in the number of graduate students.

SKY articles tended to be published in comparatively higher-IF journals indexed in the KCI. This suggests that their articles may have a relatively higher citation index or influence, or in other words, academic excellence (Table 1). In addition to the academic excellence of the research, the excellence of the research system suggests that the research guidance of graduate students at these universities is better managed.

In most fields, the ratio of professor-student co-authorship in SKY articles increased by more than 20 percentage points, but the ratio in non-SKY articles increased by less than 20 percentage points, indicating that this system of co-authorship significantly increased in articles from researchers at universities exhibiting academic excellence in research or the research system. This demonstrates that if the research and research management are excellent, students tend to be recognized as co-researchers.

This study focused on the academic fields of the humanities and social studies, but the result is that we have started to perceive the academic practice of students in the academy as collaborative research rather than merely a process of training. In addition, these results demonstrate the emergence of positive perceptions of professor and student co-authorship. Additionally, the fact that this phenomenon did not occur in only 1 or 2 fields shows that the gap between concepts and perceptions of authorship is narrowing in all academic fields in Korea. This suggests the hopeful message that it may be possible to set common standards for all ethical issues encountered in research in all academic fields.

The results of this study have another important message from a practical point of view. There is a misperception about collaborative research between professors and students in our society. In particular, court rulings have prohibited the acknowledgment of professor-student co-authorship [2]. In September 2004, the Seoul Administrative Court issued a ruling that "it is wrong for a professor to claim co-authorship when a student's dissertation is published." The following is a part of the 2004 judgment [2].

"The plaintiff, as an advisor to A, has made substantial contributions beyond the scope of guidance as an advisor in the research process and preparation of the doctoral dissertation, so the work (journal article) is claimed to be a co-creation of plaintiff and A" (...) "If the plaintiff played a leading role in the process of research and the dissertation of the student as the plaintiff claimed, or, if they have reached a level of collaborative research that is beyond mere instruction, considering that the academic maturity of the plaintiff is higher than that of A, the dissertation written during such a process should be regarded as the work of the plaintiff, rather than being a dissertation of A. In this case, A has used the results of the plaintiff's research in his doctoral dissertation, therefore not only leaving a room to doubt the authenticity of the value of the degree, but also raising another criticism that the plaintiff has failed to fulfill the role of a thesis advisor or thesis review chairperson." (...) "Even if the practice of co-publishing with the advisor is common, this is a distorted phenomenon in the academic world, and therefore it cannot be the research of the plaintiff."

In this case, it is unknown whether substantial research guidance was provided that could be considered joint research between the professor and the student. However, this ruling contains a serious error due to the ignorance of judges regarding the general process of academic research activities. In particular, the ruling referred to the practice of collaborative research and co-authorship between professors and students, which has existed for many years in academia, as a "distorted phenomenon." The results of this study document

the increasing proportion of professor-student co-authorship in scholarship, and indicate that there is a major gap between research practices in academia and this judgment. Based on the results of this study, the Korean academy should continue to encourage collaborative research between professors and students in all fields, including the fields of literature, history, and philosophy.

In conclusion, these results show that in the humanities and social sciences in Korea, the ratio of professor-student co-authorship has increased in almost all fields. Additionally, we can see that the academic practice of students is recognized as collaborative research rather than merely a training process, and that professor-student co-authorship is finding its place in the humanities and social sciences in Korea.

Conflict of Interest

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

Supplementary Material

Suppl. 1. Categories and Korean Citation Index impact factors of the journals studied

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Original Article

Rapid growth of international collaboration from articles indexed in Scopus database by researchers in Korea from 2006 to 2015

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Abstract

It aimed at analyzing the trends of international collaboration from articles indexed in Scopus by researchers in Korea from 2006 to 2015. The number of articles coauthored by researchers in Korea and those in selected foreign countries was obtained from document searches of the Scopus database. The growth of research collaboration in various academic disciplines was also studied. There were 22 countries which produced over 2,000 papers in collaboration with researchers in Korea during the ten-year period between 2006 and 2015. The average of the average annual growth rate taken over these 22 countries was 12.9%. In 9 additional Asian, Latin American, and African countries, more rapid growth of international research collaboration was clearly seen. Though research collaboration is most active in the field of physics and astronomy with most countries, it was found that the growth of collaboration in medicine was most remarkable in Southeast Asian countries. It may be originated from the intimate relationship between Korea and Southeast Asia and the leadership of Korean physicians in that region.

Keywords

Bibliometrics; Internationality; Internet; Republic of Korea; Research personnel

Introduction

In recent years, there has been a rapid increase in international collaborations in research and development [1,2]. It may be originated from a variety of reasons, such as the movement of globalization, the development in communication, information, and transportation technologies, and the general increase of human interactions across the world. One crucial factor may be the development of the internet which made it possible to have very efficient and fast academic communication among researchers. The internet made not only international but also domestic collaboration much easier, which resulted in the substantial increase of the average number of authors per paper [3]. In this article, we aimed to study this phenomenon using the yearly num-

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ber of research publications coauthored by researchers in Korea and those in 31 foreign countries, which were published from 2006 to 2015 and indexed in the Scopus database. We also searched for the factors causing the growth of international collaboration. The results will be able to show the trends of international collaboration by researchers in Korea.

Methods

We used the Scopus database to find the number of publications jointly written by researchers in Korea and those in foreign countries. The Scopus database was searched in January 9, 2017. When using the document search function of the Scopus database, we restricted the search to three types of documents, which were "articles", "reviews", and "conference papers", and to two affiliation countries, "Korea" and "each designated country". The numbers of documents published each year from "2006" to "2015" and the total number of documents during the ten-year period were retrieved. For example, the query string, (AFFILCOUNTRY(Korea) AND AFFILCOUNTRY(Japan)) AND DOCTYPE (ar OR re OR cp) AND PUBYEAR = 2006, gives the number of articles, reviews, and conference papers jointly written by researchers in Korea and those in Japan in 2006. The Scopus database provides the search data which break down the number of documents by subject areas. We also retrieved these numbers to find out the changes in each subject area separately. The search was performed for bi-national collaborations between Korea and another country. Multi-national collaborations by researchers from more than two countries were not investigated.

Using the number of documents published each year, we calculated the annual growth rate (AGR) for the year (N+1) defined by

$$\text{AGR}\ \ (N+1) = \frac{\text{Number for year } (N+1) - \text{Number for year } N}{\text{Number for year } N}.$$

By taking the average of this quantity from 2007 to 2015, we also calculated the average annual growth rate (AAGR) for each country. In addition, we calculated the compounded annual growth rate (CAGR), which was defined in the present

Table 1. The yearly number of documents coauthored by researchers in Korea and those in the country designated in the first column from 2006 to 2015

Country	No. of articles in each year											AAGR (%)	CAGR (%)
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total		
United States	5,671	5,887	6,144	6,681	7,668	8,633	9,238	9,547	9,890	9,979	79,338	6.57	6.48
Japan	1,916	1,869	1,864	1,908	2,133	2,242	2,479	2,506	2,355	2,248	21,520	1.96	1.79
China	955	1,269	1,530	1,629	2,016	2,249	2,484	2,526	2,942	3,062	20,662	14.21	13.82
Germany	600	713	745	830	998	1,162	1,317	1,353	1,457	1,549	10,724	11.28	11.11
India	479	590	693	818	965	1,107	1,286	1,366	1,651	1,725	10,675	15.45	15.3
United Kingdom	615	670	703	807	924	1,095	1,292	1,313	1,386	1,431	10,236	10.01	9.84
Canada	540	600	710	750	790	833	878	899	896	953	7,849	6.63	6.52
France	382	440	465	573	647	822	839	823	900	939	6,830	10.88	10.51
Australia	332	374	398	452	497	622	738	735	876	912	5,936	12.14	11.88
Italy	224	267	280	339	394	536	652	639	742	837	4,910	16.22	15.77
Russian Federation	450	460	427	404	403	475	554	529	590	603	4,895	3.68	3.31
Taiwan	239	253	283	325	407	525	555	572	565	591	4,315	10.99	10.58
Switzerland	253	277	301	291	368	435	589	513	506	574	4,104	10.45	9.53
Spain	151	182	177	221	312	451	556	577	604	680	3,907	19.19	18.2
Netherlands	162	222	235	228	263	321	369	373	382	419	2,970	11.71	11.14
Singapore	122	101	155	193	279	329	371	408	467	515	2,940	18.97	17.35
Poland	165	192	158	180	209	242	315	312	341	347	2,460	9.42	8.61
Sweden	113	112	158	182	210	274	318	307	362	386	2,419	15.38	14.62
Viet Nam	108	87	136	149	191	234	266	357	365	436	2,329	18.52	16.77
Pakistan	59	53	63	111	154	196	315	405	382	461	2,199	28.35	25.66
Brazil	98	100	115	147	189	247	302	291	332	363	2,185	16.24	15.66
Belgium	110	144	112	158	204	222	272	264	321	352	2,157	15.39	13.8

AAGR, average annual growth rate; CAGR, compounded annual growth rate.

case by

$$\text{CAGR} = \left(\frac{\text{Number in 2015}}{\text{Number in 2006}}\right)^{1/9} - 1.$$

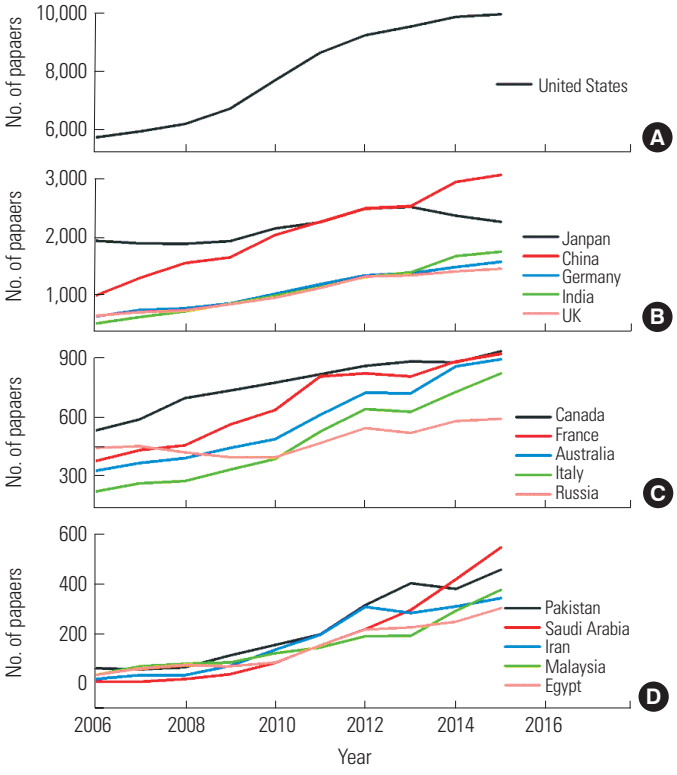

Fig. 1. The number of papers coauthored by researchers in Korea and those in the country designated in the figure in each year from 2006 to 2015 plotted versus publication year. In (A), the United States and in (B), the countries which produced the 2nd to 6th largest number of papers are shown, while, in (C), those which produced the 7th to 11th largest number of papers are shown. In (D), the countries which had the top five average annual growth rate among all countries studied are shown.

Results

Our main search results are summarized in Tables 1 and 2. In Table 1, we showed the yearly number of documents coauthored by researchers in Korea and those in the country designated in the first column from 2006 to 2015. We also showed the total number of documents during the ten-year period, the AAGR, and the CAGR. Twenty two countries

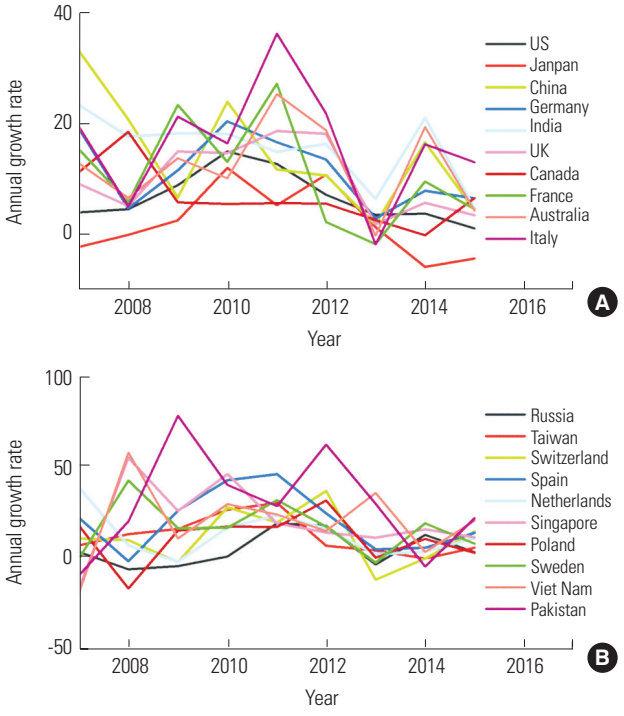

Fig. 2. Annual growth rate for (A) the top 10 and (B) the 11th to 20th countries which produced the largest number of documents in collaboration with Korea plotted versus year.

Table 2. The yearly number of documents coauthored by researchers in Korea and those in the country designated in the first column from 2006 to 2015

Country	No. of articles in each year											AAGR (%)	CAGR (%)
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total		
Saudi Arabia	3	3	15	34	81	152	218	296	420	552	1,773	100.56	78.5
Iran	14	30	31	68	134	195	309	284	310	345	1,720	50.04	42.77
Thailand	53	59	94	108	122	150	171	247	307	342	1,653	23.95	23.02
Hong Kong	65	96	107	103	147	169	216	218	240	257	1,618	17.67	16.5
Malaysia	31	67	76	83	120	143	189	191	292	378	1,570	35.34	32.03
Mexico	89	89	146	146	183	243	266	218	238	267	1,887	14.99	12.98
Colombia	33	37	55	54	81	127	151	136	146	156	976	20.99	18.84
Egypt	30	58	72	66	82	152	216	225	248	304	1,452	33.09	29.35
South Africa	21	27	28	35	46	73	102	108	126	140	706	24.53	23.47

AAGR, average annual growth rate; CAGR, compounded annual growth rate.

which produced more than 2,000 documents in collaboration with Korea were United States, Japan, China, Germany, India, United Kingdom, Canada, France, Australia, Italy, Russian Federation, Taiwan, Switzerland, Spain, Netherlands, Singapore, Poland, Sweden, Viet Nam, Pakistan, Brazil, and Belgium in the decreasing order of the number of publications. Except for Japan, which showed a low AAGR of 1.96%, all countries showed a substantial growth in the number of publications during the ten-year span. The average of the AAGR taken over the 22 countries listed was 12.9%. The CAGR is consistently a little smaller than the AAGR. The discrepancy between the AAGR and the CAGR is larger when the yearly fluctuation in the AGR is larger.

In Table 2, we showed the results obtained for 9 additional countries from Asia, North America, South America, and Africa, which include Saudi Arabia, Iran, Thailand, Hong Kong,

Table 3. Number of documents from 2006 to 2015 coauthored by researchers in Korea and those in the designated country in the top five fields

Country	1st field	2nd field	3rd field	4th field	5th field
United States	Eng (18,416)	Med (17,250)	Phys (16,490)	Bio (13,806)	Mat (11,986)
Japan	Phys (6,604)	Eng (4,370)	Mat (3,992)	Med (3,513)	Bio (3,387)
China	Phys (5,614)	Eng (4,720)	Mat (3,713)	Med (3,089)	Bio (2,912)
Germany	Phys (5,051)	Med (1,776)	Eng (1,683)	Mat (1,578)	Bio (1,333)
India	Phys (4,064)	Mat (2,815)	Chem (2,284)	Eng (2,201)	Chem Eng (1,306)
United Kingdom	Phys (3,806)	Med (2,063)	Eng (1,922)	Bio (1,369)	Mat (1,220)
Canada	Phys (1,918)	Med (1,740)	Eng (1,504)	Bio (1,218)	Comp (1,056)
France	Phys (3,327)	Eng (1,059)	Med (1,049)	Mat (815)	Bio (720)
Australia	Phys (1,478)	Med (1,434)	Eng (1,143)	Mat (834)	Bio (776)
Italy	Phys (2,443)	Med (1,160)	Bio (625)	Eng (618)	Earth (373)
Russian Federation	Phys (3,417)	Eng (667)	Mat (563)	Chem (317)	Earth (286)
Taiwan	Phys (1,967)	Med (1,025)	Eng (525)	Bio (414)	Comp (348)
Switzerland	Phys (2,330)	Med (712)	Eng (493)	Bio (401)	Mat (383)
Spain	Phys (2,027)	Med (773)	Eng (490)	Bio (462)	Earth (351)
Netherlands	Phys (1,303)	Med (748)	Bio (418)	Eng (332)	Earth (180)
Singapore	Med (937)	Eng (718)	Bio (581)	Comp (478)	Mat (411)
Poland	Phys (1,578)	Med (332)	Eng (236)	Bio (205)	Earth (187)
Sweden	Phys (1,108)	Med (544)	Bio (410)	Eng (282)	Chem (208)
Viet Nam	Eng (671)	Phys (535)	Mat (474)	Chem (420)	Med (381)
Pakistan	Phys (864)	Eng (367)	Comp (278)	Agri (264)	Math (256)
Brazil	Phys (1,394)	Med (426)	Eng (193)	Bio (176)	Earth (108)
Belgium	Phys (1,072)	Med (471)	Eng (321)	Bio (253)	Mat (192)
Saudi Arabia	Chem (451)	Mat (441)	Phys (426)	Eng (387)	Chem Eng (285)
Iran	Phys (713)	Math (354)	Eng (353)	Mat (250)	Med (176)
Thailand	Med (647)	Phys (366)	Bio (228)	Eng (213)	Agri (193)
Hong Kong	Med (586)	Eng (266)	Comp (236)	Bio (210)	Phys (189)
Malaysia	Med (450)	Eng (382)	Phys (337)	Comp (221)	Bio (184)
Mexico	Phys (1,333)	Med (237)	Eng (184)	Earth (131)	Mat (110)
Colombia	Phys (751)	Med (137)	Eng (68)	Math (59)	Bio (54)
Egypt	Phys (614)	Chem (289)	Eng (288)	Mat (252)	Med (179)
South Africa	Phys (287)	Med (176)	Eng (108)	Earth (106)	Bio (76)

Eng, engineering; Med, medicine; Phys, physics and astronomy; Bio, biochemistry, genetics and molecular biology; Mat, materials science; Chem, chemistry; Chem Eng, chemical engineering; Comp, computer science; Earth, earth and planetary sciences; Agri, agricultural and biological sciences; Math, mathematics.

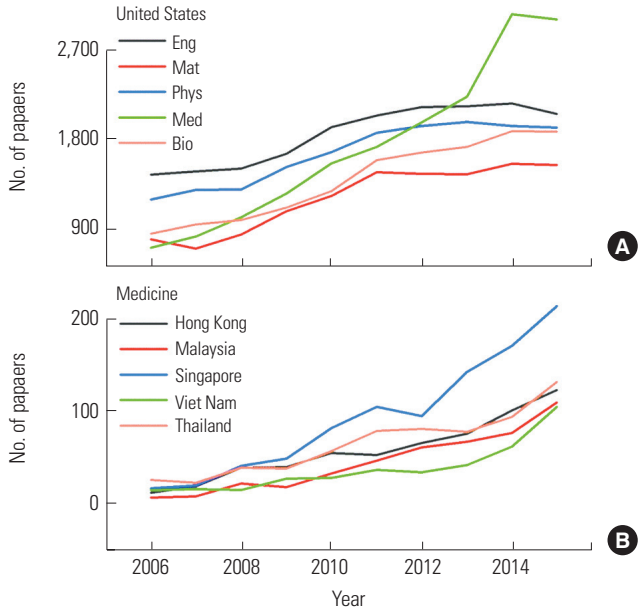

Fig. 3. (A) The number of papers coauthored by researchers in Korea and those in the United States in each year from 2006 to 2015 in the top five academic fields which produced the largest number of papers plotted versus publication year. (B) The number of papers coauthored by researchers in Korea and those in the countries designated in the figure in each year from 2006 to 2015 in the field of medicine plotted versus publication year. Eng, engineering; Mat, materials science; Phys, physics and astronomy; Med, medicine; Bio, biochemistry, genetics and molecular biology.

Malaysia, Mexico, Colombia, Egypt, and South Africa. These countries produced the largest number of publications in collaboration with Korea in each continent, except for those already shown in Table 1. Their growth rates were, on the average, substantially larger than those listed in Table 1.

In Fig. 1, we showed the number of papers coauthored by researchers in Korea and those in some selected countries in each year from 2006 to 2015 versus publication year. In Fig. 1A, 1B, and 1C, the top 11 countries which produced the largest number of papers are shown, while, in Fig. 1D, the countries which showed the top five AAGRs are shown. Except for Japan and Russian Federation, the trend of rapid growth was clearly seen.

In Fig. 2, the AGR for the top 20 countries which produced the largest number of papers in collaboration with Korea is plotted versus year. We remind the reader that, for example, the AGR for 2007 is computed from the number of papers published in 2006 and that in 2007. The yearly fluctuation of the growth rate is observed to be rather large and sometimes the growth rate is negative. From the 20 curves shown in this figure, we notice that the growth rates for many countries dropped rather rapidly between 2012 and 2013 and also between 2007 and 2008. Similar behavior is observed for other countries not shown in this figure.

We also examined the dependence of the growth of international collaboration on academic disciplines. In Table 3, the total number of documents from 2006 to 2015 coauthored by researchers in Korea and those in the country designated in the first column in the top five academic fields which produced the largest number of documents in each country. In many countries, physics and astronomy, medicine, engineering, materials science, and biochemistry, genetics and molecular biology are the dominant fields with the largest number of documents. Physics and astronomy is the most dominant field with the largest number of documents in 24 countries out of the total 31 countries. In five countries which include Colombia, Mexico, Russian Federation, Poland, and Brazil, the portion of the documents in physics and astronomy was more than 60%. Medicine is the second largest field with the largest number in 4 countries and the second largest number in 17 countries.

In Fig. 3A, we plotted the number of papers coauthored by researchers in Korea and those in the United States in each year from 2006 to 2015 in the top five academic fields which produced the largest number of papers versus publication year. We found that there was considerable growth in all five fields, with the growth in medicine being particularly rapid. In Fig. 3B, we showed the number of papers coauthored by researchers in Korea and those in the five Southeast Asian countries designated in the figure in each year from 2006 to 2015 in the field of medicine versus publication year. The rapid growth in all five countries is remarkable.

Discussion

These results show that the rapid increase of international collaborations between Korean researchers and foreign researchers is a general trend, which applies to a very large number of countries in the world. That the United States is the top ranking collaborative country is not surprising because it has been the most favorite country for Korean students and young researchers to visit to study abroad and the number of visits has been outstanding. Out of the top five collaborative countries, India and China showed the 1st and 2nd largest growth rates. This is perhaps related to the large influx of graduate students and postdoctoral researchers from these countries into Korean universities and research institutes in the recent decade. The same reasoning may be applied to Pakistan, which showed the largest AAGR in Table 1. The extremely rapid growth rate for Saudi Arabia listed in Table 2 is especially remarkable. This seems to be due to the government policy drive to enhance research collaborations between the two countries.

In Table 3, we examined the dependence of the growth of

international collaboration on academic disciplines. The case of Colombia, where physics and astronomy documents take up 77% of the total, is particularly interesting. We found that there were 10 countries other than Korea and Colombia, each of which was affiliated with more than 70% of the total 976 documents produced by collaborations between Korea and Colombia. This implies that a great majority of documents were produced through international collaborations among many countries. We suspect that a very large number of documents are in the area of experimental high energy physics, in which multinational collaborations are quite common. On the other hand, it is quite interesting to notice that the four countries with the largest number of documents in medicine are all Southeast Asian countries, namely, Singapore, Thailand, Hong Kong, and Malaysia. Saudi Arabia is unique in that the field with the largest number of documents is chemistry, in contrast to all other countries. This supports our suspicion that the collaboration between Korea and Saudi Arabia has been driven by external policies to enhance research collaborations mainly in the fields related to petrochemical industry.

In Fig. 2, we mentioned that the growth rates for many countries dropped between 2012 and 2013 and between 2007 and 2008. We think this may be due to the global economic recession which occurred during the same period and a corresponding decrease in research funding in many countries.

In conclusion, the rapid growth of international research collaboration was clearly seen in almost all cases studied here. The overall increase might be attributed to the movement of globalization, the development in communication and transportation technologies, and the development of the internet. Though research collaboration was most active in the field of physics and astronomy in most countries, it was found that, in many countries in Southeast Asia, the growth of collaboration in medicine was most remarkable. It may be originated from the intimate relationship between Korea and Southeast Asia and the leadership of Korean physicians in that region.

Conflict of Interest

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

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Original Article

Bibliometric analysis of publications from North Korea indexed in the Web of Science Core Collection from 1988 to 2016

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Abstract

The aim of this study was to analyze the bibliometric characteristics of publications from North Korea indexed in the Web of Science Core Collection from 1988 to 2016. We hypothesized that the main research area would be the physical sciences, and that the number of articles would continually increase over time. The Web of Science Core Collection was searched using the terms "North Korea" OR "Democratic People's Republic of Korea" OR "DPRK" in the address field of the basic search on February 2, 2017. The country of the co-authors, affiliations, journals, annual number of publications, and research fields were analyzed. Additionally, the articles by North Korean authors only were analyzed for the same parameters. A total of 318 articles from North Korea were found. The most frequent countries of collaboration were China, Germany, and Australia. Kim Il Sung University produced the most articles. The main research fields were physics, mathematics, and materials science. The categories of the journal titles corresponded to the research fields. The rapid increase in the number of articles in 2015 and 2016 was remarkable, although this increase started from a very small baseline number of publications. The results of the analysis of the 46 articles published by North Korean authors only were equivalent to the results for the 318 articles presented above. Our hypotheses were confirmed. The surge of articles in 2015 and 2016 may represent the recent efforts by the North Korean government to emphasize scientific research and development. It is anticipated that the productivity of North Korean researchers in terms of publications in international journals will increase dramatically based on the above trends, although the publication baseline is very low.

Keywords

Bibliometrics; Democratic People's Republic of Korea; Publications; Research

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Introduction

North Korea (the Democratic People's Republic of Korea) is one of the most closed nations in the field of journal article publications. Although some technological fields in North Korea are top-notch (for example, nuclear and military arms technology), few articles have been published in the international literature databases by North Korean researchers [1]. Most research results by North Korean researchers have been published in journals in North Korea. Scientific, technological, and medical (STM) journals from North Korea are listed in NK Scholar, which is available at http://www.nkscholar.com/. This site is the literature database of 26 STM journals from North Korea, containing 85,147 articles as of January 27, 2017. There are other STM, social sciences, arts, and humanities journals; however, it is difficult to find a comprehensive list of such journals. It is also difficult to read the journal articles published in North Korean journals. For those who can read Korean, articles can be purchased from NK Scholar. Since the user interface of the database is only in Korean, it is difficult for international researchers to access the information.

Some articles from North Korean researchers have been introduced to the world through international literature databases such as Web of Science, PubMed, and Scopus. The aim of this study was to analyze the bibliometric characteristics of 318 publications from North Korea indexed in the Web of Science Core Collection from 1988 to 2016. This study may be able to identify trends in research activities and collaboration with foreign researchers by researchers based in North Korea. We hypothesized that the main research area would be the physical sciences due to the absence of sufficient resources for the life sciences, and that the number of articles from North Korean authors would exhibit a continuous increase, based on previous bibliometric results [1].

Methods

The Web of Science Core Collection was searched using the terms "North Korea" OR "Democratic People's Republic of Korea" OR "DPRK" in the address field of the basic search on February 2, 2017. The following settings were used: Science Citation Index Expanded–1900 to present; Social Sciences Citation Index–1956 to present; and Arts & Humanities Citation Index–1975 to present. This resulted in 401 hits. Only articles with affiliations with North Korean institutions were included in the analysis because some articles with affiliations in South Korea were erroneously entered as being from North Korea or the Democratic People's Republic of Korea. This adjustment led to 318 articles. From these 318 articles, the countries of the co-authors, the affiliations of the North Korean authors, the journal titles, the number of articles over time, and the research fields of the articles were analyzed. The Hamhung Pharmaceutical University, Hamhung Chemical University, Hamhung Hydraulic Power University, Hamhung University of Chemical Industry, and Hamhung University of Chemical Technology were treated as a single institution (Hamhung University). From the 318 articles, those published without collaboration with researchers from other countries were selected as a subset. Forty-six articles were written by North Korean authors only. The same bibliometric parameters were analyzed, and the funding agencies were also analyzed.

Word cloud was built using tm and wordcloud packages of R available from: http://cran.nexr.com. Out of corpus, numeric, punctuations, stop words were removed. Capital characters were transformed into small characters. Following words were removed: results, using, can, based, properties, two, method, paper, also, elsevier, reserved, study, analysis, used, obtained, rights, different, show, new, investigated, well, conditions, data, incline, order, present, approach, degrees, one, respectively, experimental, found, solution, showed, number, three, korea, states, ltd, model, and investigated. After that, upper ranked 50 words from each corpus were included in word cloud with at least 5 times appearance. At first, word clouds of all 318 articles and 46 North Korean authors only articles were built. To find the recent trend, those of the 126 articles published through 2010 and the 182 articles from 2011 to 2016 were built.

Descriptive statistics was applied to this cross-sectional observational study of the literature.

Results

The major collaborating countries were China (197, 61.95%), Germany (50, 15.7%), Australia (10, 3.2%), the United States (5, 1.6%), and Italy (4, 1.3%) (Fig. 1, Suppl. 1). Three articles were co-authored with South Korean researchers. The 318 articles corresponded to 48 affiliations in North Korea (Suppl. 2). Kim Il Sung University (161, 50.6%), the Kim Chaek University of Technology (44, 13.8%), the Academy of Science (41, 12.9%), and the University of Science (26, 8.2%) were highly productive institutions (Fig. 2). The top 3 journal titles in which articles were most frequently published were the *International Journal of Systematic and Evolutionary Microbiology* (8), *Journal of High Energy Physics* (7), and *Linear Algebra and Its Applications* (6) (Fig. 3, Suppl. 3). The number of articles published by North Korean authors dramatically increased to 52 in 2015 and 55 in 2016 (Fig. 4). The top 5 research fields were physics (66, 20.8%), mathematics (61, 19.2%), material sciences (42, 13.2%), chemistry (31, 9.8%), and engineering (29, 9.1%) (Fig. 5, Suppl. 4). Citation data

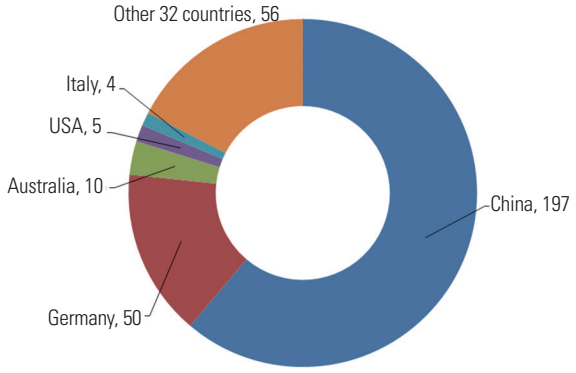

Fig. 1. Countries of the co-authors of articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

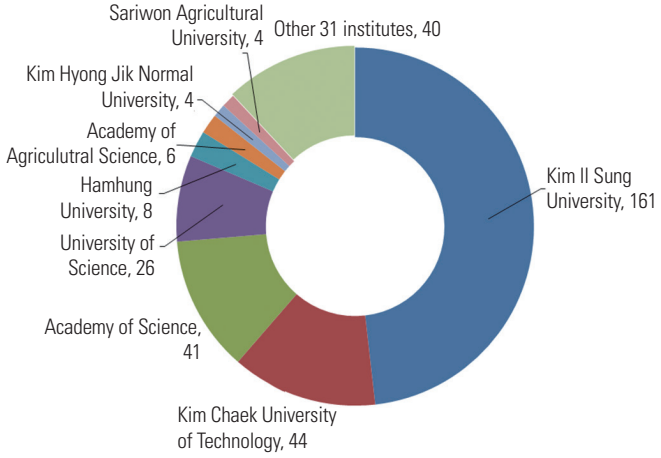

Fig. 2. Affiliations of the North Korean authors of the articles from the Web of Science Core Collection [cited on February 2, 2017].

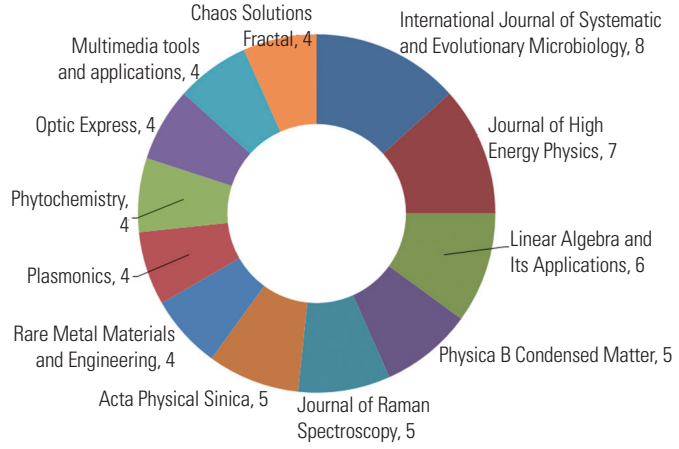

Fig. 3. Top 12 journal titles of articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

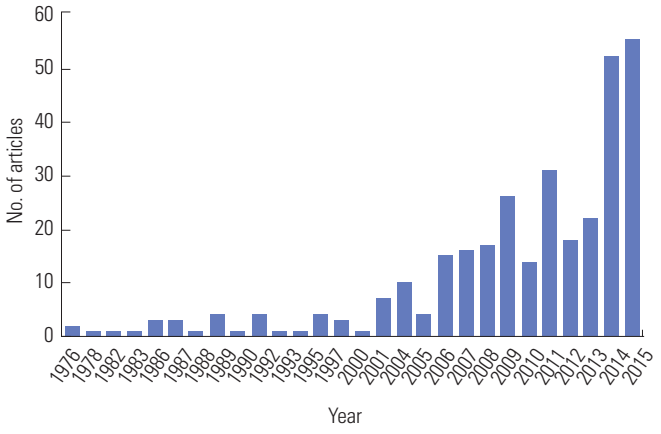

Fig. 4. Number of articles by North Korean authors from the Web of Science Core Collection over time [cited on February 2, 2017].

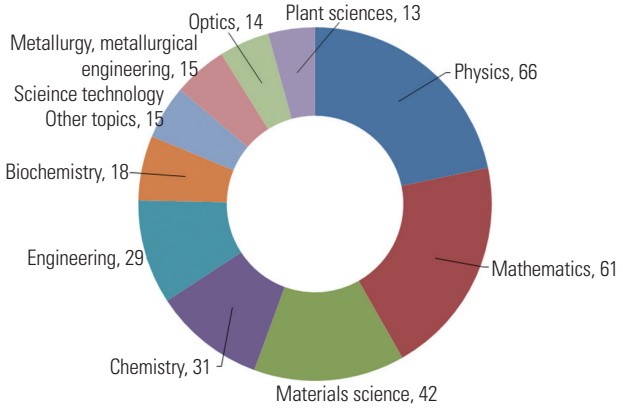

Fig. 5. Top 10 research fields of articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

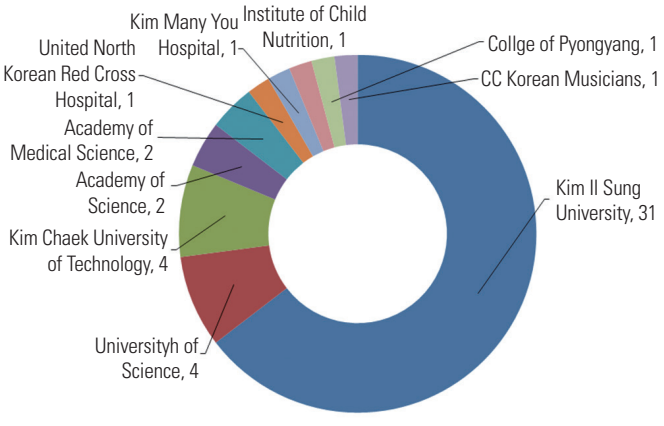

Fig. 6. Affiliation of the 46 articles with North Korean authors only from the Web of Science Core Collection [cited on February 2, 2017].

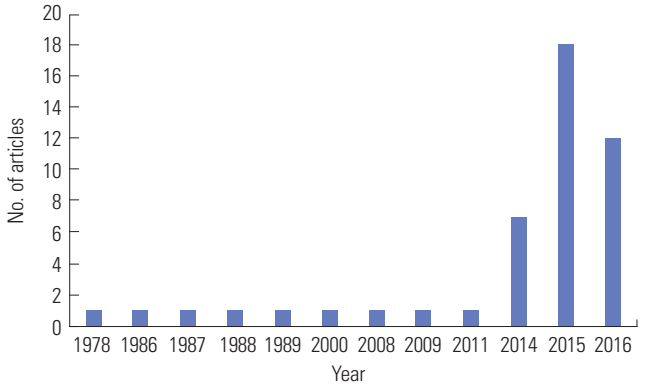

Fig. 7. Number of articles by North Korean authors only from the Web of Science Core Collection over time [cited on February 2, 2017].

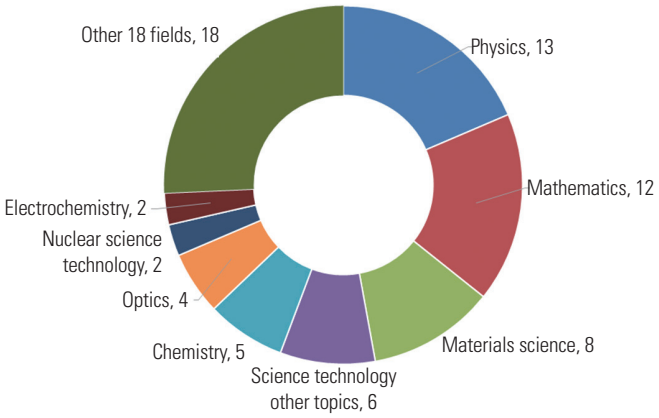

Fig. 8. Research fields of the 46 articles by North Korean authors only from the Web of Science Core Collection [cited on February 2, 2017].

and abstracts of 318 articles were available from Suppl. 5.

Forty-six articles were published without co-authors from other countries. Of these articles, 32 (69.6%) were from Kim Il Sung University, followed by the University of Science (4) and the Kim Chaek University of Technology (4) (Fig. 6). The journal titles are listed in Suppl. 6. The number of such articles recently increased to 18 in 2015 and 12 in 2016 (Fig. 7). The major research fields of articles by North Korean authors only were physics (13), mathematics (12), material sciences (8), science and technology other topics (6), and chemistry (5) (Fig. 8). Of those 46 articles, 9 were funded: 7 by the Ministry of Education of North Korea; 1 by the World Academy of Science for the Advancement of Science in Developing Countries (TWAS); and 1 by TWAS; the United Nations Educational, Scientific and Cultural Organization (UNESCO); and the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences.

Word clouds are presented in Figs. 9 and 10. There were differences of corpus between all 318 articles and 46 North

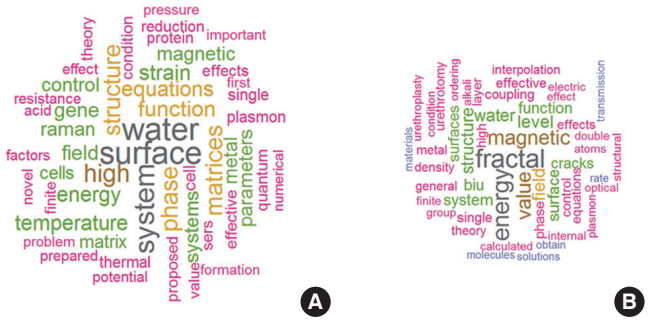

Fig. 9. Word clouds of (A) all 318 articles by authors from North Korea and (B) the 46 articles by North Korean authors only from the Web of Science Core Collection from 1988 to 2016.

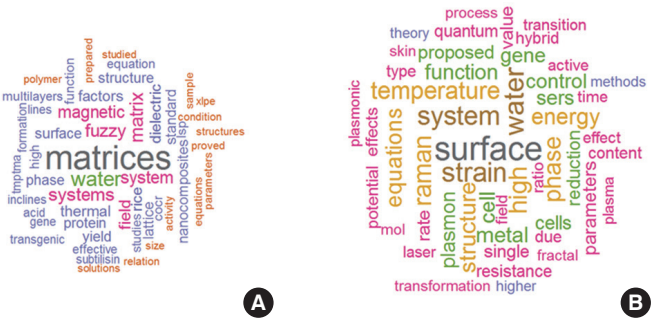

Fig. 10. Word clouds of (A) the 126 articles published through 2010 and (B) the 182 articles from 2011 to 2016 by authors in North Korea from the Web of Science Core Collection from 1988 to 2016.

Korean authors only articles: in the latter, the terms related with physics appear more frequently (Fig. 9). In the corpus from 126 articles published through 2010 and from articles from 2011 to 2016, the major terms were related with physics. the only difference was more number of agricultural terms in the former and more frequency of biology terms in the latter (Fig. 10). Raw data were available from Suppls. 7 to 10.

Discussion

The above results show that the articles by North Korean authors were mostly co-authored with researchers from other countries (85.5%). Of the 318 articles, 46 (14.5%) were by North Korean authors only. These are very small numbers given the population (25 million), gross domestic product (40 billion US dollars), and research activities of North Korea. We can infer the following conclusions: research results have been published mostly through journals in North Korea, cooperative or collaborative research with researchers in other countries has been very limited, and a few researchers in North Korea can access the internet since they presumably submit the

manuscripts to international journals through the internet.

North Korean authors most frequently collaborated with Chinese researchers (Fig. 1). The next most common countries of collaboration were Germany and Australia. The importance of China as a collaborating partner is thought to originate from the fact that China is the geographic neighbor of North Korea and a fellow socialist country; therefore, China has invited North Korean researchers to their institutions. Kim Il Sung University, the Kim Chaek University of Technology, and the Academy of Science were the top-ranking institutions in North Korea in terms of articles published in Web of Science journals (Fig. 2). These 3 institutions published 246 (77.4%) of the articles. It is believed that the North Korean government has implemented special strategies to promote research at these institutions. The journal list was compatible with the research fields; that is, journals from the fields of physics, mathematics, and material science were predominant (Fig. 3). Of the 9 articles in the field of biology, 8 were published in the *International Journal of Systematic and Evolutionary Microbiology* (Fig. 5). An increasing trend in article publication was evident, although the baseline was very low. The fact that more than 50 articles were published in 2015 and 2016 indicates that the North Korean government has begun to promote research and development and to recommend publication in international journals (Fig. 4). One article was published in the field of the arts, and 1 in the social sciences. It is believed that both arts/humanities and social sciences researchers have very rare chances to study abroad and produce collaborative works with researchers from other countries. The research and development strategy of the North Korean government has been focused on the physical sciences and engineering. There were 19 articles in the medical field and 16 in agriculture (Suppl. 1).

When the 46 articles published by North Korean authors only were analyzed, similar patterns were observed: the same top 3 institutions (Fig. 6), a surge of publication in 2015 and 2016 from a very small baseline (Fig. 7), and the same research fields (Fig. 8). Seven of the funded articles were funded by the Ministry of Education of the North Korean government; while 2 were supported by international funds such as TWAS and UNESCO, and 1 Chinese funding agency. The other 35 articles (76.1%) had no funding. The proportion of funded articles was insufficient. It is believed that many researchers in North Korea can engage in research and development using their basic facilities and manpower. Within the 46 articles with North Korean authors only, one conspicuous researcher was Song-Jin Im, professor of physics, Kim Il Sung University. He published 6 of those 46 articles, and was only researcher to provide ORCID (http://orcid.org/0000-0001-6277-7200) information among the authors of those 46 articles. According to his career summary on ORCID, he received a PhD from Kim Il Sung University in 2005, and moved to the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Germany from 2008 to 2010. According to the physicist Professor Kihong Kim from Ajou University in South Korea, he was an excellent researcher in Germany and his research activity is comparable to that of top-level South Korean physicists. We can verify that although the North Korean government has restricted most North Koreans from accessing the internet outside of North Korea, it allows top-notch researchers at selected research institutions to access the internet of other countries. Although the Korean government recommended collaboration between North Korean and South Korean researchers from 1998 to 2007, only 3 collaborative research articles were found in the Web of Science. Collaborative work between North and South Korean researchers has remained limited due to political tensions.

A report on the bibliometric analysis of the articles from North Korea indexed in the Web of Science and Scopus from 1975 to 2012 has been published [1]. A total of 251 articles were analyzed. However, in the present study, the number of articles up to 2012 was. This discrepancy between the 2 studies may originate from differences in the included databases, as the previous report also included Scopus. There may have also been a difference in the selection criteria for institutions. We manually selected articles whose authors had affiliations with institutions in North Korea. Although we first found 401 hits, this number decreased to 318 after implementing this inclusion criterion. In the previous study, the most frequent collaborating countries were China, Germany, and Australia. The 3 most productive institutions were Kim Il Sung University, the Academy of Science, and the Kim Chaek University of Technology. The major research fields were physics, engineering, and chemistry. There was a remarkable increase of number of articles in 2012, from a very small baseline [1]. In contrast, in this study the major fields were found to be physics, mathematics, and materials science.

Word cloud shows the main terms in certain corpus. Comparison of word clouds between different groups of literatures was done. In all word clouds, terms related with physics were dominant. This trend has been strengthened in the articles by North Korean authors only (Figs. 9, 10).

This study had some limitations. First, to precisely characterize research trends in North Korea, the journals published in North Korea should be analyzed. Articles in the Emerging Sources Citation Index were not included. If the Emerging Sources Citation Index had been included, the number of articles from North Korea would have been greater than reported in this study. Content analysis with data mining is another topic to be explored in the analysis of research trends.

In conclusion, our hypotheses were accepted, since the main research area was the physical sciences, including physics, mathematics, and materials science, and there was a surge in the number of articles in 2015 and 2016 from a very small baseline. Kim Il Sung University was the top-ranking institution, and has produced many articles in international journals. Additionally, top-notch researchers in North Korea are believed to use the internet outside of North Korea without difficulty during their research work.

Conflict of Interest

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

Supplementary Material

Supplementary files are available from: https://doi.org/10.7910/DVN/VG9F2U

Suppl. 1. List of countries from 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 2. List of institutes from 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 3. List of journals from 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 4. List of research fields from 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 5. Citation data including title, authors, and abstract from 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 6. Citation data including title, authors, and abstract from 46 articles by North Korean authors only from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 7. Words and their frequencies from titles and abstracts of 318 articles by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 8. Words and their frequencies from titles and abstracts of 46 articles by North Korean authors only from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 9. Words and their frequencies from titles and abstracts of 126 articles published through 2010 by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

Suppl. 10. Words and their frequencies from titles and abstracts of 126 articles published 182 articles from 2011 to 2016 by North Korean authors from the Web of Science Core Collection [cited on February 2, 2017].

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Case Study

Analysis of visits to ScienceCentral, an open access full-text archive of scientific society journal literature

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Abstract

ScienceCentral is a free or open access full-text archive of scientific society journal literature hosted by the Korean Federation of Science and Technology Societies. It was launched in December 2013. We analyzed the number of articles deposited, page views by period, country of visitors, number of visitors, and entry point of visits. Descriptive statistics were presented. We also hypothesized that visitors accessed ScienceCentral mostly through Google and Google Scholar since ScienceCentral allows Googlebot to index it. The number of deposited articles was 19,419 from 124 journals in December 2016. The number of page views per month was 20,228 in December 2016. The top countries of visitors were South Korea (39.9%), the United States (13.26%), India (4.2%), China (3.4%), and Russia (3.2%). The average number of page views per article a month in December 2016 was 1.0. Google and Google Scholar were powerful referral sites to ScienceCentral. Except for direct visits to ScienceCentral, seven out of the top ten access sites to ScienceCentral were Google or Google Scholar sites from a variety of countries. Although the number of visitors and page views has increased continuously, the average number of page views per article a month has not increased.

Keywords

Access to information; Archives; Bibliographic databases; Open access publishing

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Introduction

For journals published by academic societies, scholarly journal literature platforms are important for exposure to researchers worldwide. What is the most important platform for scholarly journals at present? We suggest it is Google or Google Scholar, although medical researchers or physicians typically search PubMed or PubMed Central first [1]. Except for PubMed Central, archives of free or open access scholarly journals are rare. *KoreaMed Synapse* provides open ac-

cess archives of medical journals published in Korea and comprised 131 journals with 90,404 articles as of January 17, 2017 [2]. It was launched in 2007 by the Korean Association of Medical Journal Editors. *Open Access Korea Central* comprises 86 scholarly journals in all fields published in Korea and has been maintained by the National Library of Korea. There is no public information on its launch year. In Japan, the *Japan Science and Technology Information Aggregator, Electronic* (J-STAGE) is the platform for 2,025 scholarly journals published in Japan [3]. It was developed by the Japan Science and Technology Agency to support the transmission of information. SciELO is a platform for 1,249 scholarly journals from 16 Latin American countries with 573,525 articles [4], which was launched in 1999. Among all these database platforms, only *Open Access Korea Central* provides the complete full-text Journal Article Tag Suite (JATS) extensible markup language (XML). *KoreaMed Synapse* contains only the abstract in XML if the main text is written in Korean. Even PubMed Central provides some articles as scanned-full text, not in JATS XML form.

In 2013, the Korean Federation of Science and Technology Societies decided to host a full-text open or free access literature database platform for society journals based on full text JATS XML, entitled ScienceCentral [5]. The test version of ScienceCentral launched in September 2013. Although it is comparable to PubMed Central, it has some distinct features. First, it comprises all science fields, not only biomedical fields; second, journals in any language from anywhere in the world can be deposited, not only articles in English; third, it only provides full text JATS XML, not scanned full text; and fourth, it provides the translation into 80 languages via Google Translate. More than 3 years have passed since the launch of ScienceCentral. Therefore, it is time to evaluate the volume of article access from throughout the world. This paper presents an analysis of the visiting to ScienceCentral from 2014 to 2016 so that the usefulness of this unique database can be evaluated by government administrators who support this project and scientists who search the database. We also hypothesized that visitors approach ScienceCentral mostly through Google and Google Scholar since ScienceCentral has a script allowing access from the Googlebot.

Analysis of Deposit and Access Logs

We analyzed the number of journals and articles deposited, page views by period, country of visitors, number of visitors, and access route to ScienceCentral from January 2014 to December 2016. Descriptive statistics are presented.

In January 2014, 526 from 12 journals had been deposited. This had increased to 19,419 from 124 journals by December 2016 (Fig. 1). In January 2014, the number of visitors was 213, but the number had increased to 7,696 by December 2016. The number of page views per month was 845 in January 2014. It had increased to 20,228 by December 2016 (Fig. 2). Visits originated from 21 countries in January 2014 and 120 in December 2016. In the entire 3-year period from 2014 to 2016, visits originated from 203 countries. The ten countries with the most visitors were South Korea (39.9%), the United States (13.26%), India (4.2%), China (3.4%), Russia (3.2%), the United Kingdom (2.6%), Japan (2.5%), Brazil (1.8%), Germany (1.7%), and Iran (1.6%) (Fig. 3). The average number of page views per article per month has been fluctuating (Fig. 4). Out of the top 10 approaches to ScienceCentral, one is direct access and the other seven entry sites were Google and Google Scholar sites from a variety of countries (Table 1). Raw data of visits to ScienceCentral are available from Suppl. 1.

The number of journals listed in ScienceCentral and number of articles included continuously increased from 2014 to

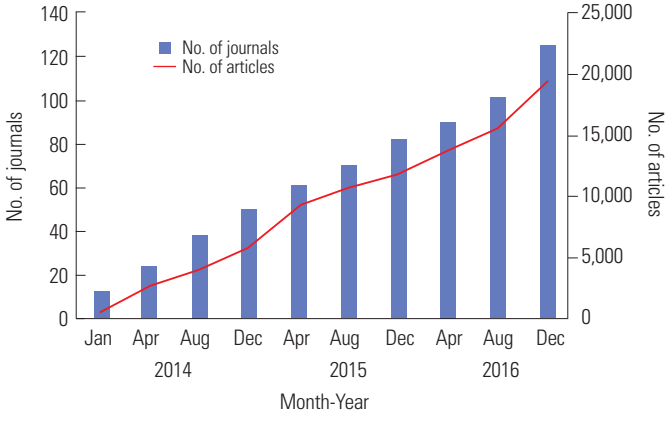

Fig. 1. Number of journals and articles deposited to ScienceCentral with passing time.

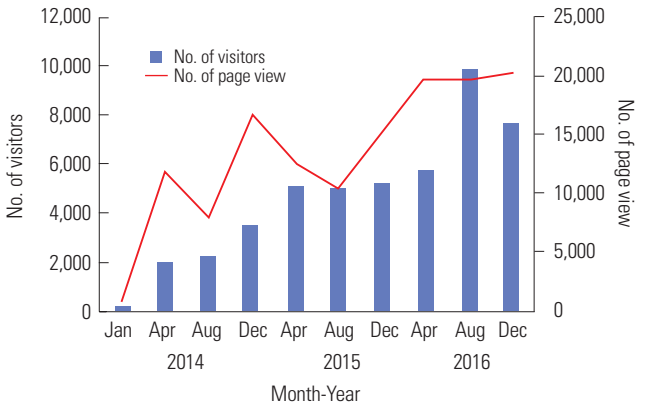

Fig. 2. Number of visitors to ScienceCentral and page views with passing time.

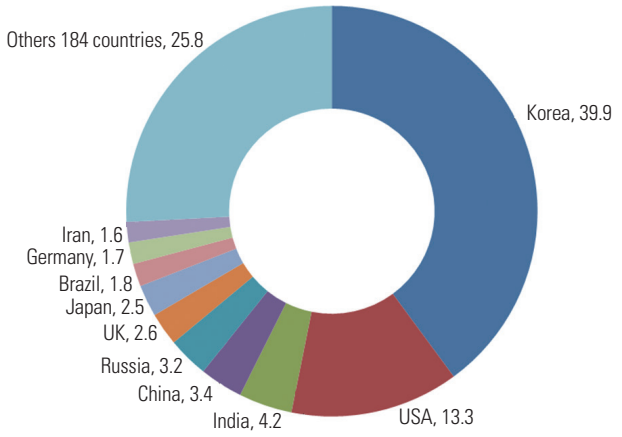

Fig. 3. Major countries of visits (%) to ScienceCentral from January 2014 to December 2016.

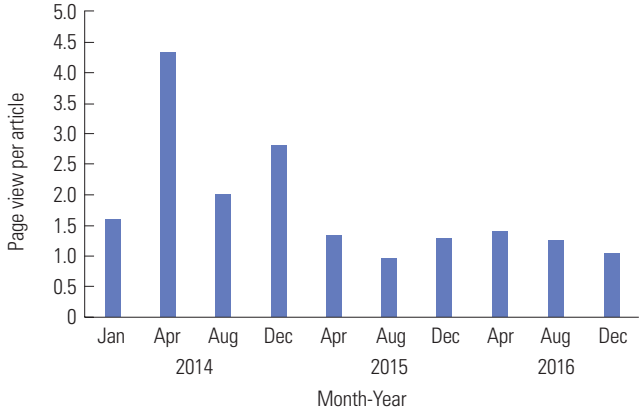

Fig. 4. Page views per article deposited to ScienceCentral from January 2014 to December 2016.

2016 (Fig. 1). The number of visitors and page views also continuously increased along with the number of journals and articles (Fig. 2). The number of countries of visits also increased to 120 in December 2016. The finding that the number of countries of origin of visits over the entire 3-year period was 203 reveals that ScienceCentral was visited from all over the world. That 39.9% of visitors were from Korea is not surprising because most of the journals listed in ScienceCentral are deposited by scholarly societies or non-profit organizations from Korea. Only three journals from outside of Korea submit their articles for indexing: Biochemia Medica from Croatia, Eurosurveillance from Sweden, and *Pediatric Neurology Briefs* from the United States. Given its origins in Korea, it is interesting to find that more than 60% of visitors are from outside of that country (Fig. 3). The second most common country of visit origin was the United States. This phenomenon likely arose from the fact that the United States is the top-ranking country in producing scholarly articles. The countries

Table 1. Sites through which visitors accessed ScienceCentral from 2014 to 2016

Site of origin	Classification	No. of visitors	%
google.com	Organic	66,908	37.30
Direct	None	37,007	20.85
scholar.google.com	Referral	10,611	5.98
scholar.google.co.kr	Referral	8,591	4.84
scholar.google.co.in	Referral	1,947	1.10
scholar.google.co.uk	Referral	1,241	0.70
biochemia-medica.com	Referral	1,234	0.70
4webmasters.org	Referral	997	0.56
scholar.google.com.br	Referral	965	0.54
google.fr	Referral	915	0.52
2,491 Other sources	Referral	47,136	26.91
Total		177,552	100

that follow in terms of number of scholarly articles published are India, China, and Russia. In fact, it was notable that so many visits originated from Russia. This phenomenon is difficult to explain. The number of monthly page views was constant in 2016 (Fig. 2). This is the reason why the average number of page views per article of ScienceCentral has decreased since 2014 (Fig. 4). Page views per article has been about 1.0 recently.

Conclusion

It was found that the number of visitors to ScienceCentral has increased continuously along with the increase in the number of articles deposited; however, the number of page views leveled out in 2016. The average number of page views per article has decreased continuously since 2014. Another factor that should be taken into consideration with regard to the frequency of visits is the quality of Google Translate into 80 languages, which is rapidly developing. As the translation quality becomes excellent, the number of visitors will increase continuously and rapidly. Furthermore, the hypothesis that ScienceCentral has been visited mostly through Google or Google Scholar can be accepted.

Conflict of Interest

Younsang Cho has been a program manager of ScienceCentral since 2013. No other potential conflict of interest relevant to this article was reported.

Supplementary Material

Supplementary file is available from: https://doi.org/10.7910/DVN/UBTVUE.

Suppl. 1. Analysis of deposited journals, articles, visitors, contries of visitors, and page views to ScienceCentral from January 2014 to December 2016

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Case Study

Analysis of the results of the first implementation of the Korea Manuscript Editors Certification

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Abstract

In the field of international scholarly journal publishing, manuscript editing has been established as an essential component of the publication process. As the necessity of this process has increased, the Korean Council of Science Editors has consistently provided education for training professional manuscript editors, and has worked to implement a manuscript editor certification system. Starting in 2014, the Korean Council of Science Editors thoroughly conducted background research and advanced analysis in preparation for such a system. Subsequently, a committee of experts was formed to develop and simulate an examination for this certification. This process culminated in the first manuscript editor certification examination, which was held in November 2016 and resulted in 40 initial Korea Manuscript Editors Certification holders. Examinations for the Korea Manuscript Editors Certification are scheduled to be held annually. The establishment of this certification system will contribute to strengthening individual capacities and further developing science journal publication in Korea by expanding the field of manuscript editing. Ultimately, this system will contribute to the promotion of Korean scientific journals to the level of prominent international journals.

Keywords

Academic publishing; Certification; Manuscript editor

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Introduction

Manuscript editors (MEs; also known as copy editors, technical editors, or managing editors) check a manuscript to ensure that it adheres to the proper format for a journal's style and play an essential role in the international academic environment.

ME certificate or certification systems have already been widely established internationally. Several representative institutions or editors' associations, including the Board of Editors in the Life Sciences (BELS), American Medical Writers Association (AMWA), and Council of Sci-

ence Editors, provide active education for training professional MEs and issue certificates to MEs who meet appropriate criteria.

As Korean science journals quickly rose to an international status, the style and format of journals became important criteria in their evaluation. Therefore, interest in manuscript editing and the necessity of professional MEs have continually increased.

However, due to the lack of standards regarding the roles and qualifications of MEs, journal editorial boards have articulated an increasing demand for clear standards and proper education. Hence, the Korean Council of Science Editors (KCSE) implemented an ME certification system.

Utilization of the Korea Manuscript Editors Certification

The Korea Manuscript Editors Certification (KMEC) is the first private ME certification system adopted by the KCSE, and aims to train and certify MEs in the field of science and technology in Korea. This certification is issued to those who have a qualified educational background, a certain amount of work experience, have received sufficient educational credits from the KCSE, and then pass the annual test.

This will provide an effective learning opportunity and motivation to MEs and journal publishing personnel, along with the public acknowledgement of an individual's expertise. Meanwhile, this program is expected to play an important role not only for individual MEs, but also for journal publishers in the field of science. The KCSE guarantees that MEs with this certificate have core competencies in manuscript editing, so journal publishers will be able to refer to this certificate when they want to hire a skilled ME.

Those who acquire the KMEC will be updated regarding worldwide trends in manuscript editing and professional education programs. Additionally, it is expected that those with the KMEC will be able to further develop their skills by actively exchanging useful information within the ME community [1].

Exam Development and Implementation Process

The KCSE thoroughly conducted background research and advanced analysis in preparation for the KMEC system. Subsequently, a committee of experts was formed to develop and simulate the examination. This article summarizes the implementation of the examination, and analyzes its composition and results.

The KCSE began to discuss the necessity of a certification system in 2014, and conducted background research. It checked whether a domestic certification regarding MEs existed, and reviewed foreign ME certifications, including the BELS, AMWA, and Council of Science Editors programs. Moreover, other domestic certifications, such as the medical librarian certification system, were examined as well.

In 2015, a survey regarding the demand for and validity of an ME certification was conducted among Korean science journal editors [2]. A fundamental study based on the survey confirmed that the certification system was valid enough for an ME certification to be implemented, so the KCSE decided to introduce an ME certification system suitable for the current state of scientific journals in Korea. Accordingly, a full-scale effort to develop an examination began in 2016.

After comprehensive discussion, an examination committee comprising 1 chairman, 2 counsels, and 11 examiners was established in July 2016. This committee was founded by members with all the following qualifications: 1) at least 3 years of experience in professional manuscript editing or journal publication; 2) a certification issued by BELS or AMWA, or completion of a formal ME education from a prominent university; and 3) a sufficient amount of educational credits received through the KCSE.

In September 2016, all examiners wrote 30 to 50 questions each, and 100 sample questions were selected after peer review and revision at the committee workshop. In October 2016, a simulation test using the sample questions was conducted on 4 current MEs with more than 3 years of experience. The level of difficulty and examination timing were subsequently adjusted. Eventually, the final version of the examination was completed with the assistance of KCSE members and other experts.

Individuals interested in or engaged in scientific journal publication were informed about the purpose and format of the examination, as well as the relevant qualifications, through the KCSE website and e-mail by August 2016. Those with a bachelor's degree or higher in any major, more than a year of manuscript editing experience, and more than 20 credits of relevant education within the past 3 years were qualified to take the examination.

Format and Content of the Examination

The first KMEC examination was held on November 19, 2016 in Seoul. By 8:50 a.m., 37 candidates had completed their registration, and the test paper was distributed after 30 minutes of instruction. The candidates were given 100 questions and the non-open-book test lasted for 2 and a half hours in the presence of 3 KCSE members (Fig. 1).

All the questions were in a 4-option multiple choice format and covered a wide range of content, including the following topics: the role of MEs, instructions for authors, copyediting

skills according to a the given style guide, bibliographic references and citations, elements of scientific publication, tables and figures, statistics, publication ethics and copyright issues, databases and impact factor, and punctuation.

The content was divided into 12 different domains, and the number of questions in each domain varied (Table 1). Units and abbreviations and English grammar and punctuation were the domains with the most questions because they are directly related to essential work skills in manuscript editing.

Fig. 1. First Korea Manuscript Editor Certification Examination. The candidates were concentrating on the exam.

Table 1. Domains of the questions

Domain	No. of questions
Role of the manuscript editor	3
General corrections	9
Units and abbreviations	12
References	8
Statistics	4
Tables and figures	10
Understanding the elements of a research article	8
Publication ethics and copyright	8
Technical factors related to publishing	8
Databases and citation indices	10
Korean grammar	5
English grammar and punctuation	15
Total	100

Results

The KMEC is fundamentally an absolute evaluation system requiring candidates to score at least 70 correct answers out of 100. However, the candidates were informed that the passing grade may change according to the difficulty of the examination. Among the 50 applicants who received the qualification, 11 were certified without an examination, and 37 of the remaining 39 (95%) took the examination. Twenty-nine of those 37 candidates passed the examination, indicating a passing rate of 78%.

Eight questions exhibited a 100% correct answer rate, 35 had a correct response rate of over 90%, and 51 had a correct answer rate of over 80% (Table 2). However, one question had a correct response rate of only 16.2% (6 of 37). This question was included in the English grammar and punctuation domain, and asked which instructions of the journal a given paragraph belonged to.

Eighteen questions had a correct response rate of under 50%. Questions asking for the correct explanation of a Latin abbreviation, the selection of a database that provides full-text articles, and identification of a misused punctuation mark each showed a 27% correct answer rate. The results for each domain are presented in Table 3. The units and abbreviations domain and the English grammar and punctuation domain, which contained the largest number of questions, also had the largest number of questions with low correct answer rates.

Table 2. Number of questions with various correct answer rates

Percentage of correct answers	No. of questions	Cumulative no. of questions
100	8	8
90–99	27	35
80–89	16	51
70–79	14	65
60–69	6	71
50–59	11	82
40–49	9	91
30–39	4	95
20–29	4	99
10–19	1	100
0–9	0	100

Table 3. Number of questions according to the correct answer rate in various domains

Domain	No. of questions with a correct answer rate of 50% or less	No. of questions with a correct answer rate of 90% or more
Role of the manuscript editor	NA	2
General corrections	NA	5
Units and abbreviations	4	1
References	NA	5
Statistics	2	NA
Tables and figures	1	3
Understanding the elements of a research article	NA	7
Publication ethics and copyright	NA	3
Technical factors related to publishing	2	5
Databases and citation indices	2	2
Korean grammar	2	1
English grammar and punctuation	5	1
Total	18	35

NA, not available.

Four of the 12 questions from the units and abbreviations domain and 5 of the 15 from the English grammar and punctuation domain had a correct answer rate of under 50%. Moreover, only 1 question from each domain had a correct answer rate of over 90%. Therefore, these 2 domains are considered to be of the utmost importance and difficulty.

The domains of general corrections, references, understanding the elements of a research article, and publication ethics and copyright contained 9, 8, 8, and 8 questions, respectively, all of which showed a correct answer rate of over 50%. These 4 domains were low in difficulty, as more than 90% of the candidates chose the correct answers for 5, 5, 7, and 3 questions, respectively. All the candidates provided correct answers to questions such as the role of a ME, selecting the appropriate instructions for authors, data computation, and the use of punctuation marks in English. This occurred because the candidates had practical experience working in the journal publication field.

Based on this analysis, it is possible to identify priorities for the future education of KMEC holders. General corrections, references, understanding the elements of a research article, and publication ethics and copyright were the domains in which the candidates showed a high level of understanding. Meanwhile, units and abbreviations and English grammar and punctuation were the most troublesome areas for MEs who did not major in medicine or science. In particular, the use of punctuation in English contained the questions with the highest and lowest correct answer rates, signifying that Korean editors had an uneven understanding of English punctuation.

Limitations

There are 3 major limitations to this examination. First, it was difficult to develop balanced questions due to the wide range of professional fields and skills of the candidates.

Second, this test was not focused on selecting a certain number of people through a relative evaluation. It was an absolute evaluation system aimed to evaluate the examinees' work ability and knowledge, resulting in relatively less effort invested in the difficulty control that would be needed to differentiate the levels of the candidates. Instead, the test makers focused more on making the test of moderate difficulty, as it was the first examination. At least 2 people were requested to produce questions on each topic to maintain balance.

Finally, an item analysis assessing the difficulty level of each item objectively and clearly was not conducted. Item analysis is the process of evaluating the reliability of an item. It is a significant aspect of ensuring the balance of an examination and ultimately increasing the degree of completion by identifying certain errors that may be present [3]. The KMEC is expected to become more objective by calculating an index of item difficulty, item discrimination, error attractiveness, and other parameters associated with classical test theory in the future.

Conclusion

The KCSE implemented the KMEC system and developed an examination, aiming to establish a standard for MEs in Korea. The recent examination was very meaningful because it was the first test to lead to the qualification of MEs in the ME certification system that was introduced in Korea.

A KMEC holder is officially guaranteed to have the basic knowledge and skills required in a professional ME. The KCSE plans to hold the KMEC examination annually and to provide professional education and updated information regarding worldwide trends in manuscript editing.

The KCSE will expand the pool of exam questions by continually inventing new questions and revising existing ones. In order to achieve objectivity and reliability, a constant effort is required in the standardization and application of the KMEC system. A performance test of candidates' ability to search for various pieces of information and practical proofreading skills may also be included in the process in the future.

The establishment of this certification system is expected to strengthen individual capacities and to further develop science journal publication in Korea by expanding the field of manuscript editing.

Conflict of Interest

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

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Essay

Should we wait until an article is cited?

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Introduction

Every year, approximately 2.5 million new scientific papers are published [1]. An analysis of the percentage of cited papers listed in Scopus from 2006 to 2015 shows that only 62.6% of all articles in the world are cited (Fig. 1). The citation distribution of the articles varies widely, ranging from being cited merely once to as many as 53,435 times as of January 18, 2017. Looking at the percentages of cited publications in the graph below (Fig. 2) [2], the Pareto principle can be applied to 80% of the citations made in 20% of the articles. Does this mean that 80% of the articles should merely wait to be cited?

Suggestions How to Increase Articles' Visibility and Citations

Current publications take a while to get cited because researchers cite earlier research and published papers, Lancho-Barrantes et al.'s research [3] shows that a 3-year publication window is the best compromise as shown in Fig. 2 of Reference 3. The observations that 1) citations are focused on only 20% of the articles, and 2) it takes three years to capture the citation peak of the majority of subjects, along with the two citation trends mentioned above show that more assertive promotion is necessary. Though the quality of the article itself is crucial for it to be cited and influence follow-up studies, it is quite a challenge to not only compete with similar articles, but also increase their impact among millions of articles. Therefore, researchers must consider how to actively promote their articles.

Apart from the traditional way of assessing an article's influence by examining its frequency, other strategies, such as assessing an article's influence within its field through various communication channels, are suggested. The first way of assessment is through social media, such as mentioning the articles on Twitter, Facebook, or Google+. This opens up conversations with other researchers and attracts their attention as well. The second way is the utilization of scholarly commentaries. By presenting articles on blogs or Wikipedia, one can allow people to share, discuss, edit, and improve them by applying other related research and information [4]. The third way is to use citation/reference managing tools such as Mendeley and Refworks and engage in a scholarly activity that both shares and advertises the articles. The fourth way is to present the article at a conference. Conference presentation is a direct way to attract the attention of the conference audience and heighten the article's influence. The fifth way is to be reported in various mass media. However, this is less related to a researcher's effort and more to

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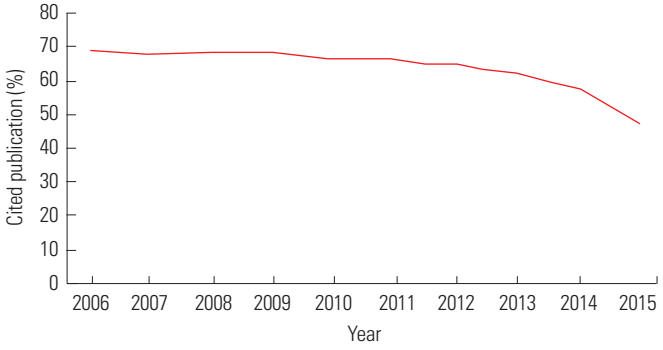

Fig. 1. Percentage of cited publications among those listed in Scopus vs. year.

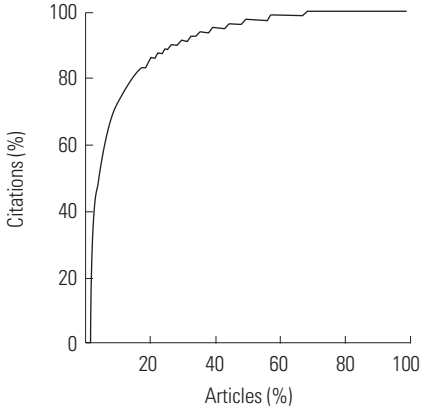

Fig. 2. The Pareto principle. Scopus data for all articles published in 2008 versus citations received from 2008 to 2012. While approximately 80% of the citations come from just 20% of the articles, about 32% of these articles remain uncited in this period. Reproduced from UK's Department of Business, Innovation and Skills. International comparative performance of the UK research base: 2013 [Internet]. Amsterdam: Elsevier; 2013 [2].

the institution's support and efforts.

Beyond promoting individual articles, researchers can also consider strategy to promote all of their research performance. The researcher could upload their curriculum vitae on LinkedIn, along with research performance and media resources, and advertise their publications on ORCID, Research Gate, Google Scholar, PUBFACTS, and Scopus author profiles. These activities are considered an effective way to make a stronger influence.

Exposing the article through various channels for promotion is not enough. Regular monitoring is necessary to see how often the article is cited and how much attention it is receiving on social media. The result of these endeavor can be identified in Abstract and Index database like Web of Science and Scopus. "Citation alert" on Web of Science and Scopus shows how many times the article is cited and Altmetrics on the article page shows its influence on social media.

Conclusion

Getting an article published is no longer enough. It is crucial to develop strategies to increase the visibility of articles to get cited. Furthermore, researchers should not only communicate with others researchers through various communication channels, but also monitor article' attentions.

Conflict of Interest

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

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Essay

Experience of taking the first Korea Manuscript Editors Certification examination

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Introduction

On November 19, 2016, the first Korea Manuscript Editors Certification (KMEC) examination was held in Hallym Hall, Hallym University of Graduate Studies, Seoul, Korea. The KMEC is a manuscript editor (ME) certification system adopted by the Korean Council of Science Editors. Only those who have a bachelor's degree or higher, more than a year of manuscript editing experience, and more than 20 credits of relevant education within the past 3 years are qualified to take the examination. I had worked as a ME for approximately 5 years, met the criteria, and had the chance to take the test. Fortunately, I passed the first KMEC examination. In this essay, I would like to introduce my experience of preparing for and taking the test.

Experience of preparing for and taking the Korea Manuscript Editors Certification examination

Working with the title of an ME, I have always been dedicated to be as professional as possible in serving the journals that I was in charge of. I believe this would be the case for any ME. However, since there was no way to objectively guarantee my expertise, it was both exciting and stressful to hear about the implementation of the KMEC. Even though I went through the sample questions provided by the committee, it was not easy to guess what type of questions would be asked or how high a passing grade would be. Therefore, I took the test with a resolved attitude, as if I was taking the Korean Scholastic Aptitude Test. The test consisted of 100 multiple choice questions, of which none were easy. It lasted for 2 and half hours and the questions covered a wide range of topics. As soon as I encountered a question asking "What kind of work does an ME do?", I sensed that the test required a profound understanding of the various subjects related to working as an ME.

Having to prepare for the test while working, I did not have much time to solely concentrate on my studies. However, I tried to make up for the relative lack of study time by directing a special focus towards the technical aspects of my work, such as punctuation, capitalization, italicization, and abbreviations. I obtained a clear understanding of table and figure editing rules and statistics by actively searching for guidelines whenever I had any doubts. Thankfully, the KMEC examination was more focused on evaluating practical skills rather than theoretical

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knowledge.

Questions regarding publication ethics and copyright, as well as those about new digital publication techniques, were the most confusing questions because I did not come across them often during my preparation. Additionally, the varieties and characteristics of representative databases and citation indices have always been tricky concepts for me, but I came to fully understand them while preparing for the test. Similarly to the other examinees, I spent the greatest amount of time answering questions on English comprehension and grammar correction. In addition, questions involving the understanding of scientific articles and other basic manuscript editing knowledge were also included, making the test time barely manageable.

Since I took the Board of Editors in the Life Sciences (BELS) certification test in 2014, I was able to see the differences between the two tests. The BELS test focuses on very detailed grammar and editing skills regarding statistics, tables, and figures. Although the KMEC also asks such questions, they are only a small proportion of the various domains of the test. As I noted above, the KMEC requires a wide understanding of editing practices. Therefore, the test not only evaluates one's proofreading ability, but also one's knowledge of the actual journal format and international standards. Fortunately, I passed the test. In addition to the excitement of passing the exam, learning and mastering more knowledge relevant to my work as an ME was deeply satisfying.

Conclusion

Since the primary hurdle to add journals to international literature indexing databases is the completeness of style and format, the demand for MEs will increase continuously. Beginning with the first implementation of the KMEC, I expect manuscript editing to gain more public attention and to be stabilized as a professional field through systematic training. I also believe the KMEC will be recognized as a professional certification in Korea, such as the BELS certification; furthermore, it will contribute to the promotion of scholarly journals to international level.

Conflict of Interest

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

Editor's note: Ms. Sun-Im Ryu, MEDrang Inc., Seoul, Korea got the best score out of 50 examinees who took the first Korea Manuscript Editors Certification examination. Korean Council of Science Editors applauds her for her hard work. Her manuscript was commissioned to record her outstanding performance.

Kihong Kim, Editor

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Meeting Report

The 3rd Asian Science Editors' Conference and Workshop 2016

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Striving to advance scientific publishing in Asia, the Council of Asian Science Editors (CASE) organized the 3rd Asian Science Editors' Conference and Workshop 2016 in Seoul, Korea. This meeting report summarizes the proceedings of the annual 3-day event that I attended and informs readers of activities of editors in Asia.

The Council and the Conference

CASE conducted its 3rd annual event at the Korean Federation of Science and Technology Societies in Seoul between July 20 and 22, 2016. The event aimed at improving the quality of Asian scientific publishing was co-organized and -hosted by CASE and the Korea Institute of Science and Technology Information. Constituting of workshops and a conference, the event was a platform for editors from Asia to contemplate, discuss, and deliberate the issues of scientific publication, such as ethical publication practices and open access journals, relevant for Asian journals to leverage their efforts to push standards internationally. A total of 183 editors and administrators (mostly from the field of medicine) from 12 countries participated in the event. As participants from the hosting country, local editors composed the majority of participants (151 attendees). In descending order, participants flew out from Vietnam (7 attendees), Japan (4 attendees), and Philippines (3 attendees) to join in the conference.

Internationally renowned associations related to scientific writing, such as the American Medical Writers Association established in 1940 and the Council of Science Editors established in 1957, have a long history and have accumulated a wealth of knowledge. Compared to these long-standing associations, which together have a 134 years' history between them, CASE whose steps only began in 2014 has a meager 3 years behind it. The growth of scientific editors have occurred in step with that of the scientific publishing industry in the Western world, whereas in spite of an explosion of scientific research and publishing in Asia in the relatively recent decades the corresponding stride of scientific editors has been disappointing. Better late than never, the potential for growth for the Asian scientific publishing industry has become all the more anticipated and greater, and besides our start is so much more abundant, guided, and well-informed given the wealth of knowledge already built by our neighbors. Yet a much concerted effort is needed. To this end, organizing events where editors across Asia can assemble, discuss, and collaborate, which CASE has proactively spear-headed in Asia, is timely and ap-

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Fig. 1. Partakers of the conference who have come from various parts of Asia listen attentively to the afternoon sessions.

propriate. And the fast development of CASE is a confirmation of this (Fig. 1).

Diverse Contents of the Event

On Wednesday July 20, the conference kick-started with a workshop led by Rachael Lammey from Crossref, a company that assigns digital object identifiers (DOIs) to academic journals. The session gave the audience an understanding of Crossref's diverse services and provided an opportunity to hear first-handedly from Crossref their insights and their prospective services. An impending feature of Crossref's services was the pre-publication registration of DOIs; it was interesting to hear their stance on their decision to adopt a service that they had previously restricted. Furthermore, helpful and constructive tips pertinent to publishers were explained using specific examples. A back-to-back session from the *Korean Journal of Medical Education* allowed us to also see real experiences of using Crossref's services; many who listened to the talk were enlightened to see how these services when effectively and practically adopted correlate to measurable benefits, validating the effectiveness and the merits of Crossref services to many. All workshops of the first day were open to editors and editorial staff at no fee.

On the second day, the conference featured talks from a wide range of publishing-related organizations and those that discussed how open access and publication policies may be improved in Asia. The day began with an update on Crossref's current standing and future plans, followed by a presentation by Donald Samulack of Cactus Communications on the role of Asian editors to educate and inform authors of issues relating to unethical irresponsible publication practices and to predatory journals. As well as hearing broad and international perspectives of where the current status of scientific publishing lies in Asia, we were able to hear current perspectives at a country-wide scale, from Vietnam and Taiwan. Also, the importance of not neglecting local scientific journals was reminded, which is often overlooked in an ever globalization-seeking society. Moving back and forth between wide and narrow angles, the lectures covered a broad range of topics, no doubt keeping the audience alert and focused throughout. The day also dealt with various topical issues pertaining to open access. Current and up-to-date trends in Open Access were shared by Jungwook Seo, who had recently attended the 12th Berlin Open Access Conference. He described vividly the universal trend how journals are changing from subscription-based to open access systems.

Fig. 2. Hyungsoon Kim welcomes guests to the evening reception.

On Friday July 22, the annual event wrapped up with workshops on the ISO (International Organization for Standardization) standard JATS (Journal Article Tag Suite) extensible mark-up language in online journal publishing. Taking Japanese and Korean publishing industries as examples, the sessions emphasized the importance of publishing in regional languages and addressed steps to ensure their survival in the publishing industry where the English language is universal. As on the first day, the last day's workshop was open to editors of all fields without need to register.

Apart from productive and informative sessions, the week gave us an opportunity to celebrate the gathering of editors and administrators through a reception that was held on the evening of the Conference. Celebratory messages were passed on by Donald Samulak and Hyungsoon Kim (Fig. 2). Guests were not only able to enjoy traditional Korean cuisine but also immerse in Korean culture by attending tourist and cultural visits prearranged by the organizers.

A Promising Future for Asian Editors

As possible harbingers of a flourishing industry, certain distinctive features of the Asian Science Editors' Conference and Workshop I felt set an auspicious tone for the future of Asian editors. First, attentiveness of the participants and the lively exchange of insights, comments, and advice between the

Fig. 3. Participants of the 3rd Asian Science Editors' Conference and Workshop 2016 gathered for a group photo.

speakers and the audience with whom they engaged was noticeable following every presentation. These 15-minute–question and answer sessions provided sufficient time for speakers to communicate bi-directionally with the audience and vice versa. Second, the conference was attended by more multicultural participants than before (Fig. 3). For instance, although more than 400 participants from 15 countries participated in the 2015 annual event organized by the Council of Science Editors, the majority was from America and only 8% of participants were from abroad. In contrast, notwithstanding a smaller number of participants, almost a fifth of the participants of the 3rd Asian Science Editors' Conference and Workshop 2016 were from outside of Korea, not mentioning the invited speakers that had composed mostly of foreign speakers. Altogether the synergistic mix of these two factors—communication and diversity—makes me anticipate how future CASE conferences and similar events will shape scientific publishing in Asia.

The growth of CASE is a mark of the impetus that the field of Asian scientific publishing has received recently. Personally, the motley mix of speakers and participants from different nationalities and the lively discussions and exchanges amongst them during the event were an indication of this impetus. To conclude, I believe that moving forward in this momentum is an opportunity for the Asia's scientific publishing/editing industry to explosively grow and mature and to closely follow in the footsteps of their Western partners.

Conflict of Interest

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

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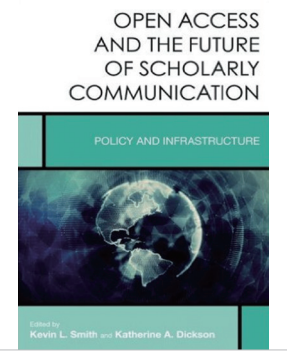
Book Review

Open Access and the Future of Scholarly Communication: Policy and Infrastructure

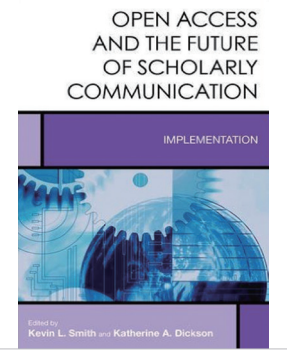
Open Access and the Future of Scholarly Communication: Implementation

Kihong Kim

Department of Physics, Ajou University, Suwon, Korea



Product Information:
- Title: Open Access and the Future of Scholarly Communication: Policy and Infrastructure
- Edition: 1st ed.
- Editors: Kevin L. Smith, Katherine A. Dickson
- Publisher: Rowman & Littlefield Publishers
- Year of publication: 2016
- ISBN: 978-1442273023
- Page: 318 pages
- Price: $45.00



- Title: Open Access and the Future of Scholarly Communication: Implementation
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- Editors: Kevin L. Smith, Katherine A. Dickson
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This set of two books, which was edited by Kevin Smith and Katherine Dickson, presents an extensive overview of open access and the future of scholarly communication, particularly from the perspective of librarians. The first book about policy and infrastructure has 14 chapters and the second book about implementation has 15 chapters. All chapters were written by different groups of authors. The topics dealt with in the first book include the main principles and concepts of the open access movement, the roles of librarians in prompting open access, various aspects and issues related to library-based open access publishing, insights from interlibrary loan relevant to open access, the long-term viability of open access publishing, metadata standards for open access repositories, and open access research management services. There are also several chapters on specific case studies on the introduction and implementation of open access by university libraries. Chapter 5, which presents the story of the musical band Grateful Dead about its policy of allowing its audiences to record and trade tapes of the band's shows freely, is refreshing and provides something to think about in the context of open access. Chapter 6 on the diversity and social justice is also of some interest and gives an advice that classifying some open access journals from developing countries as predatory ones prematurely can be prejudicial.

In the second book on implementation, there are chapters on copyright transfers and licenses, library support for courses that require open access distribution, library support for gold open access author fees, open educational resources, the use of alternative metrics, open access in the context of undergraduate education and publishing, electronic thesis and dissertation and the student anxieties associated with them, open government data, library metadata, and text mining of digital collections. It is surprising to find that in some areas of humanities and social sciences, there still exist a substantial number of academics who are resistant to the idea of open access, while it has been widely accepted in science, engineering, and medicine. It is persuasive that librarians can play a positive role in alleviating their fears of open access.

It appears that librarians, as a group, are very strong advocates for the open access movement for various reasons. The main theme running through the whole chapters is that open access is truthful to the spirit of libraries of sharing knowledge freely with everybody. Most chapters are introductory and easy to read. I have found, however, that the chapter on metadata standards is hard to read, since there is not much explanation of the background material. In addition, the writing style of a few chapters is not concise and somewhat redundant. I have also found that some chapters on the case studies of library publishing are rather similar and are redundant. In spite of the diverse topics included in these books, I think those topics were chosen mainly for librarians and not for the more general readers interested in open access. Nevertheless, I think these are very good books for understanding the principles and practicalities of open access and its role in scholarly communication not only for librarians but also for everybody.

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Science Cartoon

Article succeeded by presentation

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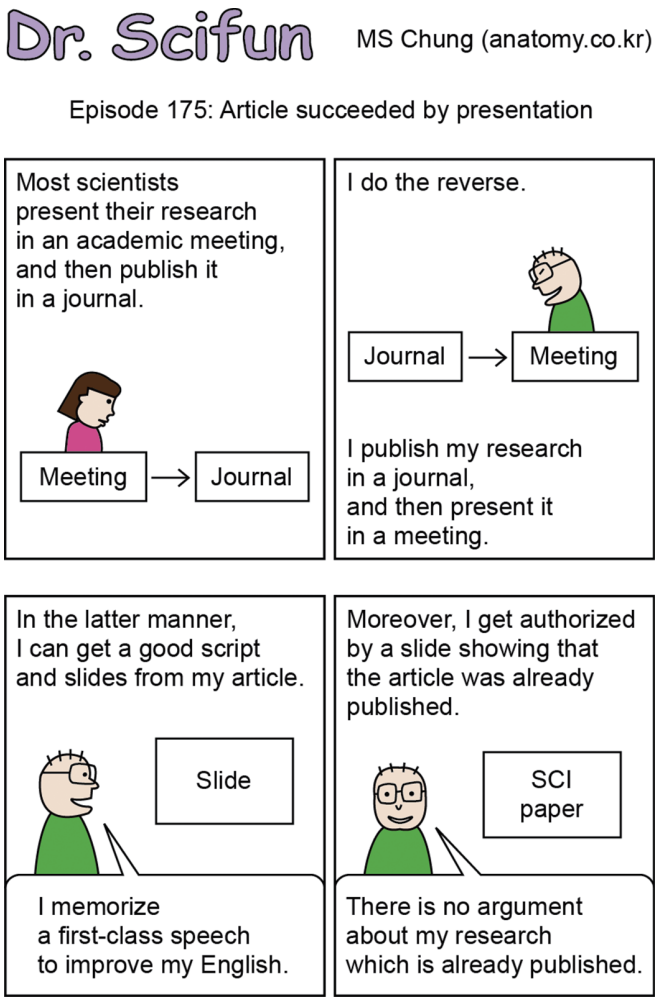
[1]Department of Anatomy, Ajou University School of Medicine, Suwon; Departments of [2]French and [3]Cultural Contents, Ajou University, Suwon, Korea



Many scientists work in the following order: first, they write an abstract for a conference. Second, they make slides for the conference. Third, they memorize the manuscript for the conference. And finally, they write the article for a journal. If they start with the easiest thing (the abstract) first, they will suffer at every step. If they write the article first, the rest will be a piece of cake.

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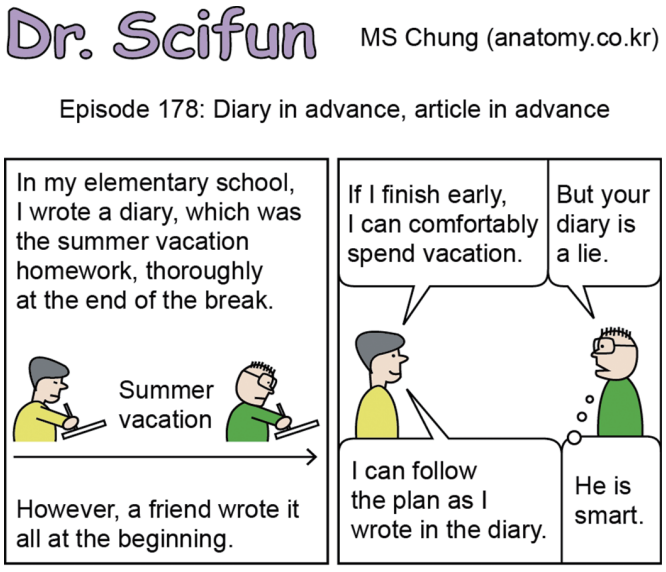
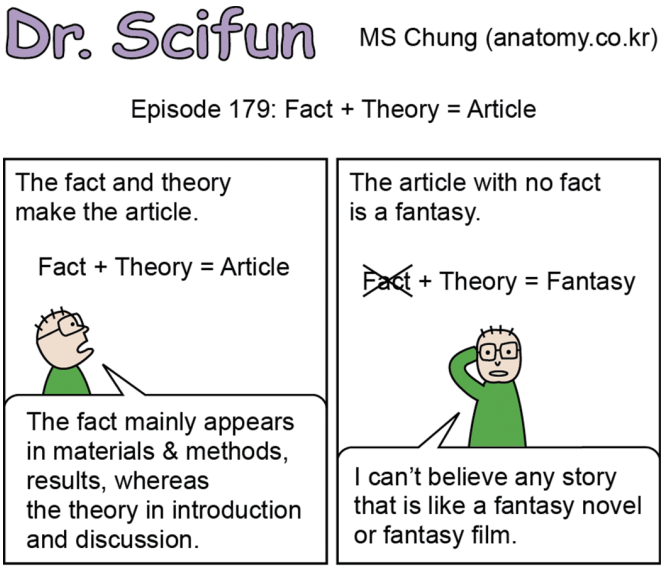


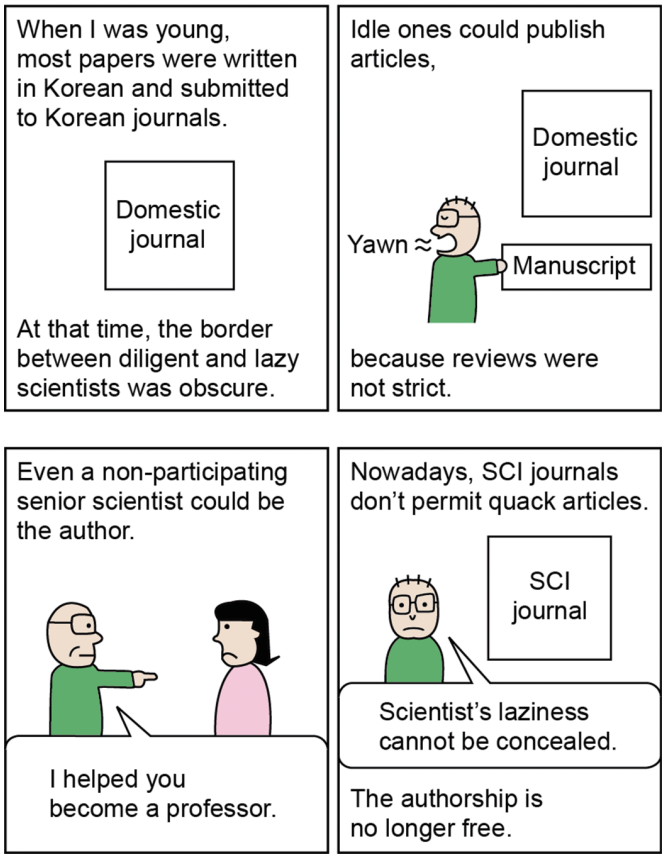


Writing an article first and performing the experiment later is possibly a good way of doing research. By writing the article first, you can study the works of references better, make the hypotheses better, and set up the experiment plans better. Moreover, you can reduce the risk of making mistakes and increase the possibilities of getting the important results when you conduct the experiment. Also, if the result is different than expected, you can revise the article promptly.

Women and men are often different when watching TV. Women prefer theory-related programs (e.g., soap opera), while men prefer fact-related ones (e.g., news, documentaries, and sports). As shown in the cartoons, women tend to enjoy fantasies without a fact, while men tend to enjoy chaos without a theory.

Dr. Scifun MS Chung (anatomy.co.kr)

Episode 182: Laziness, not to be hidden



Let's ask a movie director the following question: how many people have watched your movies? The director will not be able to conceal his/her inability for gaining the popularity. Similarly, ask a scientist the similar question. How many papers in the science citation index journals did you publish as the first or corresponding author? The scientist cannot hide his/her incompetence for accumulating the reseach achievements. This is a scary world.

Dr. Scifun MS Chung (anatomy.co.kr)

Episode 216: Ask question in academic meeting.

I used to think that asking questions in an academic meeting could be harassing for the presenting scientists. And I even considered it rude. However, I became to realize that questions would not make the presenters feel offended. Without questions, the presenters would possibly think that the talk does not interest audience at all. Therefore, even simplest questions are better than no question.

Conflict of Interest

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

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Announcement

Events in 2017

The Korean Council of Science Editors announces the schedule of the events in 2017. Precise schedule and registration of these events were or will be available from: http://www.kcse.org.

	January	February	March	April	May	June
Science Editing (twice a year)		Vol.4 No.1 (20)				
Newsletter (4 times a year)			No. 21 (31)			No. 22 (30)
Editors' Workshop	2017 Preconference Workshop (20)			Editors' Workshop (22)		
Manuscript Editors' Training & Workshop			Basic Manuscript Editing (8, 15, 22, 29)	Basic Manuscript Editing (5, 12, 19, 26)		
Publication Ethics Workshop			Publication Ethics Forum (9) Publication Ethics Workshop (10)			Publication Ethics Workshop (15-16)

	July	August	September	October	November	December
Science Editing (twice a year)		Vol.4 No.2 (20)				
Newsletter (4 times a year)			No. 23 (30)			No. 24 (31)
Editors' Workshop				Editors' Workshop (28)	Editors' Workshop (30)	
Manuscript Editors' Training & Workshop	Manuscript Editors' Certificate Workshop (13-14)			Editorial Assistants' Workshop (19)	Examination for Korea Manuscript Editors Certification (18)	
Publication Ethics Workshop						

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Corrigendum

Editing and publishing activities of the Korean Physical Society during the first fifty years since its inauguration in 1952

Editorial Office, Korean Council of Science Editors

There were errors in the article, "Koh YS. Editing and publishing activities of the Korean Physical Society during the first fifty years since its inauguration in 1952. Sci Ed 2016;3:67-79. http://dx.doi.org/10.6087/kcse.69" as published. The author apologizes for the mistake. The word 'volume' was incorrectly given instead of the word 'issue'. All 'volume' within this article should be revised to 'issue' except in 3 cases of the following:

Page 73 left column, line 14
9) References should be added at the end of the manuscript in the following order: author's name, journal title, **volume**, page, and year, such as M.J. Stephen, Phys. Rev., 123, 126 (1961).

Page 77 right column, line 18
Bold-face is used for the **volume** number, and the reference number is put in brackets [ ].

Page 79 left column, line 37
2) When a final decision is made for the publication of a manuscript, the Editorial Office will notify the corresponding author of the decision as well as of the expected **volume** and issue numbers.

Instructions to Authors

Enacted January 1, 2014

1. GENERAL INFORMATION

Science Editing (Sci Ed) is the official journal of the Korean Council of Science Editors (KCSE). Anyone who would like to submit a manuscript is advised to carefully read the aims and scope section of this journal. Manuscripts should be prepared for submission to *Science Editing* according to the following instructions. For issues not addressed in these instructions, the author is referred to the International Committee of Medical Journal Editors (ICMJE) "Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals" (http://www.icmje.org).

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Authorship credit should be based on 1) substantial contributions to conception and design, acquisition of data, and/or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; 3) final approval of the version to be published; and 4) agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Every author should meet all of these four conditions. After the initial submission of a manuscript, any changes whatsoever in authorship (adding author(s), deleting author(s), or re-arranging the order of authors) must be explained by a letter to the editor from the authors concerned. This letter must be signed by all authors of the paper. Copyright assignment must also be completed by every author.

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Submitted manuscripts must not have been previously published or be under consideration for publication elsewhere. No part of the accepted manuscript should be duplicated in any other scientific journal without the permission of the Editorial Board. Submitted manuscripts are screened for possible plagiarism or duplicate publication by CrossCheck upon arrival. If plagiarism or duplicate publication related to the papers of this journal is detected, the manuscripts may be rejected, the authors will be announced in the journal, and their institutions will be informed. There will also be penalties for the authors.

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4. Conflict of interest statement

The corresponding author must inform the editor of any potential conflicts of interest that could influence the authors' interpretation of the data. Examples of potential conflicts of interest are financial support from or connections to companies, political pressure from interest groups, and academically related issues. In particular, all sources of funding applicable to the study should be explicitly stated.

5. Statement of human and animal right

Clinical research should be done in accordance of the Ethical Principles for Medical Research Involving Human Subjects, outlined in the Helsinki Declaration of 1975 (revised 2008), available from: http://www.wma.net/en/30publications/10policies/b3/. Clinical studies that do not meet the Helsinki Declaration will not be considered for publication. Human subjects should not be identifiable, such that patients' names, initials, hospital numbers, dates of birth, or other protected healthcare information should not be disclosed. For animal subjects, research should be performed based on the National or Institutional Guide for the Care and Use of Laboratory Animals, and the ethical treatment of all experimental animals should be maintained.

6. Statement of Informed Consent and Institutional Review Board Approval

Copies of written informed consent documents should be kept for studies on human subjects. For clinical studies of human subjects, a certificate, agreement, or approval by the Institutional Review Board (IRB) of the author's institution is required. If necessary, the editor or reviewers may request copies of these documents to resolve questions about IRB approval and study conduct.

7. Process for Managing Research and Publication Misconduct

When the journal faces suspected cases of research and publication misconduct such as redundant (duplicate) publication, plagiarism, fraudulent or fabricated data, changes in authorship, an undisclosed conflict of interest, ethical problems with a submitted manuscript, a reviewer who has appropriated an author's idea or data, complaints against editors, and so on, the resolution process will follow the flowchart provided by the Committee on Publication Ethics (http://publicationethics.org/resources/flowcharts). The discussion and decision on the suspected cases are carried out by the Editorial Board.

8. Process for handling cases requiring corrections, retractions, and editorial expressions of concern

Cases that require editorial expressions of concern or retraction shall follow the COPE flowcharts available from:http://publicationethics.org/resources/flowcharts. If correction needs, it will follow the ICMJE Recommendation for Corrections, Retractions, Republications and Version Control available from:http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/corrections-and-version-control.html as follows:

Honest errors are a part of science and publishing and require publication of a correction when they are detected. Corrections are needed for errors of fact. Minimum standards are as follows: First, it shall publish a correction notice as soon as possible detailing changes from and citing the original publication on both an electronic and numbered print page that is included in an electronic or a print Table of Contents to ensure proper indexing; Second, it shall post a new article version with details of the changes from the original version and the date(s) on which the changes were made through CrossMark; Third, it shall archive all prior versions of the article. This archive can be either directly accessible to readers; and Fourth, previous electronic versions shall prominently note that there are more recent versions of the article via CrossMark.

9. Editorial Responsibilities

The Editorial Board will continuously work to monitor and safeguard publication ethics: guidelines for retracting articles; maintenance of the integrity of the academic record; preclusion of business needs from compromising intellectual and ethical standards; publishing corrections, clarifications, retractions, and apologies when needed; and excluding plagiarism and fraudulent data. The editors maintain the following responsibilities: responsibility and authority to reject and accept articles; avoiding any conflict of interest with respect to articles they reject or accept; promoting publication of corrections or retractions when errors are found; and preservation of the anonymity of reviewers.

4. AUTHOR QUALIFICATIONS AND LANGUAGE REQUIREMENT

1. Author Qualifications

Any researcher throughout the world can submit a manuscript if the scope of the manuscript is appropriate.

2. Language

Manuscripts should be submitted in good scientific English.

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All manuscripts should be submitted to kcse@kcse.org by the corresponding author.

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Science Editing reviews all manuscripts received. A manuscript is first reviewed for its format and adherence to the aims and scope of the journal. If the manuscript meets these two criteria, it is dispatched to three investigators in the field with relevant knowledge. Assuming the manuscript is sent to reviewers, *Science Editing* waits to receive opinions from at least two reviewers. In addition, if deemed necessary, a review of statistics may be requested. The authors' names and affiliations are removed during peer review. The acceptance criteria for all papers are based on the quality and originality of the research and its scientific significance. Acceptance of the manuscript is decided based on the critiques and recommended decision of the reviewers. An initial decision will normally be made within 4 weeks of receipt of a manuscript, and the reviewers' comments are sent to the corresponding author by e-mail. The corresponding author must indicate the alterations that have been made in response to the reviewers' comments item by item. Failure to resubmit the revised manuscript within 4 weeks of the editorial decision is regarded as a withdrawal. A final decision on acceptance/rejection for publication is forwarded to the corresponding author from the editor.

3. Peer review process for handling submissions from editors, employees, or members of the editorial board

All manuscripts from editors, employees, or members of the editorial board are processed same to other unsolicited manuscripts. During the review process, submitters will not engage in the decision process. Editors will not handle their own manuscripts although they are commissioned ones.

6. MANUSCRIPT PREPARATION

1. General Requirements

- The main document with manuscript text and tables should be prepared in an MS Word (docx) or RTF file format.
- The manuscript should be double spaced on 21.6×27.9 cm (letter size) or 21.0×29.7 cm (A4) paper with 3.0 cm margins at the top, bottom, right, and left margin.
- All manuscript pages are to be numbered at the bottom consecutively, beginning with the abstract as page 1. Neither the author's names nor their affiliations should appear on the manuscript pages.
- The authors should express all measurements according to International System (SI) units with some exceptions such as seconds, mmHg, or °C.
- Only standard abbreviations should be used. Abbreviations should be avoided in the title of the manuscript. Abbreviations should be spelled out when first used in the text—for example, extensible markup language (XML)—and the use of abbreviations should be kept to a minimum.
- The names and locations (city, state, and country only) of manufacturers should be given.
- When quoting from other sources, a reference number should be cited after the author's name or at the end of the quotation.

Manuscript preparation is different according to the publication type, including original articles, reviews, case studies, essays, editorials, book reviews, and correspondence. Other types are also negotiable with the Editorial Board.

2. Original Articles

Original articles are reports of basic investigations. Although there is no limitation on the length of the manuscripts, the Editorial Board may abridge excessive illustrations and large tables. The manuscript for an original article should be organized in the following sequence: title page, abstract and keywords, main text (introduction, methods, results, and discussion), acknowledgments, references, tables, figure legends, and figures. The figures should be received as separate files. Maximum length: 2,500 words of text (not including the abstract, tables, figures, and references) with no more than a total of 10 tables and/or figures.

- **Title page:** The following items should be included on the title page: 1) the title of the manuscript, 2) author list, 3) each author's affiliation, 4) the name and e-mail address of the corresponding author, 5) when applicable, the source of any research funding and a list of where and when the study has been presented in part elsewhere, and 6) a running title of fewer than 50 characters.
- **Abstract and Keywords:** The abstract should be one concise paragraph of less than 250 words in an unstructured format. Abbreviations or references are not allowed in the abstract. Up to 5 keywords should be listed at the bottom of the abstract to be used as index terms.
- **Introduction:** The purpose of the investigation, including relevant background information, should be described briefly. Conclusions should not be included in the Introduction.
- **Methods:** The research plan, materials (or subjects), and methods used should be described in that order. The names and locations (city, state, and country only) of manufacturers of equipment and software should be given. Methods of statistical analysis and criteria for statistical significance should be described.
- **Results:** The results should be presented in logical sequence in the text, tables, and figures. If resulting parameters have statistical significance, P-values should be provided, and repetitive presentation of the same data in dif-

ferent forms should be avoided. The results should not include material appropriate for the discussion.

- **Discussion:** Observations pertaining to the results of the research and other related work should be interpreted for readers. New and important observations should be emphasized rather than merely repeating the contents of the results. The implications of the proposed opinion should be explained along with its limits, and within the limits of the research results, and the conclusion should be connected to the purpose of the research. In a concluding paragraph, the results and their meaning should be summarized.
- **Conflict of interest:** Any potential conflict of interest that could influence the authors' interpretation of the data, such as financial support from or connections to companies, political pressure from interest groups, or academically related issues, must be stated.
- **Acknowledgments:** All persons who have made substantial contributions, but who have not met the criteria for authorship, are to be acknowledged here. All sources of funding applicable to the study should be stated here explicitly.
- **References:** In the text, references should be cited with Arabic numerals in brackets, numbered in the order cited. In the references section, the references should be numbered and listed in order of appearance in the text. The number of references is limited to 20 for original articles. All authors of a cited work should be listed if there are six or fewer authors. The first three authors should be listed followed by "et al." if there are more than six authors. If a reference has a digital object identifier (DOI), it should be supplied. Other types of references not described below should follow *The NLM Style Guide for Authors, Editors, and Publishers* (http://www.nlm.nih.gov/citingmedicine).

Journal articles:

1. Kim JA, Huh S, Chu MS. Correlation analysis of the citation indices of Korean scientific journals listed in international databases. Sci Ed 2014;1:27-36. http://dx.doi.org/10.6087/kcse.2014.1.27
2. Brobo E, Cambon-Thomsen A, De Castro D, et al. Citation of bioresources in journal articles:moving towards standards. Eur Sci Ed 2013;39:36-8.

Books and book chapters:

3. Morris S, Barnas E, LaFrenier D, Reich M. The handbook of journal publishing. New York: Cambridge University Press; 2013.
4. Cho HM, editor. KOFST journals 2011. Seoul: The Korean Federation of Science and Technology Societies; 2012. http://dx.doi.org/10.5082/Kofst_J_2011
5. Booth BA. Peer review. In: Coghill AM, Garson LR, editors. The ACS style guide. 3rd ed. New York: Oxford University Press; 2006. p. 71-6.

Online sources:

6. Committee on Publication Ethics. Guidelines for retracting articles [Internet]. Committee on Publication Ethics; 2009 [cited 2013 Sep 20]. Available from: http://publicationethics.org/files/retraction%20guidelines.pdf
7. Testa J. The Thomson Reuters journal selection process [Internet]. Philadelphia: Thomson Reuters; 2012 [cited 2013 Sep 30]. Available from: http://wokinfo.com/essays/journal-selection-process/

Conference papers:

8. Shell ER. Sex and the scientific publisher: how journals and journalists collude (despite their best intentions) to mislead the public. Paper presented at: 2011 CrossRef Annual Member Meeting; 2011 Nov 14-15; Cambridge, MA, USA.
9. Kim HW. Challenges and future directions on journal "perspectives in nursing science" in Korea. Poster session presented at: Asia Pacific Association of Medical Journal Editors Convention 2013; 2013 Aug 2-4; Tokyo, Japan.

Scientific and technical reports:

10. Kim SN, Park JR, Bae HS, et al. A study on the meta evaluation of Korean university evaluation. Seoul: Korean Educational Development Institute; 2004. Report No.: CR 2004-45.

News articles:

11. Kim R. SNU ranked 51st in university evaluation. Korean Times [Internet]. 2007 Nov 8 [cited 2013 Sep 25]. Available from: http://www.koreatimes.co.kr/www/news/nation/2007/11/117_13423.html

Dissertations:

12. Kim K. Quantum critical phenomena in superfluids and superconductors [dissertation]. Pasadena, CA: California Institute of Technology; 1991.

- **Tables:** Tables are to be numbered in the order in which they are cited in the text. A table title should concisely describe the content of the table so that a reader can understand the table without referring to the text. Each table must be simple and typed on a separate page with its heading above it. Explanatory matter is placed in footnotes below the tabular matter and not included in the heading. All non-standard abbreviations are explained in the footnotes. Footnotes should be indicated by [a], [b], [c], ...

Statistical measures such as SD or SE should be identified. Vertical rules and horizontal rules between entries should be omitted.

- **Figures and legends for illustrations:** Figures should be numbered, using Arabic numerals, in the order in which they are cited. Each figure should be uploaded as a single image file in either uncompressed EPS, TIFF, PSD, JPEG, and PPT format over 600 dots per inch (dpi) or 3 million pixels (less than 6 megabytes). Written permission should be obtained for the use of all previously published illustrations (and copies of permission letters should be included). In the case of multiple prints bearing the same number, English letters should be used after the numerals to indicate the correct order (e.g. Fig. 1A; Fig. 2B, C).

3. Reviews

Reviews are invited by the editor and should be comprehensive analyses of specific topics. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of no more than 200 words. The length of the text excluding references, tables, and figures should not exceed 5,000 words. The number of references is limited to 100.

4. Case studies

Case studies are intended to report practical cases that can be encountered during editing and publishing. Examples include interesting cases of research misconduct and publication ethics violations; experience of new and creative initiatives in publishing; and the history of a specific journal development. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of 200 words maximum. The length of the text excluding references, tables, and figures should not exceed 2,500 words. The number of references is limited to 20.

5. Essays

Essays are for the dissemination of the experience and ideas of editors for colleague editors. There is no limitation on the topics if they are related to editing or publishing. They are to be organized as follows: title page, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. The length of the text excluding references, tables, and figures should not exceed 2,500 words. The number of references is limited to 20.

6. Editorials

Editorials are invited by the editor and should be commentaries on articles published recently in the journal. Editorial topics could include active areas of research, fresh insights, and debates in all fields of journal publication. Editorials should not exceed 1,000 words, excluding references, tables, and figures. References should not exceed 10. A maximum of 3 figures including tables is allowed.

7. Book reviews

Book reviews are solicited by the editor. These will cover recently published books in the field of journal publication. The format is same as that of Editorials.

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Correspondence (letters to the editor) may be in response to a published article, or a short, free-standing piece expressing an opinion. Correspondence should be no longer than 1,000 words of text and 10 references.

In reply: If the Correspondence is in response to a published article, the Editor-in-Chief may choose to invite the article's authors to write a Correspondence Reply. Replies by authors should not exceed 500 words of text and 5 references.

9. Video Clips

Video clips can be submitted for placement on the journal website. All videos are subject to peer review and must be sent directly to the editor by e-mail. A video file submitted for consideration for publication should be in complete and final format and at as high a resolution as possible. Any editing of the video will be the responsibility of the author. *Science Editing* accepts all kinds of video files not exceeding 30 MB and of less than 5 minutes duration, but Quicktime, AVI, MPEG, MP4, and RealMedia file formats are recommended. A legend to accompany the video should be double-spaced in a separate file. All copyrights for video files after acceptance of the main article are automatically transferred to *Science Editing*.

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Unsolicited manuscript with publication types of original articles, case studies, essays, and correspondence can be submitted. Other publication types are all commissioned or invited by the Editorial Board.

Table 1 shows the recommended maximums of manuscripts according to publication type; however, these requirements are negotiable with the editor.

Table 1. Recommended maximums for articles submitted to *Science Editing*

Type of article	Abstract (word)	Text (word)[a]	References	Tables & figures
Original article	250	2,500	20	10
Review	200	5,000	100	No limits
Case study	200	2,500	20	10
Essay	200	2,500	20	10
Editorial	No	1,000	10	3
Book review	No	1,000	10	3
Correspondence	No			
Letter to the editor	-	1,000	10	3
In reply	-	500	5	3
Video clip	No	30 MB, 5 min	-	-

[a]Maximum number of words is exclusive of the abstract, references, tables, and figure legends.

7. FINAL PREPARATION FOR PUBLICATION

1. Final Version

After the paper has been accepted for publication, the author(s) should submit the final version of the manuscript. The names and affiliations of the authors should be double-checked, and if the originally submitted image files were of poor resolution, higher resolution image files should be submitted at this time. Color images must be created as CMYK files. The electronic original should be sent with appropriate labeling and arrows. The EPS, TIFF, Adobe Photoshop (PSD), JPEG, and PPT formats are preferred for submission of digital files of photographic images. Symbols (e.g., circles, triangles, squares), letters (e.g., words, abbreviations), and numbers should be large enough to be legible on reduction to the journal's column widths. All of the symbols must be defined in the figure caption. If the symbols are too complex to appear in the caption, they should appear on the illustration itself, within the area of the graph or diagram, not to the side. If references, tables, or figures are moved, added, or deleted during the revision process, they should be renumbered to reflect such changes so that all tables, references, and figures are cited in numeric order.

2. Manuscript Corrections

Before publication, the manuscript editor may correct the manuscript such that it meets the standard publication format. The author(s) must respond within 2 days when the manuscript editor contacts the author for revisions. If the response is delayed, the manuscript's publication may be postponed to the next issue.

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The author(s) will receive the final version of the manuscript as a PDF file. Upon receipt, within 2 days, the editorial office (or printing office) must be notified of any errors found in the file. Any errors found after this time are the responsibility of the author(s) and will have to be corrected as an erratum.

8. PAGE CHARGES OR ARTICLE PROCESSING CHARGES

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☐ Manuscript in MS Word (docx) or RTF format.

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☐ Sequence of title page, abstract and keywords, main text, acknowledgments, references, tables, figure legends, and figures. All pages numbered consecutively, starting with the abstract.

☐ Title page with article title, authors' full name(s) and affiliation(s), corresponding author's e-mail, running title (less than 50 characters), and acknowledgments, if any.

☐ Abstract up to 250 words for original articles and up to 200 words for reviews, essays, and features. Up to 5 keywords.

☐ All table and figure numbers are found in the text.

☐ Figures as separate files, in EPS, TIFF, Adobe Photoshop (PSD), JPEG, or PPT format.

☐ References listed in proper format. All references listed in the reference section are cited in the text and vice versa.

☐ The number of references is limited to 20 (for original articles, case studies, and essays), 100 (for reviews), or 10 (for editorials, book reviews, and letters to the editor).

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