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Metaverse in journal publishing

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Recently, the word metaverse has appeared more and more frequently in media reports and public discourses. Most of them are predictions of the future in the science fiction style that a new kind of world will come when the metaverse technology is successfully implemented and they do not give a sense of reality yet. Lectures on metaverse are frequently held in many academic disciplines. At the annual general meeting of the Korean Council of Science Editors held last month, an introductory talk on metaverse was given as a plenary lecture. According to the Amazon site, there are 821 books published after January 2020 with “metaverse” in their titles. According to the Kyobo Books website, there are 238 Korean books that contain the word metaverse in Korean in their titles. That such a tremendous amount of interest is being given to a technology that has not yet been realized is a very unusual and unprecedented phenomenon. The rapid development of information technology over the past few decades is thought to convince people that the metaverse can be implemented in a short period.

Virtual reality (VR), augmented reality (AR), spatial web, and non-fungible token (NFT) are some of the basic concepts associated with the metaverse. The main idea of the metaverse is to create a virtual three-dimensional (3D) space that appears and feels similar to the real world with the help of special wearable devices and to allow many people to interact in it. Due to the impact of the recent COVID-19 pandemic, many people have limitations to travel and rely on online activities to work extensively. They naturally desire that online activities will evolve to be more realistic. Due to this necessity, the development of metaverse is expected to accelerate further. In the metaverse, many activities in the real world can be performed virtually, so the concept can be applied to all fields. Academic research and journal publication are no exceptions and various applications of metaverse can be expected. In the metaverse of academic journals, all processes of launching and operating journals will be possible. The submission and review of papers, editing, publication, and the subscription to journals can all take place in this space. Metaverse has the characteristic of a 3D space that allows for closer interaction than the existing internet and it is possible to imagine the development of new types of journals utilizing such characteristics.

Papers in academic journals are mainly consisted of written texts and figures. These contents can be viewed and read using a flat-panel display, so journals can be said to be two-dimensional (2D) contents. Recently, an increasing number of journals include videos in their contents, but they can also be viewed using a flat-panel display and are 2D. In the metaverse, one tries to realize a 3D space similar to the world we live in, so the activity of searching or reading papers can be developed to reflect 3D characteristics. For example, one can imagine that when read-
ing a certain part of the text of a paper, the figures, videos, and references associated with the text pop up and are arranged three-dimensionally in the metaverse space. Furthermore, we can envision a new type of journal containing truly 3D contents that can be viewed only in the metaverse. An important part of scientific results in many fields is a numerical simulation to understand the structure and behavior of 3D objects. Due to the intrinsic difficulty of presenting 3D results in a 2D medium, the results of such simulations have been explained in a limited way by selecting appropriate cross-sections and showing the behaviors occurring in the cross-sections in several figures. In the metaverse, the simulation result could be shown directly as a function of time as if a real 3D structure existed before our eyes. Readers will be able to understand this content more easily and more completely by observing the object from any direction they choose. Furthermore, it will be possible to view the structure and activity inside the 3D object at a chosen depth. I imagine that a new type of metaverse journals that publishes papers including these kinds of 3D contents can be created. I think the expansion of scientific contents in such a direction can make a great contribution to the development of science.

Since the metaverse is a virtual space, it does not have to obey the laws of physics that exist in the real world. For example, in the metaverse, it is possible to teleport over a long distance and it can be set so that gravity does not act on some objects. It is also conceivable to create a unique metaverse where the effects of relativity or quantum physics are strongly felt. It may be an interesting research topic to create new applications by realizing a metaverse space suitable for a specific purpose. I think it will still take a considerable amount of time before the metaverse technology is actually applied to journal publication. In order to develop a large-scale metaverse, it is necessary to develop technologies for much larger memory capacity, faster information transport, and more powerful processing capacity than now. Also, how people adapt to metaverse technology psychologically and socially is not a simple matter. However, I feel that the development and implementation of this technology is inevitable because of the great advantage of the metaverse that allows overcoming temporal and spatial limitations. The possibility that research results can be presented realistically through 3D contents will greatly contribute to the development of academic journals. It is worthwhile for researchers and editors to watch with keen interest as the metaverse technology evolves.

Conflict of Interest

Kihong Kim has been the editor of Science Editing since 2014.

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Types, limitations, and possible alternatives of peer review based on the literature and surgeons’ opinions via Twitter: a narrative review

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Abstract
This review aimed to illustrate the types, limitations, and possible alternatives of peer review (PR) based on a literature review together with the opinions of a social media audience via Twitter. This study was conducted via the #OpenSourceResearch collaborative platform and combined a comprehensive literature search on the current PR system with the opinions of a social media audience of surgeons who are actively engaged in the current PR system. Six independent researchers conducted a literature search of electronic databases in addition to Google Scholar. Electronic polls were organized via Twitter to assess surgeons’ opinions on the current PR system and potential alternative approaches. PR can be classified into single-blind, double-blind, triple-blind, and open PR. Newer PR systems include interactive platforms, prepublication and postpublication commenting or review, transparent review, and collaborative review. The main limitations of the current PR system are its allegedly time-consuming nature and inconsistent, biased, and non-transparent results. Suggestions to improve the PR process include employing an interactive, double-blind PR system, using artificial intelligence to recruit reviewers, providing incentives for reviewers, and using PR templates. The above results offer several concepts for possible alternative approaches and modifications to this critically important process.

Keywords
Altruism; Artificial intelligence; Peer review; Research personnel; Social media
Introduction

Peer review (PR) is the critical appraisal of manuscripts submitted to scholarly journals by independent experts who have sufficient knowledge and expertise on the subject [1]. PR acts as a quality metric that aims to ensure that only studies fulfilling adequate quality standards are published. Despite concerns about its effectiveness, impartiality, and reliability, PR is still accepted as one of the best methods to ensure that published studies are high-quality. Almost all researchers agree that PR is a necessary tool for vetting the scientific literature; nonetheless, many researchers find that the current PR system has several shortcomings.

Through PR, studies are filtered and screened based on the novelty of the idea, rigor of methods, clarity and reproducibility of results, and adequacy of conclusions. PR is applied to assess submitted manuscripts in terms of various aspects. Firstly, PR is conducted to ascertain whether the submitted manuscript adds any new knowledge to the existing literature. New knowledge does not necessarily have to be entirely novel, but a study should at least address a known gap in the literature. Secondly, PR is used to assess the methods used in the study and determine if they are scientifically sound, rigorous, and reproducible. Thirdly, PR is conducted to evaluate the study results and determine if they are appropriate based on the stated methods. Finally, the study conclusions should be derived from the study findings and should be reported according to the level of evidence of the study [2-6]. All reviewers should strive to address all these facets of review. However, in addition to critiquing the study design and content, a statistician may sometimes need to focus on design, methodological rigor, and statistics.

The outcome of PR is used as a basis for rejecting a submitted manuscript, allowing the authors to revise, or accepting a submitted manuscript. The reviewers’ comments can help the authors revise their manuscript to improve its quality. Constructive PR is imperative for improving the manuscript quality, language, and flow, and reviewers may also suggest adding new analyses that augment the scientific value of the study. Hence, the ideal PR system should be not only a quality metric and guarantor of quality of the literature, but also a constructive platform that provides better research output to the scientific community.

Objectives: The aim of this review was to assess the current PR approaches and offer some alternatives to enhance PR.

Methods

Ethics statement: Ethics approval was obtained from the institutional review board of the Faculty of Medicine, Mansoura University (R.21.10.1474). The study was exempted from the requirement to obtain informed consent.

Study design and strategy: This collaborative study was conducted via the #OpenSourceResearch collaborative platform (https://osrc.network/). #OpenSourceResearch is an international independent research organization with a special focus on implementing information technologies and artificial intelligence (AI) in medical research. It aims to encourage innovation in medical research at different stages of the production of scientific knowledge, including the review process.

The study combined a comprehensive literature review on the current PR system with a social media survey of the opinions of various parties on the current PR system. Six independent researchers conducted a literature search on the types of PR, its shortcomings, and methods to improve PR. Electronic databases including PubMed/MEDLINE and Scopus, in addition to Google Scholar, were queried for studies and websites that discussed different aspects of PR of the scientific literature. In addition, a cross-sectional survey of the opinions of readers, authors, reviewers, and editors of journals about the current PR system and how to potentially improve PR was conducted through electronic polls organized via the social media platform Twitter in March 2021.

Outcome of Literature Review

Types of PR

PR is classified according to authors’, reviewers’, and editors’ awareness of each other as single-blind, double-blind, triple-blind, and open PR [7,8]. In single-blind review, the reviewers are aware of the identity of the authors, but they remain anonymous to the submitting authors. The concept of this type of review is to allow reviewers to detect any conflict of interests with the authors that preclude assigning them for review. However, this method can also potentially include inherent reviewer bias towards or against certain institutions and or researchers [9]. It has been stated that while revealing the authors’ identities may be beneficial for renowned authors and high ranked institutions, it might also be disadvantageous for junior researchers, particularly those based in low- and middle-income countries, who may be affected by geographic bias [10].

Double-blind review aims to ensure that the identities of the authors and reviewers are anonymous to each other. It has been suggested that double-blind reviews are less likely to be positive for papers submitted by renowned authors and institutions as compared to single-blind reviews [8,11,12]. However, double-blind reviews may not be totally double-blind, as Haffar et al. [3] found that in 25% to 50% of cases the reviewers can successfully identify the authors of the manuscript.
when they unintentionally revealed their identities by quoting their previous work in the manuscript. When the handling editor is also unaware of the identity of the authors, this is called triple-blind review, which is less frequently used than single-blind and double-blind review [13].

In contrast to previous models, open PR allows the identity of the authors and the reviewers to be revealed to all participants during and/or after the manuscript review process [14,15]. Open PR is intended to be a more transparent and collaborative approach that enhances communication among the reviewers and authors and potentially minimizes prejudices. As compared to the classic models, proponents of open PR suggest it can be more meticulous and effective [16]. However, practice may be different from theory. van Rooyen et al. [17] randomized consecutive papers that were sent to two reviewers to have the reviewer’s identity either revealed to the authors or remain anonymous, whereas editors and authors were unaware of the intervention. The study documented no impact of open PR on the quality or duration of the review process and found that the reviewers who had their identities revealed still had lower acceptance rates than reviewers with anonymous identities. Moreover, it has been noted that having the authors and reviewers aware of each other’s identity heightened tension and resulted in strong hostility and retaliation among parties [3]. Another concern about open PR is that junior reviewers might be fearful of criticizing or rejecting the work of senior and highly accomplished and renowned authors. Similarly, friends might not appropriately critically judge the work of friends. Furthermore, bias may exist against authors based upon many other factors including reputation, prior work, and their locations.

New PR models
The above classic PR models have been claimed by their critics to have several potential alleged shortcomings such as inconsistency, lack of transparency, bias, inadequate reviews, and conflicts of interest [3]. These possible problems have motivated the search for better quality review models [7]. Other PR models have been introduced to overcome the flaws identified in the classic assessment methods [18].

Pre-PR commenting involves making a formal pre-release comment or discussion on a study submitted for review on a public platform. The advantages of this approach include being fast, transparent, and low-cost; however, a lack of editorial review is its main drawback. Pre-publication PR is PR by invited experts in the relevant field after formal acceptance of the article and before its publication. It has the disadvantage of being a non-transparent process with regards to the basis on which the experts are invited, which may be associated with potential bias [19].

In contrast, post-publication PR entails review of the published articles by expert reviewers in the field who are formally or voluntarily invited. Post-publication review consists of a discussion of published research, independent of any formal PR. This platform allows anyone to publicly contribute without any filtration. Similarly, post-publication commenting (community review) entails evaluation of the articles after publication by experts in the field, by invited officials, and by the common readers. One major flaw of post-publication PR is its openness to every reader, regardless of their qualification or expertise on the topic of the published article. Having unqualified and sometimes biased individuals able to comment freely on published science may have negative consequences. Spam and trolling can be additional threats. Since post-publication PR is still considered PR, it requires time and effort, which many busy scientists may not afford.

Transparent PR involves publishing the reviewers’ reports along with the accepted articles, with or without specifying the identity of the reviewers. Transparency in PR can highlight possible changes made to the manuscript based upon the reviewers’ suggestions [20]. Interactive PR is a dynamic PR platform where the identities of the authors and reviewers are kept anonymous yet there is more direct communication. In this system, responses to the reviewers are quick, and waiting time and misinterpretation of the reviewers’ comments may be eliminated [21]. Hybrid PR combines open public and classic PR to enhance the impact and value of open PR while ensuring compliance to academic standards through single-blind PR per evaluation [22].

Collaborative PR is novel model for PR in which reviewers, editors, and readers agree on a set of revisions through a discussion process. Through this interactive environment, a set of well revised feedback is shared with the authors. Another novel, yet controversial model is portable review [23], in which PR is done in an independent manner without involvement of the journals. In this model, the reviewers’ reports are detached by third-party companies and are transferred along with the manuscript to suitable journals. An example of this model is the article transfer service offered by some journals when a manuscript is rejected and its authors receive an offer to transfer the submission, along with the review reports, to a sister, usually open-access, journal published by the same publisher. This application may help save time in terms of uploading the article to the journal and reduce duplications, however, it can be expensive. Another problem with this model is that many journals and authors do not accept this evaluation, which takes place with a service procurement model. Table 1 summarizes the types of PR systems.
While the current PR system has helped ensure the quality of published articles, it may also have some potential limitations. Time commitment Conducting PR in a timely manner without compromising the focus on the integrity of the scientific work and ethics is critical for the effectiveness of the PR system. Several key indicators have been used to evaluate the duration of the multiphase review process. These factors include the immediate rejection time, the reviewer invitation time or 'invitation phase,' the duration of the first review round or 'first response time,' the revision time taken by authors, the number of review rounds, and the total review duration [24,25]. A summary of the time phases of the PR process is illustrated in Fig 1.

Previous have reports suggested that the PR process is time-consuming and its duration may have even increased in recent decades [26,27]. Delays in the review process may adversely impact the transition of scientific evidence into practice [28]. Although there are considerable variations among different scientific fields, lengthy PR durations can potentially be ascribed to three main factors: inefficient editorial processes, delay in manuscript revision by authors, and importantly the timely availability of appropriate reviewers [24]. In a recent comprehensive study by Huisman and Smits [25], the time until desk rejection was more than 2 weeks for almost one-third of journals; such a long time until immediate rejection may point to an inefficient editorial process. Consistent with this finding, the journal’s impact factor was found to be inversely correlated with the immediate rejection time, the
first response time, and the total review duration [25]. It is perceived that high-ranked journals generally have more resources at their disposal, and thus have more efficient and quicker manuscript handling at the editorial office.

If the manuscript passes the initial editorial evaluation, the role of reviewers remains the most important determinant of the PR duration, and may significantly influence different phases of the review process and outcome. It has been noted that reviewers who are personally known to the editor tend to be more likely to accept review invitations than other reviewers with no previous personal connection (89% vs. 33%) [28]. Reviewers may also prolong the first response time if they are overwhelmed by other professional commitments or have no spare time to invest in PR [28, 29]. Moreover, they may extend the author’s revision time by providing contradictory or unclear comments or by focusing on trivia coercing authors into unnecessary revisions, which may in turn increase the number of review rounds. On the contrary, papers receiving more consistent and favorable reviews tend to be associated with a shorter author’s revision time and total review duration [30]. However, it is important to emphasize that quicker reviews do not necessarily entail higher-quality, more detailed, or better-focused review reports that ensure publication of good-quality articles.

The impact of the type of PR on review time has also been evaluated. Open PR is associated with a comparable review duration to the classic PR system [17]. Transparent PR was associated with a longer time when the reviewers were informed that their signed reports would be available to readers; however, it did not seem to have a comparably discernible effect on the total review duration [31]. Thus, unfortunately, none of the alternative proposed PR methods seem to offer any improvements in the duration of the review process.

Inconsistency
Perhaps the most frequent criticism of the current PR system is the poor inter-reviewer agreement on the same manuscript, also referred to as inconsistency [32]. Inconsistency has been theorized to have at times been associated with unethical practices, especially in the widely adopted single-blind review system [33]. According to recent reports, inconsistent reviews were provided by independent reviewers in 25% to 55% of manuscript submissions [34-36]. These figures were shown to be higher for recommendations concerning rejection than those for acceptance [36, 37]. A study examined the reviewers’ recommendation of ‘reject’ versus ‘accept/revise’ in an internal medicine journal and found that level of the inter-rater agreement on recommendation was barely beyond chance, yet the editors nonetheless placed considerable weight on reviewers’ recommendations. This reinforces the fact that recommendations rendered by reviewers, particularly those favoring rejection, markedly influence publication decisions [38, 39].

One major reason for such inconsistency could potentially be variation in expertise among reviewers. Indeed, it was shown that similar research productivity and experience of reviewers in a particular subject area, as measured by the number of indexed peer-reviewed publications, significantly increased the level of inter-reviewer agreement [36]. One of the jobs of journal editors and editors-in-chief is to ensure that reviewers with sufficient expertise are requested to review submissions. It is also the job of these journal leaders to regularly evaluate the submitted reviews to actively optimize reviewer selection and assignments.

Further, reviewers are often provided with limited written instructions and are not required to undergo training before submitting reviews [40], resulting in a lack of uniformity in assessing scientific articles and hence poor reviewer agreement regardless of the level of expertise. In particular, different reviewers may value some article traits such as timeliness, the quality of writing, and the originality of the material higher than others. To mitigate against this limitation, some journals have created reviewer training sessions, which have been very popular with reviewers and authors. In addition, the Publons organization has offered a PR training course for early-career researchers [41].

Potential conflict of interest with authors is another theorized source of inconsistency that could possibly bias judgment made by reviewers in favor of or against a manuscript that is not receiving adequate attention. Currently, fewer than half of biomedical journals require reviewers and editors to disclose conflicts of interest [42]. Potential conflicts of interest for reviewers may arise from financial interests related to the research under review and personal or professional relationships with authors. Other reviewer biases that may contribute to inconsistency include biases towards positive research results, theoretical support or paradigm confirmation, and personal attributes of authors such as gender and prestige of institutional affiliation [43, 44].

Biases
Since PR is conducted by humans, by design it cannot be totally free of bias. The single-blind PR system, which accounts for about 85% of all annually conducted PRs [45], is particularly notorious for its alleged association with implicit or explicit bias. Single-blind PR has the benefit of enabling reviewers to give an honest assessment since their identity is anonymous and thus can make better independent decisions. However, this type of PR has come under increasing criticism, mainly for a theoretical lack of accountability [3, 46]. Indeed, this system enables unscrupulous reviewers to act on biases
based on the authors’ information and/or institutional affiliation and either underrate the ideas with which they disagree or promote the work of like-minded researchers in an inappropriate manner [47,48]. Moreover, there may exist an implicit conflict of interest between the reviewer or editor and the authors. Driven by inter-group competition or intention to plagiarize the authors’ work, a peer reviewer who is working in the same field could provide unjustified negative recommendations, in order to block or slow down the publication, and the authors are often left without recourse [49]. Concerns regarding biases due to reviewers’ and editors’ financial interests have also been raised [42]; nevertheless, the impact of this type of bias on PR outcomes has not been studied yet. Eventually, biases associated with single-blind PR may result in fewer recommendations for publication [50], and may undermine the authors’ trust in the PR process. Again, editors and editors-in-chief must be vigilant in their search for and elimination of any and all such possible behavior.

Lack of transparency

Another hypothesized limitation of the current PR system, particularly single-blind review, is a lack of transparency. Some reviewers may recommend rejection of an article with unjustified comments, and sometimes with no comments at all. This behavior could be due to personal grudges between the reviewer and author, or a reviewer may just decide to be biased or overly critical because his/her identity is not known [51]. In these cases it is incumbent upon the editor or editor-in-chief to find alternative reviewers and/or make decisions themselves based upon the other submitted reviews. In open PR, reviewers may find it difficult to reject a manuscript for undeclared reasons as they may be prompted to explain why. However, unjustified rejection by reviewers can still occur with open PR; therefore, the editor should require the reviewers to justify their recommendations and decisions for both open and blind PR. Similarly, in an open review, the reviewers cannot be overly critical as they will be prompted to explain the merit of their remarks. Conversely, in single-blind PR the reviewers tend to focus more on the negative aspects of the work rather than providing constructive comments [52]. In contrast, open review is more transparent, and the reviewer is more focused on the positive aspects of the work and improving it. This renders the review process more useful to the author.

One of the prominent issues with the current PR system is that reviewers are usually assigned to assess the scientific merit and quality of the manuscript; however, they should also assess the possibility of research misconduct such as plagiarism, fabrication, and falsification. It can be argued that specialized software will detect most cases of plagiarism; however, while such software is available to editors and publishers, it may fail to detect some cases of misconduct. Unfortunately, specialized software may not find every breach of ethics or research conduct, particularly mirror-copied images and tables and plagiarism by translation, which reviewers may be able to detect. Furthermore, public PR, whether pre- or post-publication, may also serve as a gatekeeper against this problem because with a larger PR audience such problems with research integrity may be easier to detect and annotate.

Possible Alternatives to Enhance the Current PR System

In order to optimize the quality and rigor of PR, several suggestions have been proposed regarding the PR method and platform, reviewer selection and recruitment, managing PR reports, and ensuring the integrity and impartiality of the PR process.

Double-blind PR is potentially one of the best methods to eliminate or at least minimize bias towards or against the authors. Knowing the identity of the authors may positively or negatively impact the reviewer’s impression based on the authors’ reputation, gender, and institutional affiliation. This behavior was demonstrated in a study showing that double-blind PR, instead of single-blind PR, improved the representation of female authors, with a significant increase in female first-authored papers [53]. Furthermore, there is accumulating evidence that in single-blind PR the manuscript acceptance rates may be higher for authors familiar to the reviewers, prominent authors in their fields, and authors from prestigious universities and institutions [54]. A strong geographic bias has also been observed, as native English-speaking authors from the United Kingdom, North America, Australia, and New Zealand were more likely to have their work accepted for publication than non-native authors from other countries. This apparent bias may stem from the disadvantage of the suboptimal linguistic quality of manuscripts submitted by non-native English speakers or lack of access to the relevant literature [55]. The major critique of double-blind PR is that in small research sectors the reviewer can make an educated guess regarding the authors’ identity when they try to make a point in their research and reference their own previous research [3]. While this may be an exception in most cases, in order to ensure totally blind PR, it would be helpful to require anonymous self-citations by authors and declarations of conflicts of interest by reviewers.

In addition to the double-blind PR system, having an interactive platform may expedite the process and eliminate time wasted in the routine submission/revision/resubmission process [19]. Having an interactive platform where the authors and reviewers can mutually discuss the reviewers’ comments...
and their applicability and usefulness may subsequently yield better research output by clarifying any vague points and misinterpretations. This platform has been applied by some journals [56] that have an interactive review forum in which the authors read the review reports and take part in an online discussion with reviewers while the identity of both parties is kept anonymous. Although the idea does seem compelling, there is not enough data to support its routine application. Moreover, it has been assumed that many traditional reviewers would not welcome the idea of interacting directly with the authors, either because they do not want extensive discussions or simply because of a lack of time.

Although, the problems of PR are usually associated with reviewers, editors and publishers may also contribute to these issues. Editors may find it particularly difficult to recruit expert reviewers on the subject in a timely manner, and inadvertently assign unqualified reviewers, thereby increasing the overall PR time and decreasing the quality of PR. A novel solution for this issue is the use of AI for reviewer selection. For example, the UNSILO (https://unsilo.ai) AI platform utilizes a concept engine that recognizes hundreds of concepts which are key phrases that distinguish articles from each other, ranks these concepts in order of relevance to the manuscript submitted, and matches the results with millions of articles and abstracts in the PubMed/MEDLINE database. The platform then identifies the authors of the matching publications and ranks them by relevance, presenting the top 20 for the editorial office to review [57]. The use of AI to recruit reviewers has been tried by some publishers/journals; although the experience remains preliminary and limited, it may be an option for finding reviewers.

Another possible way to improve the process of reviewers’ recruitment is providing some sort of incentive or compensation for their efforts and time. These incentives can stake many forms, including honoraria, waivers of article processing charges, recognition in dedicated services such as Publons, issuing certificates of recognition, and providing continuing medical education points. While providing financial compensation to the reviewers may seem suitable, an experimental study found that offering material incentives to the reviewers may undermine the moral motives that guide the reviewer’s behavior [58]. Conversely, it has been suggested to avoid overwhelming reviewers by employing a strict editorial filtration policy to avoid sending reviewers manuscripts that are less likely to be published. Rejections without PR can be decisions made by editors-in-chief or editors, which can lessen the burden placed upon reviewers. Similarly, it has been suggested that upon minor revisions the editors can check the authors’ compliance with the review comments and render a final decision, rather than sending the revised manuscript back to the reviewers.

One method to minimize inconsistency among different reviewers is to provide pre-set templates to comment on each section of the manuscript and ensure objectivity and clarity of their remarks. Typical PR templates ask the reviewers to rate the manuscripts in terms of novelty, scientific rigor, relevance to the field, ethical compliance, use of appropriate statistics, adequacy of table and figure numbers, and the validity of the conclusions. Equally, offering PR training courses and workshops helps peer reviewers to understand the principles and functions of PR and empower them to write solid, actionable PR reports [59].

Finally, publishing the PR reports along with the accepted articles can play an important role in improving the process. Knowing that their reports would be published along with the article, reviewers may choose to avoid personal and inappropriate comments, proofread their reports to ensure clarity, and provide a professional, step-wise appraisal of the manuscripts. On another note, publishing PR reports can benefit the readers and other authors by drawing attention to the main points of critique and weakness in each published article, which may enable them to address and avoid them in their future work. Indeed, there is a growing trend among major journals to publish the PR reports together with the published articles [60]. The suggestions to improve the current PR system are summarized in Table 2.

Table 2. Potential alternative options to improve the current peer review system

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<thead>
<tr>
<th>Suggested option</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-blind peer review</td>
<td>Both authors and reviewers are unaware of each other identity</td>
</tr>
<tr>
<td>Interactive platform</td>
<td>Authors and reviewers can interact directly and respond to comments on a dedicated, secure platform</td>
</tr>
<tr>
<td>The use of artificial intelligence</td>
<td>Artificial intelligence can be used to identify and recruit possible reviewers for each manuscript</td>
</tr>
<tr>
<td>Incentives for reviewers</td>
<td>Journals may offer financial incentives or continuing medical education points to reviewers upon their completion of manuscript review</td>
</tr>
<tr>
<td>Peer review templates</td>
<td>The journal provides reviewers with pre-set templates to aid in timely and efficient peer review.</td>
</tr>
<tr>
<td>Strict editorial review</td>
<td>Preliminary editorial review can help relieve the reviewers’ workload by desk rejection of unsuitable manuscripts</td>
</tr>
</tbody>
</table>
Opinions of Social Media Users

The #OpenSourceResearch collaboration uses the ‘wisdom of the crowd’ in research, as demonstrated in recently published papers [61,62]. The platform enabled the conduction of a cross-sectional survey of the opinions of the surgical community on the current PR system. Four polls regarding to the preferred type of PR and possible alternative approaches were introduced to the surgical community on the social media platform Twitter. Polls were anonymized to ensure the confidentiality of participants’ data. The #OpenSourceResearch account distributed the Twitter polls among members of the surgical community that not only included authors and readers, but also included reviewers and editors of surgical journals. The main purpose of the polls was to investigate authors’ and reviewers’ opinions about the current system of PR. The Twitter polls were not restricted to authors of papers; instead, the whole surgical community was invited and many of the authors who participated and engaged in conversations about the polls were also peer reviewers. Therefore, the opinions presented may reflect the combined perspectives of both authors and reviewers.

The first poll asked the participants about their personal preferences for the PR system; two-thirds of the 158 participants preferred the single-blind system. The second poll asked about the most prominent limitation of the current system; the major limitation was the time-consuming nature of the process.

![Survey results via Twitter on the peer review system. (A) Preferred type of peer review system and suggested model to improve the process. (B) Most prominent limitation of the current system and suggestions to improve.](image-url)
pants preferred either the double or triple-blind system. Interestingly, the single-blind system, which is by far the most commonly used one, ranked last, as fewer than 10% of participants chose this option.

The second poll asked the participants to select one of the new PR models that they think might “improve” PR. More than half of 60 participants chose the interactive PR system, perhaps because they felt it would be more practical and time-saving. One-quarter of users chose transparent PR, presumably because they thought that publishing PR reports with the articles would make reviewers keener to produce clearer and more consistent and organized reports.

The third poll asked about the most prominent limitations of the current PR system. Out of 102 participants, 41% chose the inconsistency of review reports, whereas 25% considered the time-consuming nature of PR as its major potential flaw. The final poll asked the participants what they would suggest to enhance the PR system. Of 54 participants, 33% chose providing the reviewers with incentives of any form, whereas 31% and 24% suggested that interactive and double-blind systems would be good means for improving PR. Fig. 2 illustrates screenshots of the four Twitter polls used to generate these data.

**Limitations:** The present study is limited by being mainly oriented towards surgery, as most authors were surgeons who are active on Twitter. We also cannot assume that the results would be identical among surgeons who are not active on Twitter.

**Conclusion**

PR is an integral component of scientific publishing and plays an essential role in vetting of the scientific literature. The current PR system has several postulated limitations including time commitment, lack of consistency, possible conflicts of interest, potential biases, and lack of transparency. Possible options to improve the PR system include applying double-blind, interactive PR platforms, expediting reviewers’ recruitment by using AI or providing incentives to reviewers, eliminating inconsistency by offering PR training courses and preset review templates, and publishing the PR reports along with each accepted article. In the interim it is the job of editors to ensure the consistent, timely delivery to authors of fair, unbiased, balanced, constructive, and detailed reviews. At the present time, editors and editors-in-chief can best serve authors, reviewers, and readers by providing the authors with detailed, constructive comments in addition to the individual points and critiques raised by the reviewers.

**Conflict of Interest**

Steven D. Wexner is an editor-in-chief of *Surgery* (eISSN 1532-7361) and an editor of *Colorectal Disease* (eISSN 1463-1318) and *Techniques in Coloproctology* (eISSN 1128-045X). Sameh Hany Emile and Hossam Elfeki are editors of *BMC Surgery* (eISSN 1471-2482) and members of the editorial advisory board of *Colorectal Disease*. Otherwise, no potential conflict of interest relevant to this article was reported.

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The opinions of Indian dental faculty members on harmonizing manuscript preparation and the submission guidelines of journals

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Abstract

Purpose: Authors of scholarly writing are underrepresented in discussions about improving the academic publishing system. The objective of this study was to assess the possibility of harmonizing manuscript preparation and the submission guidelines of journals by assessing the opinions of dental faculty members who worked in the state of Andhra Pradesh, India.

Methods: A cross-sectional survey of 1,286 participants from 16 dental schools in Andhra Pradesh was conducted from March 15, 2021 to April 15, 2021. The questionnaire addressed the participants’ demographic details and perspectives on the guidelines for manuscript preparation and the need to harmonize those guidelines with the publication process. The online questionnaire was generated using Google Forms and consisted of six dichotomous, one multiple-choice, and seven Likert scale items. Descriptive statistics were obtained.

Results: Of the 894 (69.5%) dental faculty members who responded, 448 (50.1%) were not aware of the International Committee of Medical Journal Editors’ guidelines for manuscript preparation and submission. During the manuscript revision process, 792 (95.5%) had experienced difficulty with the variation in author guidelines for each journal, especially the guidelines for formatting tables, reference style, and citation of references in-text. The idea of a standardized template for manuscript preparation and submission was supported by 800 respondents (86.7%).

Conclusion: Dental faculty members in India experienced difficulty in manuscript preparation due to the differing editorial policies among journals. Therefore, a standardized template providing uniformity in style and format is needed.

Keywords

Editorial policies; Dental schools; Writing; Awareness; India
Introduction

Background/rationale: As evidence-based practice becomes the standard in healthcare, research to address clinical questions and therapeutics has increased [1], with researchers submitting their findings to scientific journals in order to communicate with the medical community [2]. However, for various reasons, authors often submit their manuscripts to several journals before being peer-reviewed and accepted in one. This often requires multiple revisions of the manuscript to conform to the style and format requirements of each journal during the submission process [3].

Journals adopt different formats in order to align with the scientific writing policies and requirements of their parent organization or society. Differing abstract formats, word count limitations, and reference styles are common [2]. Authors struggle with the constant need to adapt to the changing requirements of numerous journals in their pursuit of publication. As a result, they are frequently confronted with minor issues that can have a significant impact on their time, money, and resources, particularly when a publication is resubmitted. It can also be an obstacle to timely data presentation [3].

There are currently no uniform guidelines or protocols that ensure harmony within journal publications and conference presentations globally. The most widely followed guidelines are those provided by the International Committee of Medical Journal Editors (ICMJE) and the American Medical Association (AMA Manual of Style). Despite offering specific recommendations, they do not cover issues such as harmonized structure and format [3]. Furthermore, the ICMJE does not mandate that all scientific journals follow their guidelines [4].

The International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) developed harmonized guidelines for clinical study reports in 1995. This document described the format and content of a clinical study report that would be acceptable to all regulatory authorities within the scope of the ICH [5]. This allowed researchers in the pharmaceutical industry to concentrate on science rather than editing, formatting, and style. Authors are at the core of academic publishing, yet they are underrepresented in discussions of how to improve scholarly publishing [4].

Objectives: The aim of this study was to document the opinions of Indian dental faculty members regarding harmonizing manuscript preparation and submission guidelines. Data were obtained through an online survey. Three specific areas were addressed: 1) knowledge of the ICMJE guidelines, 2) key challenges that authors experienced during the manuscript preparation and submission process, and 3) possible solutions to harmonize the manuscript preparation and submission process.

Methods

Ethics statement: The institutional ethical committee of Vishnu Dental College, Bhimavaram, India approved the study protocol (IECVD0/2021/UG01/PDQ/Q/50). The purpose of the study was stated on the first page of the document with the question "Do you agree to participate in the study voluntarily?" Clicking ‘yes’ gave the participant access to the questionnaire.

Study design: This was a cross-sectional, survey-based, descriptive study. It was described according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Setting: A survey was conducted among dental faculty members working in 16 dental schools in the state of Andhra Pradesh, India (Suppl. 1). Initial emails were sent on March 15, 2021, followed by reminder emails after 15 days and 1 month. The objective of the study and the requested response time were included in the email's brief statement. The responses were collected on April 15, 2021.

Participants: The target population was 1,286 dental faculty members (assistant, associate, and full professors) of 16 dental schools in Andhra Pradesh. The list of dental schools was obtained from the official website of the Dental Council of India and email invitations were sent to eligible participants.

Data source/measurement: A self-administered questionnaire was developed by five experienced dental researchers during three discrete review rounds. When there was a disagreement, the expert opinion of journal editors was sought to reach a consensus. To maximize participation, the questionnaire was kept short and included closed-ended questions only. The questions provided data on participants’ demographic details, including gender, research experience, work sector, and number of publications. Questions were created to gather information about participant opinions of existing manuscript preparation and submission guidelines and the need for publication harmonization. Furthermore, the survey collected opinions that could aid in the harmonization of publications. Participants answered six dichotomous, one multiple-choice, and seven Likert-scale questions (Suppl. 2). The online survey was created using Google Forms (Google, Mountain View, CA, USA). The Kuder-Richardson Formula 20 (KR20) was used to test the reliability of the 894 responses to six dichotomous questions, with a KR20 score of 0.5961. The reliability of 7 Likert-scale items was assessed using the Cronbach alpha test with a score of 0.8397 (P < 0.05).

Variables: Variables included the 14 items of the questionnaire and the participants’ characteristics.

Bias: Only voluntary participants were included in the analysis. Reasons for not participating in the survey were not obtained. Therefore, the opinions of 392 professionals (30.5%)
could not be traced. It is presumed that non-participants were not interested in writing articles or were too busy to respond.

**Study size:** The survey was dispatched to all professionals in 16 dental schools; study size estimation was not done.

**Statistical methods:** The data collected were subjected to statistical analysis using IBM SPSS Statistics ver. 25.0 (IBM Corp, Armonk, NY, USA). Descriptive analysis was performed.

**Results**

**Participants:** Out of 1,286 faculty members, 894 responses (69.5%) were received over 1 month from 16 dental schools (Dataset 1). However, we could not determine how many dental faculty members received the questionnaire; therefore, the number of actual responses or rejections could not be computed. Only the total target population was traceable.

**Descriptive data of participants:** As shown in Table 1, most participants were women (68%), with a mean age of 31.37 ± 11.48 years, while 50.22% of the participants had less than 5 years of research experience and 13.08% had more than 16 years of experience. In addition, 91.16% worked in private institutions, whereas 8.83% worked in the public sector. Interestingly, 13.3% had not published yet and 58.05% had fewer than 10 publications during their career.

As shown in Table 2, the survey questions and results represent the opinions of dental faculty members regarding harmonizing guidelines for manuscript preparation and submission. The study findings revealed that all participants were aware of ICJME guidelines for manuscript preparation and submission, and 792 (95.5%) had experienced difficulty in revising their manuscripts following rejection due to variation in submission guidelines. The difficulty level of revising a manuscript was assessed for different sections of the manuscript on a scale of 1 to 5 (1, easy; 5, difficult). The participants found it challenging to format tables (mean score = 3.03), followed by dealing with word limits (2.92) and reference styles (2.63).

Of the 894 respondents, 776 (89.5%) agreed or strongly agreed with the need for uniform guidelines for manuscript preparation and submission. Most agreed that harmonizing manuscript preparation and submission guidelines would help authors focus on scientific content rather than adherence to the style and format of the journal. The requirement of a harmonized template for manuscript preparation and submission was agreed or strongly agreed upon by 875 participants (86.7%). Submission of manuscript files initially with later application of style and format upon acceptance and the integrated journal portal were both considered good solutions by 560 study participants (62.6%).

In Table 3, a comparison of opinions about the need for uniform guidelines for manuscript preparation and submission is presented. There was no significant difference in opinions based on gender, research experience, work sector, or number of publications by chi-square test (P > 0.05).

**Discussion**

**Key results:** The present study gathered valuable perspectives from dental faculty members in the state of Andhra Pradesh, India that provided insights into harmonizing scientific publications in journals. Scientific publications are the lifeline of the research community and play a critical role in disseminating data to healthcare providers, scientists, and researchers. The lack of harmonization across journals, however, impedes the publication process. This variability presents a challenge to authors, diluting their ability to concentrate on science and medicine. In this study, there was a perceived need for standardized or harmonized manuscript preparation and submission guidelines.

**Interpretation:** The variations in journal specifications at the time of manuscript preparation/submission can be attributed to several factors. Interdisciplinary variations, journal size differences, available staff and resources, journal priorities, target readership, and stylistic preferences are only a few of those factors. Although many of them are understandable factors, when taken together they contribute to dissimilar guidelines that are difficult to navigate when revising a rejected manuscript for a new journal [6]. The development of a harmonized template would be a watershed moment, allowing the

**Table 1.** Demographic characteristics of study participants in a survey on the challenges of manuscript preparation and submission in India (n=894)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Category</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Men</td>
<td>286</td>
<td>32.00</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>608</td>
<td>68.00</td>
</tr>
<tr>
<td>Research experience (yr)</td>
<td>≤ 5</td>
<td>449</td>
<td>50.22</td>
</tr>
<tr>
<td></td>
<td>6–10</td>
<td>256</td>
<td>28.63</td>
</tr>
<tr>
<td></td>
<td>11–15</td>
<td>72</td>
<td>8.05</td>
</tr>
<tr>
<td></td>
<td>≥ 16</td>
<td>117</td>
<td>13.08</td>
</tr>
<tr>
<td>Work sector</td>
<td>Public</td>
<td>79</td>
<td>8.83</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>815</td>
<td>91.16</td>
</tr>
<tr>
<td>No. of publications</td>
<td>≤ 10</td>
<td>519</td>
<td>58.05</td>
</tr>
<tr>
<td></td>
<td>11–20</td>
<td>212</td>
<td>23.71</td>
</tr>
<tr>
<td></td>
<td>21–30</td>
<td>70</td>
<td>7.82</td>
</tr>
<tr>
<td></td>
<td>31–40</td>
<td>47</td>
<td>5.25</td>
</tr>
<tr>
<td></td>
<td>≥ 41</td>
<td>46</td>
<td>5.14</td>
</tr>
</tbody>
</table>
Table 2. Responses to a questionnaire on the challenges of manuscript preparation and submission in India

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>Questionnaire items</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you know that each journal has specific guidelines for manuscript preparation/submission?</td>
<td>Yes</td>
<td>894</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Are you aware of ICMJE guidelines for manuscript preparation and submission?</td>
<td>Yes</td>
<td>446</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>448</td>
</tr>
<tr>
<td>3</td>
<td>If yes, do you know that many journals do not follow ICMJE guidelines for manuscript submission?</td>
<td>Yes</td>
<td>212</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>682</td>
</tr>
<tr>
<td>4</td>
<td>Did you experience rejection of any of your manuscripts?</td>
<td>Yes</td>
<td>848</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>46</td>
</tr>
<tr>
<td>5</td>
<td>If yes, did you resubmit your rejected manuscript to any other journal?</td>
<td>Yes</td>
<td>829</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>If yes, did you experience difficulty in revising your manuscript according to other journal guidelines?</td>
<td>Yes</td>
<td>792</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>102</td>
</tr>
<tr>
<td>7</td>
<td>If yes, indicate the level of difficulty in revising according to other journal guidelines: 1-easy to 5-difficult (No. of respondents)</td>
<td>Abstract revision (634)</td>
<td>2.04(^a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference citation in text (633)</td>
<td>2.77(^a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referencing style (633)</td>
<td>2.63(^a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figures/tables formatting (633)</td>
<td>3.03(^a)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Word limit (633)</td>
<td>2.92(^a)</td>
</tr>
<tr>
<td>8</td>
<td>Manuscripts are sometimes rejected because of formatting, styling and structure.</td>
<td>Strongly disagree</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>283</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
<td>399</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly agree</td>
<td>71</td>
</tr>
<tr>
<td>9</td>
<td>There is a need for uniform guidelines for manuscript preparation/submission.</td>
<td>Strongly disagree</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
<td>377</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly agree</td>
<td>423</td>
</tr>
<tr>
<td>10</td>
<td>Harmonizing manuscript preparation with the submission process will save authors time.</td>
<td>Strongly disagree</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutral</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
<td>355</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly agree</td>
<td>468</td>
</tr>
</tbody>
</table>

(Continued to the next page)
Table 2. Continued

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>Questionnaire items</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Harmonizing the manuscript preparation/submission process will allow authors to focus on scientific content.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>24</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>72</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>471</td>
<td>52.7</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>327</td>
<td>36.6</td>
</tr>
<tr>
<td>12</td>
<td>Creating a harmonized template would be a milestone in streamlining the manuscript writing process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>24</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>23</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>72</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>496</td>
<td>55.5</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>279</td>
<td>31.2</td>
</tr>
<tr>
<td>13</td>
<td>Initial submission of manuscripts with application of format and styling after acceptance is a good solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>72</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>72</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>190</td>
<td>21.3</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>373</td>
<td>41.7</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>187</td>
<td>20.9</td>
</tr>
<tr>
<td>14</td>
<td>An integrated journal portal for easy submission of manuscripts is needed (common portal for all journals).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>24</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
<td>23</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>71</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>446</td>
<td>49.9</td>
</tr>
<tr>
<td></td>
<td>Strongly agree</td>
<td>330</td>
<td>36.9</td>
</tr>
</tbody>
</table>

ICMJE, International Committee of Medical Journal Editors.

a) Totals vary (n = 894) because of missing data for some questions. b) Average value.

Table 3. Comparison of opinions about the need for uniform guidelines for manuscript preparation and submission

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Category</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Men</td>
<td>8 (0.9)</td>
<td>0</td>
<td>25 (2.8)</td>
<td>142 (15.9)</td>
<td>111 (12.4)</td>
<td>0.665</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>16 (1.8)</td>
<td>0</td>
<td>47 (5.3)</td>
<td>329 (36.8)</td>
<td>216 (24.2)</td>
<td></td>
</tr>
<tr>
<td>Research experience (yr)</td>
<td>≤ 5</td>
<td>12 (1.3)</td>
<td>0</td>
<td>36 (4.0)</td>
<td>237 (26.5)</td>
<td>164 (18.3)</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>6–10</td>
<td>7 (0.8)</td>
<td>0</td>
<td>21 (2.3)</td>
<td>135 (15.1)</td>
<td>93 (10.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11–15</td>
<td>2 (0.2)</td>
<td>0</td>
<td>6 (0.7)</td>
<td>37 (4.1)</td>
<td>27 (3.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 16</td>
<td>3 (0.3)</td>
<td>0</td>
<td>9 (1.0)</td>
<td>62 (6.9)</td>
<td>43 (4.8)</td>
<td></td>
</tr>
<tr>
<td>Work sector</td>
<td>Public</td>
<td>3 (0.3)</td>
<td>0</td>
<td>6 (0.7)</td>
<td>39 (4.4)</td>
<td>31 (3.5)</td>
<td>0.856</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>21 (2.3)</td>
<td>0</td>
<td>66 (7.4)</td>
<td>432 (48.3)</td>
<td>296 (33.1)</td>
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</tr>
<tr>
<td>No. of publications</td>
<td>≤ 10</td>
<td>14 (1.6)</td>
<td>0</td>
<td>44 (4.9)</td>
<td>274 (30.6)</td>
<td>187 (20.9)</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>11–20</td>
<td>5 (0.6)</td>
<td>0</td>
<td>16 (1.8)</td>
<td>112 (12.5)</td>
<td>79 (8.8)</td>
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<tr>
<td></td>
<td>21–30</td>
<td>2 (0.2)</td>
<td>0</td>
<td>6 (0.7)</td>
<td>37 (4.1)</td>
<td>25 (2.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31–40</td>
<td>1 (0.1)</td>
<td>0</td>
<td>4 (0.4)</td>
<td>24 (2.7)</td>
<td>18 (2.0)</td>
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</tr>
<tr>
<td></td>
<td>≥ 41</td>
<td>2 (0.2)</td>
<td>0</td>
<td>2 (0.2)</td>
<td>24 (2.7)</td>
<td>18 (2.0)</td>
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</table>
writing process to be streamlined. Harmonizing the structure, style, and format of manuscripts and applying them globally is necessary and worthwhile. This would allow authors to focus on technical/scientific content rather than struggle with style and format. For example, journals and publishing houses could agree on using superscripted numbers, numbers in brackets, or an author-year format for citations within a text. A consensus on using Harvard or Vancouver style for the reference list could be reached [3]. Publishers are aware of writers’ frustrations with formatting and attempts to solve the problem have been made. Some journals have stated that the format of a document has no bearing on the acceptance of a manuscript if it contains all required elements. Some publishers have policies that do not require writers to use a particular manuscript format when submitting their work (e.g., Elsevier’s Your Paper, Your Way and Taylor & Francis’ Format-free submission) [6].

A significant proportion of survey participants (92.0%) stated that authors spend too much presubmission time on formatting manuscripts. In the broader context of researching, writing, and submitting a paper, this presubmission period may not seem significant to an individual researcher, but in general it was a cause for concern. In fact, the actual number of authors frustrated with the current system is likely to be much higher since most manuscripts are rejected by the first journal to which they are sent, and others might never be published despite being submitted to other journals [7]. Indeed, it would be fascinating to investigate how much time authors spend attempting to meet journal guidelines for manuscript preparation and submission. Moreover, many research papers lose their relevance and significance by the time they are published in journals.

The authors’ opinions stress the importance of harmonizing all inter-journal discrepancies and establishing standard guidelines for a broad scope of disciplines. ICMJE’s uniform requirements for manuscripts submitted to biomedical journals are designed primarily for authors who submit their work to ICMJE member journals. However, many non-ICMJE journals choose to follow these guidelines as well. The ICMJE advocates this practice but cannot oversee or enforce it [5]. Establishing a global task force or committee on manuscript preparation and submission requirements might be one way to address these issues [6]. A committee, including experienced journal editors, publishers, active researchers, and peer reviewers from various disciplines and geographic locations, could work to identify critical standards for uniform journal guidelines [8,9]. Admittedly, it is no easy task to harmonize publishing guidelines while duly considering unavoidable journal-specific needs. Perhaps the solution to these issues is to change the emphasis and discuss the technical specifics and discrepancies in the context of a larger picture. This could provide direction for future research on harmonizing manuscript preparation and submission guidelines.

**Comparison with previous studies:** A survey conducted by D’Souza et al. [10] found that most authors viewed manuscript preparation to be the most difficult aspect of the publication process, emphasizing the need to make the journal publication process more author-centered. Cerejo [11] reported that East Asian authors experienced similar difficulties in academic publishing. A significant proportion of authors found journal submission guidelines unclear and felt that journals need to consider the needs and challenges of authors.

**Limitations:** Subjects of the study included dental professionals from 16 dental schools in India. Therefore, it is difficult to generalize the results to professionals in other fields and other countries.

**Conclusion:** The majority of participants in this study had experienced difficulty in revising a manuscript after rejection due to differing submission guidelines among journals and agreed that a harmonized template could help minimize authors’ pre-submission or preparation time. The findings highlight the need for harmonizing manuscript preparation and submission guidelines to help facilitate a more reasonable experience in publishing for authors.

**Conflict of Interest**

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

**Funding**

The authors received no financial support for this article.

**Data Availability**

Dataset file is available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/XMCSA6

**Dataset 1.** Raw response of 894 dental professionals from 16 dental schools to a questionnaire on harmonizing manuscript preparation and submission guidelines

**Supplementary Material**

Supplementary file is available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/XMCSA6

**Suppl. 1.** List of 16 dental schools with their cities and number of professionals in Andhra Pradesh state, India
Suppl. 2. Survey questionnaire on harmonizing manuscript preparation and submission guidelines

References

Development of a decision-support tool to quantify authorship contributions in clinical trial publications

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Abstract

Purpose: This study aimed to develop a decision-support tool to quantitatively determine authorship in clinical trial publications.

Methods: The tool was developed in three phases: consolidation of authorship recommendations from the Good Publication Practice (GPP) and International Committee of Medical Journal Editors (ICMJE) guidelines, identifying and scoring attributes using a 5-point Likert scale or a dichotomous scale, and soliciting feedback from editors and researchers.

Results: The authorship criteria stipulated by the ICMJE and GPP recommendations were categorized into 2 Modules. Criterion 1 and the related GPP recommendations formed Module 1 (sub-criteria: contribution to design, data generation, and interpretation), while Module 2 was based on criteria 2 to 4 and the related GPP recommendations (sub-criteria: contribution to manuscript preparation and approval). The two modules with relevant sub-criteria were then differentiated into attributes (n = 17 in Module 1, n = 12 in Module 2). An individual contributor can be scored for each sub-criterion by summing the related attribute values; the sum of sub-criteria scores constituted the module score (Module 1 score: 70 [contribution to conception or design of the study, 20; data acquisition, 7; data analysis, 27; interpretation of data, 16]; Module 2 score: 50 [content development, 27; content review, 18; accountability, 5]). The concept was integrated into Microsoft Excel with adequate formulae and macros. A threshold of 50% for each sub-criterion and each module, with an overall score of 65%, is predefined as qualifying for authorship.

Conclusion: This authorship decision-support tool would be helpful for clinical trial sponsors to assess and provide authorship to deserving contributors.

Keywords

Authorship criteria; International Committee of Medical Journal Editors; Good Publication Practice; Dichotomous scale; Clinical trial publications
Introduction

**Background/rationale:** Disagreements between authors can arise during study planning, conduct, data analysis, manuscript writing, submission, and post-publication phases. The Committee on Publication Ethics (COPE) classifies these disagreements into disputes and misconduct [1]. The guidelines of the International Committee of Medical Journal Editors (ICMJE), COPE, and those of Good Publication Practice (GPP), first proposed in 2003 by the International Society for Medical Publication Professionals, regulate research publications and help determine authorship credit [2]. The third version of GPP (GPP3) was published in 2015, and the fourth edition is expected to release in 2022 [3]. These guidelines are related to publishing industry-funded clinical studies of marketed products and review articles and secondary articles initiated by companies.

Both GPP3 [3] and ICMJE [4] outline the criteria for authorship and are widely accepted. However, with respect to multicentric clinical trials involving several investigators, pharmaceutical companies struggle to attribute appropriate credit to all contributors [5]. The biomedical industry has remarkably acknowledged the role of a key opinion leader [6], often found among authors in clinical trials causing author inflation. In these situations, the guidelines cannot adequately resolve authorship issues, and the team involved must formulate its own strategy.

**Objectives:** The objective of this study was, therefore, to develop a quantitative decision-support tool that complies with recent ICMJE and GPP guidelines in order to help pharmaceutical companies accurately identify the deserving authors and their order of authorship in publications arising from clinical trials.

**Methods**

**Ethics statement:** The authors requested feedback and questions from editors and researchers during networking opportunities such as panel discussions, question-and-answer sessions, and off-the-stage meetings of two editorial conferences held in the United Arab Emirates [7,8] and the Philippines [9]. No sensitive personal information was acquired; therefore, neither institutional review board approval nor informed consent was required.

**Setting:** Two authors (SM and HI) initiated the study in January 2015. The tool was developed in 3 phases, which included reviewing the selected authorship guidelines and identifying and categorizing authorship criteria (Phase 1), ranking these elements on a Likert or dichotomous scale (Phase 2), and modifying the scale based on solicited feedback (Phase 3) (Fig. 1).

**Phase 1. Consolidation of authorship recommendations from the GPP and ICMJE guidelines**

The authors independently reviewed and abstracted all relevant elements of the authorship criteria mentioned in the

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of ICMJE and GPP guidelines</td>
<td>Ranking the attributes</td>
<td>Soliciting feedback</td>
</tr>
<tr>
<td>• Consensus meeting to document relevant criteria</td>
<td>• Independent review to develop modules, sub-criteria and attributes</td>
<td>• Soliciting feedback at 2 editorial conferences</td>
</tr>
<tr>
<td></td>
<td>• Ranking using Likert (1-5) or dichotomous (Yes or No) scale based on relevance and importance</td>
<td>• Updating the tool with recent ICMJE 2019 and GPP3 guidelines</td>
</tr>
<tr>
<td></td>
<td>• Setting threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Incorporation of the whole concept into Microsoft Excel</td>
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</table>

Fig. 1. Schematic diagram depicting the developmental phases of the quantitative authorship decision-support tool. ICMJE, International Committee of Medical Journal Editors; GPP3, third version of Good Publication Practice.
GPP2 guidelines and the ICMJE recommendations (formerly the Uniform Requirements for Manuscripts). The authors then entered into a consensus meeting in which they discussed the findings, deliberated, identified relevant clinical trial and publication development processes, and systematically documented them.

**Phase 2. Ranking the attributes**
The third author (PV) scrutinized all responses, identified keywords, removed redundancies, and segregated them into different modules (with sub-criteria and attributes) based on the congruity and different steps in the clinical trial process and developing clinical trial publications. Wherever possible, each attribute was ranked on a 5-point Likert scale based on its relative relevance and importance (1 = least important and 5 = highly important) in determining authorship. If an attribute could not be ranked on the Likert scale, the responses were collected as ‘yes’ or ‘no’ (dichotomous scale), which were further converted to binary (no = 0 and yes = 1).

These data were then incorporated into Microsoft Excel (Microsoft, Redmond, WA, USA), with filters, formulas, and drop-down menus. Using this Microsoft Excel sheet, an individual contributor could be scored for all attributes. The sum of the attribute scores of each module and sub-criterion could also be determined. Further, a threshold for the overall score and individual modules was proposed to decide the eligibility and order of authorship.

**Phase 3. Soliciting feedback and modifications**
The prototype of this tool was presented at two conferences [7-9]. The authors solicited feedback and questions from editors and researchers during the networking opportunities.

**Statistical methods:** No statistical analysis was performed. Suggestions by researchers and editors were reflected in the tool development.

**Results**

**Phase 1. Consolidation of authorship recommendations from the GPP and ICMJE guidelines**
After review, discussion and deliberations, all authors agreed on the key elements (Table 1) from both guidelines. The authors also identified and documented clinical trial publication processes relevant to these elements.

**Phase 2. Ranking the attributes**
The ICMJE provides global criteria for authorship, and GPP deciphers these guidelines in the context of the conduct of clinical trials and developing related publications by clinical trial sponsors. Considering this, the third author (PV) scrutinized all responses, and the four criteria of authorship stipulated by ICMJE were categorized into two modules: criterion 1 in Module 1 (contribution to design, data generation, and interpretation); and criteria 2 to 4 in Module 2 (contribution to manuscript preparation and approval). Both modules were further divided into the relevant sub-criteria (Module 1: study concept or design, data acquisition, data analysis, data interpretation; Module 2: content development, content review, accountability) (Fig. 2). With the help of GPP, different attributes related to each of these sub-criteria were identified (overall 26 attributes).

All attributes were ranked on a Likert scale (0–5) or a dichotomous scale (yes = 1 and no = 0). In Module 1, the following attributes were ranked on a Likert scale: critical review of the protocol, participation in scientific advisory boards/study meetings, planning and conduct of the study; contribution to statistical analysis, contribution to data cleaning in electronic data capture or tables/listings/figures reviews, and direction of the team to conclusions regarding the critical study results. While attributes such as writing the protocol/strategic direction, active involvement in implementing data collection and data management activities, statistical analysis of the data, and preparation of reports from the data analysis to help the team understand the conclusions were ranked on a dichotomous scale. Furthermore, in the category of data acquisition, the number of patients planned to be completed for each investigator; the number of patients screened, randomized, completed; and their respective indices (randomized:screening, completed:planning, and completed:randomized) were also noted.

In Module 2, attributes such as writing most of the initial draft, providing an outline or strategic input for the manuscript, communicating with other contributors/medical writers during the drafting stage, participating in the content review on time, and critical review of the content were ranked on a Likert scale. On a dichotomous scale, the following attributes of the publication steering committee were ranked: anticipating and communicating issues related to sponsor proprietary information and intellectual property, complying with the organizational publication policy and other ethical guidelines and journal instructions (also agreeing to avoid premature publication or release of study information and duplicate publications), disclosing any potential conflicts of interest and appropriately acknowledging support from any source (including funding), reading and approving the final version of the manuscript, agreeing to be responsible for all aspects of the study, ensuring that questions related to the accuracy or integrity were appropriately investigated and resolved, and being able to identify coauthors (accountable for the integrity of the contributions). After ranking, certain attri-
<table>
<thead>
<tr>
<th>Main parameter</th>
<th>Relevant ICMJE recommendation</th>
<th>Relevant GPP3 recommendation</th>
<th>Relevant processes in the clinical trial and subsequent publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant role in the study</td>
<td>Ideation, conceptualization, or design of the study</td>
<td>Important intellectual contributions in ideation, conducting and interpreting the study results</td>
<td>Strategic direction</td>
</tr>
<tr>
<td></td>
<td>Obtaining the data and its analysis</td>
<td></td>
<td>Development and critical review of the protocol</td>
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<tr>
<td></td>
<td>Interpretation of data</td>
<td></td>
<td>Participation in the scientific advisory boards/study meetings/publication steering committee</td>
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<td></td>
<td>Planning and conduct of the study (both operational and scientific)</td>
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<td>Statistical analysis and interpretation</td>
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<td>Active involvement in implementing data collection and data management activities</td>
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<td></td>
<td></td>
<td>Contributions towards data clean-up in EDC or TLF review</td>
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<td></td>
<td>Directed team on critical study result conclusions</td>
</tr>
<tr>
<td>Manuscript development</td>
<td>Writing or revision to enhance the scientific content of the manuscript</td>
<td>Not limited to linguistic assistance but active participation throughout during development of the manuscript</td>
<td>Drafting discussion section</td>
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<td></td>
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<td>Provide intellectual suggestions to develop manuscript</td>
<td>Support in writing most of the manuscript or providing an outline</td>
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<td></td>
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<td>Accountable for how research findings are presented and published</td>
<td>Participated in the content review on time</td>
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<td>Critical review of the content.</td>
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<tr>
<td></td>
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<td>Accountable for identifying and ensuring the integrity of sections written by co-authors</td>
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<td></td>
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<td>Identify nonauthor contributors</td>
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<td>Declare conflict of interest and any funding sources for the study</td>
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<td>Declare conflict of interest and financial and non-financial relationships and activities</td>
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ICMJE, International Committee of Medical Journal Editors; GPP, Good Publication Practice; EDC, electronic data capture; TLF, tables listings figures.
Fig. 2. Different modules, subcategories, and attributes of the quantitative authorship decision-support tool. Maximum possible score (sum of all attributes), 120; Module 1, 70; Module 2, 50. ICMJE, International Committee of Medical Journal Editors; GPP, Good Publication Practice. *Module 1 is based on ICMJE criteria 1 and related GPP recommendations; Module 2 is based on ICMJE criteria 2 to 4 and related GPP recommendations; †Sub-criteria; ‡Attributes.

Sub-criteria supposed to have higher relative importance to authorship, as well as the authorship order, were further multiplied by a number between 2 and 5. The sum of all attributes could provide a maximum score of 120 (Module 1, 70; Module 2, 50).

It was assumed that to qualify for authorship, of the maximum possible score of 120, every contributor should receive a score of at least 60 (50%) for each module (Module 1, 35; Module 2, 25), while the overall score should be at least 78 (65%). The first author is the contributor who receives the highest score, followed by others in order. However, the senior (last) author should be the one who scores the maximum for the concept or design of the study (Module 1.1), content (Module 2.2), and accountability (Module 2.3). A similar approach can be taken to decide the sequence of authors if multiple authors have equal scores. The corresponding author has the maximum score for content development (Module 2.1) and accountability (Module 2.3).

Phase 3. Soliciting feedback and modifications
The tool was well received at both conferences [7-9]. Feedback included suggestions to update the tool to reflect the revisions of the GPP and ICMJE guidelines. The majority of the audience were researchers, journal editors, and professional medical writers worldwide. Some editors showed interest in using this tool as an optional requirement for authors submitting publications arising from clinical trials. However, upon further discussion, it was decided to increase the acceptability of this tool by disseminating it as a publication in a relevant medical journal. We honored the feedback and updated the tool with recent 2015 GPP3 and 2019 ICMJE guidelines.

Use of the authorship decision-support tool
The authorship decision-support tool was incorporated into the Microsoft Excel program with appropriate formulae and macros. The user needs to input each contributor’s name and score them against each of the attributes using drop-down menus. This tool also prompts the user to include all contributors who participated in the activities mentioned in Module 1 when the user completes the encoding of Module 1 and before the beginning of the manuscript drafting stage (Module 2). The tool automatically calculates each contributor’s total score, along with scores for each module and subcategory. It also identifies the contributing and non-contributing authors,
senior author, and corresponding author and rearranges them based on the order. The chair of the publication steering committee or designee in consultation with the contributor can input the contributor’s name and score him or her for each of the relevant attributes (Fig. 3).

**Discussion**

**Key results:** This quantitative authorship decision-support tool presented in this article includes 26 attributes. We developed the decision-support tool to quantify authorship contributions in clinical trial publications by segregating the attributes into two modules and then finally integrating them into the Microsoft Excel program.

**Interpretation:** It may not be fair to expect each author to be an ‘equal’ contributor. However, every author should contribute substantially and have a reasonable sense of accountability. Here, the significance of quantifying their role as contributing authors comes into play.

The ICMJE and GPP have provided a conceptual basis for authorship [3,4]. Still, with the ever-expanding field of clinical research publications and evolving transparency and ethical requirements, there are often deficiencies or limitations in putting these guidelines into practice.

After carefully understanding these guidelines and the importance of several clinical trial processes in publication, the attributes were taught and ranked according to their prominence in authorship. For the attributes, which essentially reflect the views and perspectives of the respondent, a 5-point unidimensional psychometric scale, the Likert scale, was used [10]. In contrast, for attributes expected to have absolute responses, a 2-point dichotomous scale was used [11].

A significant contribution to the criteria mentioned in both modules is essential to entitle the claim of authorship. Therefore, we proposed a score threshold of 60 (50.0%) for each module (Module 1, 35; Module 2, 25) and an overall score of 78 (65.0%) to be eligible for authorship. Using this threshold would help eliminate the chances of providing authorship to every (non-substantial) contributor associated with the clinical trial. However, this is only a recommendation, and users can choose an appropriate threshold based on the unique procedural and scientific circumstances of a study.

**Comparison with previous studies:** Bhopal et al. [12] introduced a democratic method to score credits. They devised a list of 14 points and passed the onus of scoring each author to the other coauthors. The process is anonymized, and each individual is made to score the others, excluding himself or herself. The final authorship order is then agreed upon by the whole team.

The Authorship Order Score, proposed by Masud et al. [13],
consists of 13 Likert-scale items based on four factors: conception, planning, execution, and writing. The author sequence is based on the final sum of the scores, ranging from 0 to 100. A simple percentage-based score, called the Author Contribution Index, only quantifies the contribution of each author relative to the others [14]. In another percentage-based system, called the Quantitative Uniform Authorship Declaration, there are four categories by which the percentages are calculated: conception and design, data collection, data analysis and conclusion, and manuscript preparation [15]. Warrender's system provides scores rather than percentages based on four aspects (conception and design, data acquisition, analysis and interpretation, and manuscript preparation) [16]. Another unique matrix-based system uses four factors (ideas, work, writing, and stewardship). One should score each category, and the total sum should not be more than 1. This limit of 1 helps eliminate over-scoring and requires the user to provide a reasonable score, keeping in mind the true role of an author and giving a well-balanced score for each category [17].

Another formula-based scoring system, known as the Authorship Index (AuI), calculates the literary contribution of an author [18], where the corresponding and first authors receive a score of 1. The maximum score can be 100, and the sequence of the author in the authorship list in each of his or her publications will determine his or her final score. This seems reasonable because the ‘number’ of publications would no longer matter. However, this ‘sequence-determines-credit’ system in itself is not an impartial perception. Besides this, there is no set score given by AuI that can be called a ‘good’ AuI score. The CRediT–Contributor Roles Taxonomy is a simple 14-point chart [19]. However, it does not reflect the actual role or degree of contribution of each author compared to the others. The CRediT system is more of a self-declaration form that can be provided to journals when submitting an article.

Our quantitative authorship decision-support tool has certain advantages. First, we have attempted to identify specific processes in a clinical trial and its subsequent publications relevant to the different elements of these two guidelines. Further, the combined use of both Likert and dichotomous scales provided greater flexibility for the tool to accommodate attributes with different characteristics. This tool also has provisions to overcome issues arising when two or more authors receive an equal score.

**Limitations:** It can be argued that scoring attributes using a Likert scale is qualitative in a certain sense and prone to subjective decisions; however, there are no better alternatives to score these attributes at present. In addition, this tool still has not been systematically applied to any clinical trial publication process to check how it works.

**Conclusion:** As the concept of this authorship decision-support tool is incorporated into the widely used Microsoft Excel application, it is very intuitive and easy to use. The threshold of the percentage score to become a contributory author helps clinical trial sponsors reduce author inflation. This would also help medical journals ensure that the authorship is properly distributed. We recommend that clinical trial sponsors and peers use this tool to decipher authorship and that medical journals should encourage authors to submit the outcome from the tool along with manuscripts. As a next step, we will systematically review relevant information from COPE, the Council of Science Editors, the World Association of Medical Journal Editors, other professional bodies, reputed publishing houses, and institutions to ensure that the attributes and criteria are current and comprehensive. We plan to further develop this tool as a web-based system with a better user interface using HTML, CSS, bootstrap, or CodeIgniter with MVC architecture.

**Conflict of Interest**

Sam T. Mathew has been an editorial board member of *Science Editing* since 2014. He was not involved in the review process. Otherwise, no potential conflict of interest relevant to this article was reported. The opinions expressed in this article are the authors’ personal views and do not represent that of their affiliated organizations.

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**Acknowledgments**

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**Data Availability**

All data generated or analyzed during this study are available from the corresponding author.
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Changes in article share and growth by publisher and access type in Journal Citation Reports 2016, 2018, and 2020

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Abstract

Purpose: This study explored changes in the journal publishing market by publisher and access type using the major journals that publish about 95% of Journal Citation Reports (JCR) articles.

Methods: From JCR 2016, 2018, and 2020, a unique journal list by publisher was created in Excel and used to analyze the compound annual growth rate by pivot tables. In total, 10,953 major JCR journals were analyzed, focusing on publisher type, open access (OA) status, and mega journals (publishing over 1,000 articles per year).

Results: Among the 19 publishers that published over 10,000 articles per year, in JCR 2020, six large publishers published 59.6% of the articles and 13 publishers 22.5%. The other publishers published 17.9%. Large and OA publishers increased their article share through leading mega journals, but the remaining publishers showed the opposite tendency. In JCR 2020, mega journals had a 26.5% article share and an excellent distribution in terms of the Journal Impact Factor quartile. Despite the high growth (22.6%) and share (26.0%) of OA articles, the natural growth of non-OA articles (7.3%) and total articles (10.7%) caused a rise in journal subscription fees. Articles, citations, the impact factor, and the immediacy index all increased gradually, and the compound annual growth rate of the average immediacy index was almost double than that of the average impact factor in JCR 2020.

Conclusion: The influence of OA publishers has grown under the dominance of large publishers, and mega journals may substantially change the journal market. Journal stakeholders should pay attention to these changes.

Keywords

Journal Citation Reports; Journal publisher; Major journal; Mega journal; Open access

Introduction

Background/rationale: Over the past 20 years since the advent of e-journals, there have been many changes in the journal publishing environment, including an increase in new journals,
the frequent extinction of small publishers due to mergers and acquisitions, a strengthened position of large commercial publishers, and the pursuit of open access (OA) opposed to the subscription model. The emergence of OA publishers was associated with a new publishing business model, substituting article processing charges (APCs) for subscription fees. Traditional print journal publishers, which had long monopolized libraries throughout the world, no longer overlook their competition with OA publishers. With the increase of OA journals and articles, the journal publishing environment continues to undergo unprecedented changes. Therefore, all stakeholders of academic journals need to pay close attention to changes and trends in the journal publishing environment.

Comparing the publication trends of the journals included in major bibliographic databases by year is effective because they cover the world’s major journals and publishers. Although some studies have dealt with changes in journal publishing in a fragmentary manner, such as OA publishing based on Web of Science (WoS), Journal Citation Reports (JCR), Directory of Open Access Journals (DOAJ), and Scopus, it is difficult to find accurate and up-to-date research on major publishers focusing on core journals. We published four consecutive studies on publishers, number of articles, indicators, APC, list price, and OA status using JCR journals in the Science Citation Index Expanded (SCIE) and Social Sciences Citation Index (SSCI) [1–4]. JCR 2020, which was released in June 2021, expanded to include the Arts and Humanities Citation Index and the Emerging Sources Citation Index, but the impact factors (IFs) and percentage of OA gold were not yet presented for those resources. The inclusion of information on the percentage of OA gold for the past 3 years’ ratio of OA articles in WoS made it easier to understand OA trends. Thus, it would be meaningful to analyze and compare the changes in journal publishing by year or by publisher type, including mega journals, based on JCR.

Knowledge of the environmental changes in journal publishing is useful for librarians who are considering economic subscription contracts and reasonable user services. For an accurate analysis of the rapidly changing and diverse journal environment, ongoing research based on reliable journal data is required. JCR lists only peer-reviewed journals through a rigorous evaluation process; therefore, an analysis of publication trends focusing on major journals that have been consistently listed in JCR would enable more accurate predictions of future changes in the journal publishing market.

Objectives: The purpose of this study was to analyze how the traditional journal publishing market, which was previously concentrated on peer-reviewed subscription journals produced by large commercial publishers, is changing in terms of article share and growth by publisher and access type with the expansion of OA journals and articles. Its results, with precise and up-to-date data, will help journal stakeholders establish journal subscription plans and APC support policies.

Methods

Ethics statement: This was not a study with human subjects, so neither institutional review board approval nor informed consent was required.

Study design: This was a literature database-based descriptive study.

Data collection and analysis: We used JCR instead of the journals in DOAJ and Scopus to identify the recent publication trends of only major journals. Research data were collected from JCR 2016, 2018, and 2020—2 years before and after JCR 2018, which began to have information on the percentage of OA gold—and an analysis was conducted by integrating the JCR journal lists into a single Excel file, similar to previous studies [1–4]. As of July 2021, SCIE and SSCI data of JCR 2016, 2018, and 2020 were downloaded as a text file and converted into an Excel file. The same journals were integrated using journal names and International Standard Serial Number, and affiliated publishers were classified according to the holding company (the recently merged BMC [BioMed Central] was classified as separate from Springer). Articles and reviews, which are counted as citable items in JCR, were considered as the number of articles per journal; thus, only journals with at least one citable item were identified as JCR journals, excluding journals with no citable items.

Among the collected data, major journals that were consistently listed in JCR 2016, 2018, and 2020 were extracted and pivot tables were used to calculate the compound annual growth rate (CAGR). In order to investigate changes by publisher type, 19 publishers that published more than 10,000 articles per year on average were selected and classified into four types. In addition to the current status of OA journals, trends in mega journals (defined as those containing more than 1,000 articles per year) were also analyzed.

Statistical methods: Data were tabulated and the proportions of the cells were calculated by pivot tables. The growth rate (%) was calculated in terms of the CAGR.

Results

JCR journals and articles
JCR journals were grouped into major journals, which were consistently listed in JCR 2016, 2018, and 2020, and minor journals, which were listed only once or twice in the 3 editions of JCR due to new entry or exclusion. The former can be regarded as core journals with higher usability for researchers.
than the latter. Table 1 shows the analysis results of 10,953 major journals and minor journals. The number of major journals to all JCR journals decreased from 96.8% to 93.0% and 89.9%, implying that the journals newly entering JCR increased gradually. Among the JCR articles, 94.7% were published in major journals and only 5.3% in minor journals. As about 95% of JCR articles were published in major journals, their CAGR was very similar to that of the entire JCR. From JCR 2018 to JCR 2020, the CAGR for the increase of journals was only 1.7%, but the CAGR for articles was 13.5%, reaching the first year with over 2 million articles. The CAGRs for articles and citations were much higher in JCR 2020 than in JCR 2018. The CAGRs for average IF and the immediacy index were more than doubled, and each value entered the 3-point and 1-point range for the first time in JCR 2020. The average IF increased at a similar CAGR to that of citations, but the average immediacy index increased about twice as much as the average IF. These findings indicate that there have been significant changes in article publication and use.

**Major journals in JCR**

In JCR 2020, the OA data show the gold OA materials published in 2018, 2019, and 2020, and citations in 2020 to these items. To classify journal types according to the percentage of OA gold, gold OA journals were defined as those with a percentage of 95% and above, hybrid journals as those with a percentage of less than 95%, and subscription-only journals as those with a percentage of 0%. The status (Table 2) of OA journals and articles in JCR major journals was different from that reported in a previous study [3], which directly analyzed OA articles by year. Looking at only 10,953 major journals, the number of subscription-only journals decreased significantly in JCR 2020 compared to JCR 2018. Meanwhile, the number of hybrid and gold OA journals increased, with a higher proportion of hybrid journals than gold OA journals. Fig. 1 shows the status of articles in the JCR major journals. In JCR 2020, the growth rate of total articles was over 10%, which resulted from a significant increase in OA articles (22.6%) along with the natural increase in non-OA articles (7.3%). The share of OA articles in major journals in JCR 2020 was estimated to be 26.0%.

**JCR major journals by publisher type**

It was assumed that there were many changes in JCR journals and publishers due to the radical growth in OA publications; therefore, the publishers of major journals were divided into 5 groups, and each group’s articles and citations were compared (Table 3). There was little change in the total number of publishers of JCR journals, with a maximum of 2,082. Among the 19 publishers that published more than 10,000 articles per year, the status of large publishers was dominant, as in the previous study [1], while OA publishers grew rapidly over time. As shown in Fig. 2, six large publishers (including Elsevier) gradually increased their article and citation share to

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**Table 1. Journals and articles in JCR**

<table>
<thead>
<tr>
<th>Journals and articles in JCR</th>
<th>JCR 2016</th>
<th>CAGR (%)</th>
<th>JCR 2018</th>
<th>CAGR (%)</th>
<th>JCR 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minor journals</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journals</td>
<td>363</td>
<td>50.6</td>
<td>823</td>
<td>22.4</td>
<td>1,234</td>
</tr>
<tr>
<td>Articles</td>
<td>41,827</td>
<td>22.2</td>
<td>62,465</td>
<td>71.8</td>
<td>184,269</td>
</tr>
<tr>
<td><strong>Major journals</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journals</td>
<td>10,953</td>
<td>-</td>
<td>10,953</td>
<td>-</td>
<td>10,953</td>
</tr>
<tr>
<td>Articles</td>
<td>1,502,324</td>
<td>4.6</td>
<td>1,643,110</td>
<td>10.7</td>
<td>2,013,175</td>
</tr>
<tr>
<td>Citations</td>
<td>57,626,438</td>
<td>9.8</td>
<td>69,424,170</td>
<td>15.5</td>
<td>92,686,632</td>
</tr>
<tr>
<td>Average IF</td>
<td>2.228</td>
<td>6.1</td>
<td>2.510</td>
<td>15.0</td>
<td>3.322</td>
</tr>
<tr>
<td>Average II</td>
<td>0.532</td>
<td>14.5</td>
<td>0.698</td>
<td>30.2</td>
<td>1.183</td>
</tr>
<tr>
<td><strong>All journals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journals</td>
<td>11,316</td>
<td>2.0</td>
<td>11,776</td>
<td>1.7</td>
<td>12,187</td>
</tr>
<tr>
<td>Articles</td>
<td>1,544,151</td>
<td>5.1</td>
<td>1,705,575</td>
<td>13.5</td>
<td>2,197,444</td>
</tr>
<tr>
<td>Citations</td>
<td>58,167,743</td>
<td>9.9</td>
<td>70,294,170</td>
<td>16.2</td>
<td>94,945,306</td>
</tr>
<tr>
<td>Average IF</td>
<td>2.180</td>
<td>6.8</td>
<td>2.487</td>
<td>16.5</td>
<td>3.377</td>
</tr>
<tr>
<td>Average II</td>
<td>0.526</td>
<td>14.8</td>
<td>0.693</td>
<td>31.3</td>
<td>1.194</td>
</tr>
</tbody>
</table>

JCR, Journal Citation Reports; CAGR, compound annual growth rate; IF, impact factor; II, immediacy index.

<sup>a</sup>Journals listed once or twice in JCR 2016, 2018, and 2020; <sup>b</sup>Journals consistently listed in JCR 2016, 2018, and 2020.
Changes in article share and growth by publisher and access type

nearly 60%. OA publishers grew so much that MDPI ranked fifth in article share, overtaking Sage, but their citation share was less than half of their article share. For the other publishers, both article and citation shares gradually decreased despite their growing CAGR.

Distribution of JCR mega journals
Table 4 shows the article distribution of the JCR major journals. Most journals (over 45%) published 50-199 articles per year. About one-third of journals published fewer than 50 articles, while 20% published over 200 articles. The number of journals in the former category decreased over time, while the number of journals in the latter category increased. Of particular note, mega journals (publishing over 1,000 articles per year) showed radical growth, with a CAGR of 11.6% in JCR 2018 and 15.6% in JCR 2020. The article share of the 231 mega journals in JCR 2020 was 26.5%, and more than half (132 journals) were influential journals, ranked in Journal Impact Factor quartile 1. In an analysis of the 231 mega journals by publisher type, 113 journals were distributed by large publishers, 49 journals by OA publishers, and 46 journals by society publishers. Elsevier was the largest individual publisher, publishing 73 mega journals, followed by MDPI, which published 25 mega journals. Among the 132 most influential mega journals, 104 journals were hybrid journals (i.e., subscription journals with numerous OA articles).

Discussion

Major changes in articles and citations
The CAGR of articles in major journals increased to 10.7% in JCR 2020, reflecting a more than 2-fold increase since JCR 2018. In JCR 2020, there was no significant change in the number of publishers and journals, but it was confirmed that

Table 2. Journals and articles in JCR major journals by OA type

<table>
<thead>
<tr>
<th>Item</th>
<th>OA type</th>
<th>JCR 2016</th>
<th>CAGR (%)</th>
<th>JCR 2018</th>
<th>CAGR (%)</th>
<th>JCR 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal</td>
<td>Subscription only journals</td>
<td>-</td>
<td>-</td>
<td>3,116</td>
<td>-13.8</td>
<td>2,316</td>
</tr>
<tr>
<td></td>
<td>Hybrid journals</td>
<td>-</td>
<td>-</td>
<td>6,640</td>
<td>5.2</td>
<td>7,349</td>
</tr>
<tr>
<td></td>
<td>Gold OA journals</td>
<td>-</td>
<td>-</td>
<td>1,197</td>
<td>3.7</td>
<td>1,288</td>
</tr>
<tr>
<td>Article</td>
<td>Average article per journal</td>
<td>137.2</td>
<td>4.6</td>
<td>150.0</td>
<td>10.8</td>
<td>183.8</td>
</tr>
<tr>
<td></td>
<td>Non-OA articles</td>
<td>-</td>
<td>-</td>
<td>1,294,832</td>
<td>7.3</td>
<td>1,489,609</td>
</tr>
<tr>
<td></td>
<td>Gold OA articles</td>
<td>-</td>
<td>-</td>
<td>277,810</td>
<td>19.8</td>
<td>398,401</td>
</tr>
<tr>
<td></td>
<td>Hybrid OA articles</td>
<td>-</td>
<td>-</td>
<td>70,468</td>
<td>33.3</td>
<td>125,165</td>
</tr>
</tbody>
</table>

JCR provides OA information about gold OA articles since JCR 2018; Gold OA journals were defined as those with an OA gold percentage of 95% and above, and hybrid OA journals as those with a percentage of less than 95%. JCR, Journal Citation Reports; OA, open access; CAGR, compound annual growth rate.

Fig. 1. Articles in major Journal Citation Reports (JCR) journals. CAGR, compound annual growth rate; OA, open access.
the average IF and immediacy index increased rapidly, along with the increase of articles and citations. In particular, the CAGR of the average immediacy index was double than that of the average IF, which is assumed to be due to the increase of OA articles, early promotion of new articles, and free articles for temporary services, which resulted in faster access to articles by users. However, further studies are needed to find the exact cause. In an analysis according to publisher type, the average IF and immediacy index increased rapidly, along with the increase of articles and citations. In particular, the CAGR of the average immediacy index was double than that of the average IF, which is assumed to be due to the increase of OA articles, early promotion of new articles, and free articles for temporary services, which resulted in faster access to articles by users. However, further studies are needed to find the exact cause. In an analysis according to publisher type,
large publishers continued to increase their article and citation shares to nearly 60%, while the remaining publishers (except OA publishers) maintained a citation share higher than their article share, even though both decreased. These changes in the share of articles and citations by publisher type will be referred to in journal package contracts.

Implications for the increase of OA journals and articles
As OA articles are welcomed by libraries and researchers, the growing influence of OA journals and articles with the rapid progress of OA publishing merits attention. In JCR 2020, the CAGR of OA articles was 3 times higher than that of non-OA articles, and the share of OA articles in JCR major journals reached 26.0%. Although this share is lower than that of 27.1% [3] for all journals in JCR 2019, which directly reflected the number of OA articles in WoS by year, it was found to be higher than has been reported in other studies (the share of OA articles in 2018 was 18.9% in Scopus [5], and 24.0% in WoS [6]). Hybrid OA articles increased at a higher rate than gold OA articles, but gold OA articles were much more numerous. In a previous study [3], some gold OA journals showed superior influence in several JCR indicators. However, in JCR major journals, OA articles issued by OA publishers increased with the highest CAGR, but their citation share was less than one-half of their article share. It is assumed that there are substantial differences in influence among OA journals, and institutions need to reflect these differences when supporting APC fees for each journal.

Mega journals as major changers of the journal market
In order to forecast the future journal market, the influence of mega journals is noteworthy. In JCR 2020, mega journals made a substantial contribution to the article share (26.5%), with numerous OA articles, despite their small journal share (2.1%), and showed a high level of excellence in terms of their Journal Impact Factor quartile. When mega journals appeared, they were embroiled in controversy over predatory journals, as they were initiated by new OA publishers. However, in JCR 2020, traditional print journal publishers actively participated in publishing mega journals, as six large publishers accounted for about 50% (including Elsevier’s 32%) and four society publishers accounted for 20% of the 231 mega journals. Moreover, among the 132 excellent mega journals (in Journal Impact Factor quartile 1), 79% were hybrid journals. This means that mega journals were no longer limited to OA publishers; instead, traditional print journal publishers were at the forefront of publishing mega journals. The results of this study suggest that the influence of mega journals is expected to grow greatly; therefore, journal stakeholders should pay attention to mega journals as a substantial source of changes in the future journal market. Due to recent changes, wherein article submission and use are driven to these mega journals, a new evaluation of mega journals (including OA journals) is required.

Continuing increases in journal subscription fees
To find reasons for increases in journal subscription fees, only subscription articles were considered (i.e., with the exclusion of gold and hybrid OA articles). Regarding the issue of journal subscription fees, one researcher pointed out the high profits of the major commercial publishers, concentrated contracts for “big deal” electronic licenses, high barriers to new entrants, and protected competitive positions for industry rivals [7]. Non-OA articles increased by 7.3% in JCR 2020 and became an important factor for publishers to raise journal subscription fees. While six large publishers maintained a high share (nearly 60%) in articles, their growth rate (13.1%), which was higher than the overall rate (10.7%), may also have been an important factor explaining why large publishers demanded higher increases in journal subscription fees. Despite the high growth of OA articles, the natural growth of both non-OA articles and total articles, which was higher than the inflation rate, continues to make it difficult to negotiate subscription fees between libraries and publishers. However, a study on reductions in publication cost with journal volume reported that with a retraction rate of around 90%, publishing costs are 1,054 US dollars for 100 articles or 771 US dollars for 1,000 articles [8]. This suggests that a new strategy can be considered for negotiating subscription fees depending on how many hybrid journals with numerous OA articles are included in the journal packages.

Limitations: The analytical results of this study reflect the assumption that the WoS journals in 2021 are identical to major journals in JCR, without changes in the publisher. In addition, the number of OA articles was easily estimated by using JCR’s percentage of OA gold, but caution is needed as there was a slight difference from the previous study [3] in how OA articles were calculated and gold OA journals were determined. A regrettable limitation is that the correlation analysis between the markedly increased average immediacy index and IF was excluded from the scope of this study.

Conclusion: This study analyzed the journal publishing environment, focusing on major journals that were consistently listed in JCR and publishing about 95% of articles. Among the 19 publishers publishing more than 10,000 articles per year, in JCR 2020, six large publishers accounted for 59.6% of articles and the remaining 13 publishers for 22.5%, with the other publishers (about 2,000 publishers not included in the 19 publishers) for 17.9%. Under the strong influence of large publishers, OA publishers grew rapidly, but the share of the remain-
ing publishers gradually decreased. Even though the growth rate of OA articles was higher than that of non-OA articles, the natural growth of non-OA articles and total articles was assumed to be main factor leading publishers to raise journal subscription fees. The growth rate of the average immediacy index was nearly double than that of the average IF; implying that major changes may have been taking place in journal publishing and the research community. Large and society publishers, rooted in their experiences with traditional print journals, published mega journals actively, along with OA publishers. Furthermore, mega journals showed a strong influence on the increase of articles and citations. Journal stakeholders need to continue to pay attention to these changes. This study is expected to be useful for libraries in negotiating journal subscription fees with publishers, planning journal subscription, and supporting APC fees for OA articles.

Conflict of Interest

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

Funding

The authors received no financial support for this article.

Data Availability

Most of the raw data in this paper are various indicators of JCR, which is sold as a paid commercial database; therefore, sharing is not available. Please contact the corresponding author for raw data availability.

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Comparing the accuracy and effectiveness of Wordvice AI Proofreader to two automated editing tools and human editors

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Abstract

Purpose: Wordvice AI Proofreader is a recently developed web-based artificial intelligence-driven text processor that provides real-time automated proofreading and editing of user-input text. It aims to compare its accuracy and effectiveness to expert proofreading by human editors and two other popular proofreading applications—automated writing analysis tools of Google Docs, and Microsoft Word. Because this tool was primarily designed for use by academic authors to proofread their manuscript drafts, the comparison of this tool’s efficacy to other tools was intended to establish the usefulness of this particular field for these authors.

Methods: We performed a comparative analysis of proofreading completed by the Wordvice AI Proofreader, by experienced human academic editors, and by two other popular proofreading applications. The number of errors accurately reported and the overall usefulness of the vocabulary suggestions was measured using a General Language Evaluation Understanding metric and open dataset comparisons.

Results: In the majority of texts analyzed, the Wordvice AI Proofreader achieved performance levels at or near that of the human editors, identifying similar errors and offering comparable suggestions in the majority of sample passages. The Wordvice AI Proofreader also had higher performance and greater consistency than that of the other two proofreading applications evaluated.

Conclusion: We found that the overall functionality of the Wordvice artificial intelligence proofreading tool is comparable to that of a human proofreader and equal or superior to that of two other programs with built-in automated writing evaluation proofreaders used by tens of millions of users: Google Docs and Microsoft Word.

Keywords

Artificial intelligence; Natural language processing; English proofreading; Writing assistant; Human editing
Introduction

**Background/rationale:** The use of English in all areas of academic publishing and the need for nearly all non-native English-speaking researchers to compose research studies in English have created difficulties for non-native English speakers worldwide attempting to publish their work in international journals. Faced with the time-consuming process of self-editing before submission to journals, many researchers are now using Automated Writing Analysis tools to edit their work and enhance their academic writing development [1,2]. These include grammatical error correction (GEC) programs that automatically identify and correct objective errors in text entered by the user. At the time of this study, most popular GEC tools are branded automated English proofreading programs that include Grammarly [3], Ginger Grammar Checker [4], and Hemingway Editor [5], all of which were developed using natural language processing (NLP) techniques; NLP is a type of artificial intelligence (AI) technology that allows computers to interpret and understand text in the same way a human does.

Although these AI writing and proofreading programs continue to grow in popularity, reviews regarding the effectiveness of these programs at large are inconsistent. Similar studies to the present one have analyzed the effectiveness of NLP text editors and their potential to approach the level revision of expert human proofreading [6-8]. At least one 2016 article [9] evaluates popular GEC tools and comes to the terse conclusion that “grammar checkers do not work.” The jury appears to be out on the overall usefulness of modern GEC programs in correcting writing.

However, Napoles et al. [10] propose applying the Generalized Language Evaluation Understanding (GLEU) metric, a variant of the Bilingual Evaluation Understudy (BLEU) algorithm that “accounts for both the source and the reference” text, to establish a ground truth ranking that is rooted in judgements by human editors. Similarly, the present study applies a GLEU metric to more accurately compare the accuracy of these automated proofreading tools with that of revision by human editors. While the practical application of many of these programs is evidenced by their success in the marketplace of writing and proofreading aids, gaps remain in how accurate and consistent certain AI proofreading programs are in correcting grammatical and spelling errors.

**Objectives:** It aimed to analyze the effectiveness of the Wordvice AI Proofreader [11], a web-based AI-driven text processor that provides real-time automated proofreading and editing of user-input text. We also compared its effectiveness to expert proofreading by human editors and two other popular writing tools with proofreading and grammar checking applications, Google Docs [12] and Microsoft (MS) Word [13].

Methods

**Ethics statement:** This is not a human subject study. Therefore, neither approval by the institutional review board nor the obtaining of informed consent is required.

**Study design:** This was a comparative study using qualitative open dataset and quantitative GLEU metric of comparison.

**Setting:** The Wordvice AI Proofreader tool was measured in terms of its ability to identify and correct objective errors, and it was evaluated by comparing its performance to that of experienced human proofreaders and to two other commercial AI writing assistant tools with proofreading features: MS Word and Google Docs in June 2021. By combining the application of a quantitative GLEU metric with a qualitative open-dataset comparison, this study compared the effectiveness of the Wordvice AI Proofreader with that of other editing methods, both in the correction of “objective errors” (grammar, punctuation, and spelling) and in the identification and correction of more “subjective” stylistic issues (including weak academic language and terms).

**Data sources**

**Open datasets**

The performance of the Wordvice AI Proofreader was measured using the JHU Fluency-Extended GUG (JFLEG) open dataset 1 [14], a dataset developed by researchers as Johns Hopkins University and consisting of a total of 1,501 sentences, 800 of which were used to comprise Dataset 1 in the experiment (https://github.com/keisks/jfleg). The JFLEG data consists of sentence pairs, showing the input text and the results of proofreading by professional editors. These datasets assess improvements in sentence fluency (style revisions), rather than recording all objective error corrections. According to Sakaguchi et al. [15], unnatural sentences can result when the annotator collects only the minimum revision data within a range of error types, and letting the annotator rephrase or rewrite a given sentence can result in more comprehensible and natural sentences. Thus, the JFLEG data was applied with the aim of assessing improvements in textual fluency rather than simple grammatical correction.

Because many research authors using automated writing assistant tools are English as a second language writers, the proofread data was based on sentences written by non-native English speakers. This was designed to create a more accurate sample pool for likely users of the AI Proofreader. “Proofread data” refers to data that has been corrected by professional native speakers with master’s and doctoral degrees in the academic domain. The data were constructed in pairs: sentence before receiving proofreading and sentence after receiving proofreading.
The sample data used in the experiment consisted of 1,245 sentences (i.e., 1,245 pairs of sentences were assessed both before and after proofreading), and these sentences were derived from eight academic domains: arts and humanities, biosciences, business and economics, computer science and mathematics, engineering and technology, medicine, physical sciences, and social sciences. Table 1 summarizes the number of sentences applied from each academic domain (Dataset 2).

GLEU-derived datasets
The GLEU metric was used to create four datasets of comparison. The first dataset (Dataset 3), GLEU 1 (T1, P1), compares the correctness of the output sentence text of the Wordvice AI Proofreader (“predicted sentence,” P1) with that of human proofreaders (“ground truth sentence,” T1). The second dataset (Dataset 4), GLEU 2 (T1, P2), compares the correctness of the Wordvice AI Proofreader’s predicted sentence (P1). The third dataset (Dataset 5), GLEU 3 (T1, P2), compares the correctness of MS Word’s predicted sentence (P2). The fourth dataset (Dataset 6), GLEU 4 (T1, P3), compares the correctness of Google Doc’s predicted sentence (P4).

**Measurement (evaluation metrics)**

**Error type comparison**
A qualitative comparison was performed on T1, P1, P2, and P3 for categories including stylistic improvement (fluency, vocabulary) and objective errors (determiner/article correction, spell correction). Table 2 illustrates these details for each writing correction method (human proofreading, Wordvice AI, MS Word, and Google Docs).

A GLEU metric [16] was used to evaluate the performance of all proofreading types (T1, P1, P2, and P3). GLEU is an indicator based on the BLEU metric [17] and measures the number of overlapping words by comparing ground truth sentences and predicted sentences with n-gram to assign high scores to sequence words. To calculate GLEU score, we record all sub-sequences of 1, 2, 3, or 4 tokens in a given predicted and ground truth sentence. We then compute a recall (Equation 1), which is the ratio of the number of matching n-grams to the number of total n-grams in the ground truth sentence; we also compute a precision (Equation 2), which is the ratio of the number of matching n-grams to the number of total n-grams in the predicted sequence [18]. Python library (https://www.nltk.org/_modules/nltk/translate/gleu_score.html) was used for the calculation of GLEU.

\[
\text{Recall} = \frac{\text{number of matching } n\text{-grams}}{\text{number of total } n\text{-grams in the ground truth sentence}} \quad \text{(Equation 1)}
\]

\[
\text{Precision} = \frac{\text{number of matching } n\text{-grams}}{\text{number of total } n\text{-grams in the predicted sentence}} \quad \text{(Equation 2)}
\]

The GLEU score is then simply the minimum of recall and precision. This GLEU score’s range is always between 0 (no matches) and 1 (complete match). As with the BLEU metric, the higher the GLEU score, the higher the percentage of identified and corrected errors and issues captured by the proofreading tool. These are expressed as a percentage of the total revisions applied in the ground truth model (human-edited text), including objective errors and stylistic issues. The closer to the ground truth editing results, the higher the performance score and the better the editing quality.

**Statistical methods**: Descriptive statistics were applied for

---

**Table 1. Summary of experiment dataset**

<table>
<thead>
<tr>
<th>Subject area</th>
<th>No. of sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and humanities</td>
<td>57</td>
</tr>
<tr>
<td>Biosciences</td>
<td>54</td>
</tr>
<tr>
<td>Business and economics</td>
<td>58</td>
</tr>
<tr>
<td>Computer science and mathematics</td>
<td>60</td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>52</td>
</tr>
<tr>
<td>Medicine</td>
<td>53</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>55</td>
</tr>
<tr>
<td>Social sciences</td>
<td>56</td>
</tr>
<tr>
<td>JFLEG</td>
<td>800</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,245</strong></td>
</tr>
</tbody>
</table>

JFLEG, JHU Fluency-Extended GUG.

**Table 2. Comparison of the corrections and improvements of the sentences before correction, the sentences after correction of the comparative methods, and the sentences after the correction by Wordvice AI Proofreader**

<table>
<thead>
<tr>
<th>Correction method</th>
<th>Stylistic improvement</th>
<th>Objective errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fluency improvement</td>
<td>Vocabulary improvement</td>
</tr>
<tr>
<td>Human editing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Wordvice AI Proofreader</td>
<td>Yes</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Google Docs</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Microsoft Word</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

https://www.escienceediting.org
comparison between the target program and other editing tools.

**Results**

**Quantitative results based on GLEU**

**Comparison of all automated writing evaluation proofreaders**

Table 3 shows the average GLEU score in terms of percentages of corrections made by the Wordvice AI Proofreader and other automated proofreading tools as compared to the ground truth sentences. As an average of total corrections made, the Wordvice AI Proofreader had the highest performance of the Automated Writing Analysis proofreading tools, performing 77% of the corrections applied by the human editor.

Based on the dataset of 1,245 sentences used in the experiment, the proofreading performance of Wordvice AI achieved a maximum of 11.2%P and a minimum of 3.0%P compared to those of Google Doc’s proofreader. Additionally, the GLEU score of the Wordvice AI-revised text was higher by 13.0%P at maximum compared to sentences before proofreading.

Analysis of variance was used to determine the statistical significance of the values. Comparisons made between Wordvice AI, Google Docs, and MS Word proofreading tools revealed a statistically significant difference in proofreading performance (analysis of variance, P < 0.05) (Table 4).

**Comparison of Wordvice AI Proofreader and Google Docs proofreading tool**

Google Docs proofreader’s results scored second in total corrections. Our comparative method confirmed that the deviation of Wordvice AI performance was smaller than that of the performance of Google Docs and MS Word proofreaders.

The proofreading performance of Wordvice AI (with a variation of 5.4%) was more consistent in terms of percentage of errors corrected compared to MS Word (with a variation of 5.6%), but was slightly less consistent than the Google Docs proofreader (with a variation of 5%).

**Comparison of Wordvice AI Proofreader and MS Word proofreading tool**

We compared the AI Proofreader’s performance in the specific academic subject area compared to Google Docs and MS Word, as listed in the Methods section (Tables 3, 5, 6). In each of the eight subject areas, the Worldvice AI Proofreader showed the highest proofreading performance, by total percentage of ground truth sentence corrections applied, at 79.4%. When compared using the GLEU method, MS Word applied the lowest amount of revision and was closest to the original source text in terms of revised to unrevised text. Of the three proofreading tools, MS Word applied the least amount of editing. Table 3 shows the comparison between performance of

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Original sentence (%)</th>
<th>Wordvice AI Proofreader (%)</th>
<th>Google Docs (%)</th>
<th>Microsoft Word (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and humanities</td>
<td>61.5</td>
<td>78.5</td>
<td>73.2</td>
<td>65.1</td>
</tr>
<tr>
<td>Biosciences</td>
<td>62.6</td>
<td>75.7</td>
<td>68.5</td>
<td>64.9</td>
</tr>
<tr>
<td>Business and economics</td>
<td>66.5</td>
<td>79.4</td>
<td>68.2</td>
<td>67.1</td>
</tr>
<tr>
<td>Computer science and mathematics</td>
<td>65.1</td>
<td>74.5</td>
<td>71.5</td>
<td>66.5</td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>64.3</td>
<td>74.1</td>
<td>67.5</td>
<td>65.8</td>
</tr>
<tr>
<td>Medicine</td>
<td>61.5</td>
<td>80.5</td>
<td>73.5</td>
<td>62.9</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>67.8</td>
<td>78.3</td>
<td>73.4</td>
<td>66.5</td>
</tr>
<tr>
<td>Social sciences</td>
<td>65.8</td>
<td>78.1</td>
<td>71.5</td>
<td>68.5</td>
</tr>
<tr>
<td>Average</td>
<td>64.4</td>
<td>77.4</td>
<td>70.9</td>
<td>65.9</td>
</tr>
</tbody>
</table>

**Table 4.** One-way analysis of variance results of proofreading performance analysis between Automated Writing Analysis tools

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of squares</th>
<th>Degrees of freedom</th>
<th>Mean squares</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>0.052960333</td>
<td>2</td>
<td>0.026480167</td>
<td>54.78317838</td>
<td>4.65E-09</td>
<td>3.466800112</td>
</tr>
<tr>
<td>Withing groups</td>
<td>0.010150625</td>
<td>21</td>
<td>0.000483363</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.063110958</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
the Wordvice AI Proofreader and Google Docs.

The Wordvice AI Proofreader exhibited a higher performance metric over MS Word in every subject area. As illustrated in Table 4, the Wordvice AI Proofreader outperformed the MS Word proofreader by 17.6%P in the subject area of medicine and by 8.1%P in computer science and mathematics. It also exhibited an 11.4% total average performance advantage over MS Word in each subject area.

Qualitative results
Qualitative results were derived from an open dataset by applying a set of error category criteria (Table 2). These criteria are applied to the input sentences before proofreading, input sentences proofread by MS Word and Google Docs, and sentences proofread by Wordvice AI.

Criteria 1. Fluency improvement (stylistic improvement)
The Wordvice AI Proofreader improved sentence fluency by editing awkward expressions, similar to revision applied in documents edited by editing experts (“human editing”). In Table 7, “point” was used to indicate how different editing applications can interpret the intended or “correct” meaning of words that have multiple potential meanings. In the original sentence instance, “point” means pointing a finger or positioning something in a particular direction. However, “point out” means indicating the problem, and thus the original term “point” was changed to “point out” by human editing. Because our study considers the sentence revised by human editing as 100% correct, this result accurately conveys the intended meaning of the sentence—here, “point out” is more appropriate than “point.”

Google Docs applied the same correction, changing “points” to “points out.” However, it did not correct the misspelling “scond,” the intended meaning of which human editing recognized as “second.” However, Wordvice AI corrected both of these errors perfectly, following the human editor’s revisions. MS Word did not detect or correct either error in this sentence.

Criteria 2. Vocabulary improvement (stylistic improvement)
The Wordvice AI Proofreader applied appropriate terminology to convey sentence meaning in the same manner as the human editor. Human editing removed the unnecessary definite article “the” from the phrase “the most countries” to capture the intended meaning of “an unspecified majority”; it also

**Table 5.** Comparison of Wordvice AI Proofreader performance to Google Docs proofreader by academic subject area

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Wordvice AI Proofreader (%)</th>
<th>Google Docs (%)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and humanities</td>
<td>78.5</td>
<td>72.2</td>
<td>6.3</td>
</tr>
<tr>
<td>Biosciences</td>
<td>75.7</td>
<td>70.5</td>
<td>5.2</td>
</tr>
<tr>
<td>Business and economics</td>
<td>79.4</td>
<td>69.8</td>
<td>9.6</td>
</tr>
<tr>
<td>Computer science and mathematics</td>
<td>74.5</td>
<td>71.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>74.1</td>
<td>68.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Medicine</td>
<td>80.5</td>
<td>73.5</td>
<td>7.0</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>77.2</td>
<td>73.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Social sciences</td>
<td>78.1</td>
<td>72.5</td>
<td>5.6</td>
</tr>
</tbody>
</table>

**Table 6.** Comparison of Wordvice AI Proofreader performance to Microsoft Word’s proofreader by academic subject area

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Wordvice AI (%)</th>
<th>Microsoft Word (%)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and humanities</td>
<td>78.5</td>
<td>65.1</td>
<td>13.4</td>
</tr>
<tr>
<td>Biosciences</td>
<td>75.7</td>
<td>64.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Business and economics</td>
<td>79.4</td>
<td>67.1</td>
<td>12.3</td>
</tr>
<tr>
<td>Computer science and mathematics</td>
<td>74.5</td>
<td>66.5</td>
<td>8.0</td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>74.1</td>
<td>65.8</td>
<td>8.3</td>
</tr>
<tr>
<td>Medicine</td>
<td>80.5</td>
<td>62.9</td>
<td>17.6</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>77.2</td>
<td>66.5</td>
<td>10.7</td>
</tr>
<tr>
<td>Social sciences</td>
<td>78.1</td>
<td>68.5</td>
<td>9.6</td>
</tr>
</tbody>
</table>
Kevin Heintz et al.

Table 7. Comparative sentence example evaluating fluency improvement

<table>
<thead>
<tr>
<th>Fluency improvement</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original (source text)</td>
<td>Scond, Menzied points that chinese ships in the 1400s used very distinctive anchors that were round stones with a hole in the middle.</td>
</tr>
<tr>
<td>Human editing</td>
<td>Second, Menzied points out that chinese ships in the 1400s used very distinctive anchors that were round stones with a hole in the middle.</td>
</tr>
<tr>
<td>Wordvice AI Proofreader</td>
<td>Second, Menzied points out that chinese ships in the 1400s used very distinctive anchors that were round stones with a hole in the middle.</td>
</tr>
<tr>
<td>Google Doc</td>
<td>Second, Menzied points out that chinese ships in the 1400s used very distinctive anchors that were round stones with a hole in the middle.</td>
</tr>
<tr>
<td>Microsoft Word</td>
<td>Second, Menzied points out that chinese ships in the 1400s used very distinctive anchors that were round stones with a hole in the middle.</td>
</tr>
</tbody>
</table>

Table 8. Comparative sentence example evaluating vocabulary improvement

<table>
<thead>
<tr>
<th>Vocabulary improvement</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original (source text)</td>
<td>Unfortunately in the most of the countries the functioning of the public transport is not perfectly organised.</td>
</tr>
<tr>
<td>Human editing</td>
<td>Unfortunately in most countries, public transport is not perfectly organised.</td>
</tr>
<tr>
<td>Wordvice AI Proofreader</td>
<td>Unfortunately, in most countries, the functioning of public transport is not completely organized.</td>
</tr>
<tr>
<td>Google Doc</td>
<td>Unfortunately in most of the countries the functioning of the public transport is not perfectly organised.</td>
</tr>
<tr>
<td>Microsoft Word</td>
<td>Unfortunately, in most of the countries the functioning of the public transport is not perfectly organized.</td>
</tr>
</tbody>
</table>

Table 9. Comparative sentence example evaluating determiner and article correction

<table>
<thead>
<tr>
<th>Determiner/article correction</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original (source text)</td>
<td>He said in other words that the more fluoride may create damage in human body, specifically the bone.</td>
</tr>
<tr>
<td>Human editing</td>
<td>He said, in other words, that the more fluoride may create damage to the human body, specifically the bones.</td>
</tr>
<tr>
<td>Wordvice AI Proofreader</td>
<td>He said, in other words, that the more fluoride may create damage to the human body, specifically the bones.</td>
</tr>
<tr>
<td>Google Doc</td>
<td>He said in other words that the more fluoride may create damage in the human body, specifically the bone.</td>
</tr>
<tr>
<td>Microsoft Word</td>
<td>He said in other words that the more fluoride may create damage in human body, specifically the bone.</td>
</tr>
</tbody>
</table>

changed the phrase “functioning of the public transport” to “public transport” to reduce wordiness (Table 8).

Similarly, Wordvice AI improved the clarity of the sentence by removing the unnecessary article “the” from the above-mentioned sentence. In addition, Wordvice AI was able to improve the clarity of sentences by inserting a comma and the word “completely,” neither of which revisions were made by human editing. Furthermore, neither Google Docs nor MS Word performed these or any additional revisions to the text.

Criteria 3. Determiner/article correction (objective errors)
In the grammar assessment, Wordvice AI exhibited the same level of performance as human editing. Table 9 shows that the objective errors identified and corrected by Wordvice AI were the same as those corrected by human editing. A comma is required before the phrase “in other words” to convey the correct meaning, but the comma is omitted in the original. Both the human edit and Wordvice AI edit detected the error and added a comma appropriately.

Additionally, the definite article “the” should be deleted from the original sentence because it is unnecessary in this usage, and both the human edit and Wordvice AI edit performed this revision correctly. Finally, because the human body is not composed of one bone, but multiple bones, the
term “bone” should be revised to “bones.” Both Wordvice AI and the human editor recognized this error and corrected it appropriately. However, Google Docs and MS Word did not detect or correct these errors.

Criteria 4. Spelling correction (objective errors)
The ability to recognize and correct misspellings was exhibited not only by Wordvice AI, but also by all the other proofreading methods we compared (Table 10). In this original sentence, the misspelled word “becasue” should be revised to “because,” and the misspelled word “abd’ should be revised to “and.” Each of the proofreading tools accurately recognized the corresponding spelling mistakes and corrected them.

Discussion

Key results: In terms of the accurately revised text, as evaluated by the GLEU metric, Wordvice AI exhibited the highest proofreading score compared to the other proofreading applications, identifying and correcting 77% of the human editor-corrected text. The Wordvice AI Proofreader scored an average of 12.8%P higher than both Google Doc and MS Word in terms of total errors corrected. The proofreading performance of Wordvice AI (variation of 5.4%) was more consistent in terms of percentage of errors corrected compared to MS Word (variation of 5.6%) but was slightly less consistent than Google Docs (variation of 5%). These results indicate that Wordvice AI Proofreader is more thorough than these other two proofreading tools in terms of the percentage of errors identified, though it does not edit stylistic or subjective issues as extensively as the human editor.

Additionally, Wordvice AI Proofreader exhibited consistent levels of proofreading among all academic subject areas evaluated in the GLEU comparison. Variability in editing performance among these subject areas was also relatively small, with only a 6.4%P difference between the lowest and highest average editing applied compared to the human proofreader. Both Google Docs and MS Word exhibited similar degrees of variability in performance throughout all subject areas. The highest percentage of appropriate corrections recorded for these automated writing evaluation proofreaders (Google Docs: medicine 73.5%) was still lower than Wordvice Proofreader’s lowest average (medicine 80.5%).

Interpretation: The Wordvice AI Proofreader identifies and corrects writing and language errors in any main academic domain. This tool could be especially useful for researchers writing manuscripts to check the accuracy of their writing in English before submitting their draft to a professional proofreader, who can provide additional stylistic editing and. NLP applications like the Wordvice AI Proofreader may exhibit greater accuracy in correcting objective errors than more widely-used applications like MS Word and Google Docs before the input text is derived primarily from academic writing samples. Similar AI proofreaders trained on academic texts (such as Trinka and Ginger) may also prove more useful for research authors than general proofreading tools such as Grammarly, Hemingway Editor, and Ginger, among others.

Suggestion of further studies: By training the software with more sample texts, the Wordvice AI Proofreader could potentially exhibit performance and accuracy levels even closer to those of human editors. However, due to the current output limits of NLP and AI, human editing by professional editors remains the most comprehensive and effective form of text revision, especially for authors of academic documents, which require the understanding of jargon and natural expressions in English.

Conclusion: In most of the texts analyzed, the Wordvice AI Proofreader performed at or near the level of the human edi-
tor, identifying similar errors and offering comparable suggestions in the majority of sample passages. The AI Proofreader also had higher performance and greater consistency than the other two proofreading applications evaluated. When used alongside professional editing and proofreading to ensure natural expressions and flow, Wordvice AI Proofreader has the potential to improve manuscript writing efficiency and help users to communicate more effectively with the global scientific community.

**Conflict of Interest**

The authors are employees of Wordvice. Except for that, no potential conflict of interest relevant to this article was reported.

**Funding**

The authors received no financial support for this study.

**Data Availability**

Dataset file is available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/KZ1MYX

**Dataset 1.** Eight hundred sentence pairs out of 1,501 from JHU Fluency-Extended GUG (JFLEG) open dataset, which were used for assessing improvements in textual fluency (https://github.com/keisks/jfleg).

**Dataset 2.** Four hundred forty-five sentences from eight academic domains, derived from Wordvice’s academic document data: arts and humanities, biosciences, business and economics, computer science and mathematics, engineering and technology, medicine, physical sciences, and social sciences.

**Dataset 3.** One thousand two hundred forty-five sentences composed of 800 JFLEG data and 445 academic sentence data edited by human editing experts.

**Dataset 4.** One thousand two hundred forty-five sentences composed of 800 JFLEG data and 445 academic sentence data edited by Wordvice AI.

**Dataset 5.** One thousand two hundred forty-five sentences sentences composed of 800 JFLEG data and 445 academic sentence data edited by MS-Word.

**Dataset 6.** One thousand two hundred forty-five sentences composed of 800 JFLEG data and 445 academic sentence data edited by Google Docs.

**References**

Computational Linguistics; 2007 Jun; Prague, Czech Republic. p. 344-51.


Role of academic publishers in 10 years: a perspective from the Chairman of Elsevier

Youngsuk Chi
Elsevier, New York, NY, USA

Introduction

While it is unfortunate that we are unable to come together in person, I believe that there is a silver lining in this coronavirus disease 2019 (COVID-19) pandemic for the global publishing industry. The pandemic has allowed us to pause and reflect on our recent progress so that we can accelerate into an exciting new era of scientific research and discovery.

I would like to sincerely congratulate you on the 10th anniversary of the Korean Council of Science Editors (KCSE). With its progress over the last decade, KCSE is making great strides in its mission to improve the quality of Korean scientific journals. I am confident that the recent partnership between KCSE and Elsevier on the Scopus Expert Content Selection & Advisory Committee-Korea (ECSAC-Korea) will spur even more developments in the decades to come [1]. In the last ten years since KCSE’s founding, the role of publishers has changed significantly to adapt to the evolving needs of the scientific community. So today, I would like to discuss how these roles have transformed and how these transformations will influence the future of our industry.

Transformation: The Role of Netflix

Before I dive into our discussion, I would like to talk about a company that arose from humble beginnings to redefine its roles and industry. I am sure that almost everyone has heard of Netflix, and binge-watched a couple of movies and TV shows on their platform during 2020’s lockdowns.

Well, Netflix was not always the popular movie-streaming platform it is today. The company began in 1997 as a simple DVD-delivery company. It did not create anything particularly groundbreaking; it simply cataloged and distributed films. From the start, however, its founders understood the importance of data. Co-founder Reed Hastings earned a master’s degree in artificial intelligence from Stanford University in 1988, talk about ahead of the curve. After their founding, Netflix launched a personalization algorithm that used member ratings to predict customers’ tastes and recommend new titles. Because of this remarkable customization system, Netflix’s subscriber count accelerated quickly, from 1.41 million in 2003 to 4.02 million in 2005 [2].
But they did not just stop there. They continued to innovate boldly and added online streaming to their subscription plans in 2007. By 2010, they had become the Netflix we know and love. Netflix expanded worldwide, and by 2016 it operated in 190 countries, including Korea. While growing, Netflix established a studio and began producing original content in many different languages, including award-winning TV shows like “Kingdom,” “Mr. Sunshine,” and “Hospital Playlist (슬기로운 의사생활)” (Fig. 1). To date, Netflix has made over 80 original Korean TV shows and films and plans to spend half a billion more dollars on Korean content this year alone. But even as Netflix expanded internationally, their data analysis capabilities remained the core of their business. Today, their personalization algorithm alone is worth 2 billion US dollars. But what does a movie company like Netflix have to do with publishing? Well, in just under a decade, Netflix defined a new role for itself by harnessing data analytics to change the way customers consumed and interacted with content. When Netflix switched to streaming, few of its competitors envisioned that it would be successful. But when combined with a deep understanding of data, their streaming model became the gold standard for media. Now, everyone follows Netflix’s lead, leaving the entire media and entertainment industry looking dramatically different than it did before.

**The Three New Roles of Publishers**

Much like Netflix, publishers have evolved into new roles centered around technology and development in the last decade, and in doing so, transformed the science, technology, and medicine (STM) industry. Today’s publishers do much more than just peer review, format, print, package, and sell authors’ work. Instead, we explore new publishing models to find better ways to meet customer needs and influence the trends that define STM. These trends include the new roles of publishers in social responsibility, research solutions and technology, and Open Science (Fig. 2). Together, they are the foundation upon which we will build the next decade of publishing!

**Social responsibility for sustainable development and gender and racial diversity**

The first trend I would like to discuss is how new roles in research have brought on more responsibility for publishers in society. For the modern publisher, social responsibility is interwoven into the company’s DNA. The last decade has demonstrated the importance of publishers as leaders in social issues, such as data ethics and the Inclusion and Diversity in research. Luckily, as the world grows more aware of these challenges, we as publishers have taken on new roles in ensuring that our content and practices are ethical.

Take the UN Sustainable Development Goals (SDGs), for example. Last year, dozens of publishers signed the SDG Publisher’s Compact, committing to 10 action points to accelerate progress on the 17 goals. These publishers are combining their unique insights with expertise from the research community to drive innovation. Already, some publishers have taken concrete steps to achieve these goals, too. At Elsevier, we renewed our commitment to the SDGs in July by signing the Climate Pledge. In addition to internal changes like reducing business travel, we have created new journals focused on climate action, such as *One Earth* from Cell Press and *Lancet Planetary Health* (Fig. 3). We even mapped each of our journals’ progress towards the SDGs they support. These actions show that publishers use their unique insights to lead concerted efforts.
to combat our world’s biggest problems. This new role in social responsibility also includes an examination of Inclusion and Diversity, both within the publishing industry and academic research fields.

Diversity in research is especially crucial, and excluding researchers can have dire real-life consequences. For example, a study in Britain found that women were 50% more likely to be misdiagnosed following a heart attack, largely because most clinical trials use male participants.

Publishers have taken important steps to improve gender and racial diversity in response to these issues. Elsevier’s gender reports benchmark progress and identify systemic barriers to equality. All our journals have published gender goals measured by discipline benchmarks. We also use our advanced data capabilities to combat gender inequality through programs like SHE figures and MINDtheGEPs (Modifying Institutions by Developing Gender Equality Plans) (Fig. 4).

A global commitment to social responsibility will fuel the next great innovations and breakthroughs in our industry and the entire scientific community. And while we have made a lot of progress, there is still a long way to go. As UN Secretary-General Antonio Guterres warned in 2019, no country is on track to meet the SDG goal of gender equality [3]. His prediction is especially relevant in Korea. While women in science, technology, engineering, and mathematics research & development increased significantly over the last decade, 181,972 out of 718,759 (25.3%) of R&D personnel in Korea were women in 2019 [4]. Luckily, one of the beauties of the publishing world is that we can amplify other voices and bring important regional or social issues into the global spotlight. So, let’s keep striving towards this new and exciting role in the next decade.

Solutions in publishing technologies built on AI, machine learning, and data
Our second trend, the growing role of technology in publishing solutions, builds on the foundation of ethics and social responsibility. The last decade of STM publishing has seen unprecedented data-driven insights and research workflows. Technologies built on AI, machine learning, and data will be used to increase publication and make publishing better.
Let me share with you an analogy from Elsevier to explain what I mean. When Elsevier first started in the print environment, we were like farmers. We would produce journals and “harvest” information without knowing how our products were used. In the 1990s, at the start of the internet era, Elsevier evolved into a supermarket. When we adopted electronic distribution, we consolidated everything we had farmed into one place, where library and researcher customers could pick out exactly what they needed. But the key to our success in the last decade is that we did not just stop at electronic content.

Now, we have become a restaurant serving artificial intelligence and machine learning-powered solutions. We work directly with our customers to create “recipes” catered to their unique wants and needs, using artificial intelligence and machine learning as our key ingredients. The content volume is only increasing in today’s market, making our analytical insights even more important for streamlining the research process.

At Elsevier, the focus on workflows has taken several different paths. We have tools like Mendeley (https://www.mendeley.com/) that help connect researchers with relevant papers based on what they are researching. Our Pure tool (https://www.elsevier.com/solutions/pure) works with researchers to improve decision-making, data, and functionality in all project areas. And we have also developed an ‘Article Recommender’ [5] to help researchers connect with the essential information they might not have otherwise discovered. Offering analytical tools like these demonstrates the evolution of publishers’ roles, from research facilitators to initiators of insights. And our new role in technology is only made possible by our commitment to ethics and social responsibility, which helps us solve the problems that arise with new technologies.

The emergence of data-centered technology and widespread information sharing has spurred greater oversight of responsible companies. Every industry has had to deal with new issues relating to technology. Netflix, for example, had to grapple with the privacy implications of storing massive user data needed for their algorithm. The STM industry has also had to deal with new challenges arising from advancing technology. Dishonest publications can use artificial intelligence and machine learning for citation hacking and article generation, often evident through “tortured phrases.” These trends could threaten the credibility of research and the journals that publish them.

Ethical publishing, then, means changing both how research is verified and how it is measured. Publishers that already had ethics in their DNA have thrived. Elsevier has invested in software and tools to uphold ethical publication standards and combat fraud. Furthermore, our International Center for the Study of Research (https://www.elsevier.com/icsr) develops new methods to advance research evaluation. Its outcomes support the responsible use of metrics and help develop best practices in research assessment and research impact. Just as Netflix turned to data analytics to enhance and customize their content, the future growth of publishers relies on the new ways to apply artificial intelligence solutions and technological tools to research workflows and publishing processes.

Open Science
The last major change in the last decade has been our new role in Open Science, a broad term for publicly accessible re-
search findings and outputs. Open Science is one way to ensure equitable access to research, data, and innovation. Open Science presents innovations in publishing, just as Netflix’s online streaming services did for media and entertainment. Similar to how Netflix adopted a new way of delivering content to its customers, publishers and researchers alike are turning to diverse publishing methods for research access. Open Science is an even more complex innovation than Netflix since Open Science research published in one country benefits the global information economy.

Open access, one of the many branches of Open Science, has become increasingly popular in the last decade. As publishers, we have embraced open access, highlighted by transformative agreements. Even though we do not favor any particular publishing model, we at Elsevier are committed to enabling researchers to meet their goals, including their open access objectives. We believe that every researcher has a fundamental right to validate their work through peer review and publish it in a way that works for them. We are one of the fastest-growing open access publishers. Just look at the data: last year, we published 84,000 gold open access articles, up from just under 12,000 in 2011 (Fig. 5) (Suppl. 1). Elsevier alone has 17 commercial agreements, and over 20% of our journals are now fully gold open access—all the others allow open access publications when desired.

Elsevier is committed to working closely with Korean journals to extend Open Science opportunities. After a decade of rapid growth, Korea is already a world leader in open access. In the Scopus database, open access documents from Korea were published by 24.3% in 2011 and 47.8% in 2021 (Fig. 6) (Suppl. 2). We signed a Transformative Agreement with the National Research Council of Science and Technology of Korea in 2019 to help support these trends. With collaborations like these, Korea will continue its rapid progress in open access and Open Science. However, in the same way that movies are just one part of Netflix’s diverse offering, Open access is just one small slice of the greater Open Science pie (Fig. 7).

In addition to open access, Open Science also includes open data, open metrics, open software and hardware, open protocols, and many more. Open Science aims to support trust and reproducibility in research outcomes and encourage the reuse of data for a more comprehensive analysis. So as you can see, Open Science will be a global, impactful, and unprecedented movement that truly maximizes research discoverability, transparency, and collaboration.

At Elsevier, Open Science forms part of our commitment to ensuring credible, high-quality research for our trusted partners. For example, we are helping develop research in low-income countries through Research4Life (https://www.research4life.org/) by providing the content and publishing solutions they need. This devotion is all part of our commitment to make the most significant difference in a sustainable way. We even offer free access to relevant research for health emergencies, most notably during the COVID-19 pandemic. Our Novel Coronavirus Information Center (https://www.elsevier.com/connect/coronavirus-information-center) harnessed the power of Open Science to help researchers make the timely breakthroughs that have helped fight this pandemic.

While the relationships between researchers and publishers are becoming more diverse, the fundamental support that publishers provide institutions and researchers has not changed. All parts of Open Science articles are evaluated along with the same measures of robustness, impact, novelty, and integrity as every article we publish. We never compromise on quality, but in embracing Open Science, we are building a more collaborative, inclusive, and transparent world of research. Going for-

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>900,000</td>
</tr>
<tr>
<td>2012</td>
<td>800,000</td>
</tr>
<tr>
<td>2013</td>
<td>700,000</td>
</tr>
<tr>
<td>2014</td>
<td>600,000</td>
</tr>
<tr>
<td>2015</td>
<td>500,000</td>
</tr>
<tr>
<td>2016</td>
<td>400,000</td>
</tr>
<tr>
<td>2017</td>
<td>300,000</td>
</tr>
<tr>
<td>2018</td>
<td>200,000</td>
</tr>
<tr>
<td>2019</td>
<td>100,000</td>
</tr>
<tr>
<td>2020</td>
<td>0</td>
</tr>
</tbody>
</table>

Fig. 5. Number of gold open access documents in the Scopus database according to year [cited 2021 Sep 8] (Suppl. 1).
ward, authors, researchers, and their institutions will be able to share knowledge and build on each other's work faster and more easily than ever before. Just as Netflix reinvented itself first as a revolutionary online streaming platform, then as a world leader in original storytelling, the publishing industry continues to evolve. We have made great strides leading the world in social responsibility, enhancing research through technological advancements, and pioneering new models of Open Science.

Conclusion

These trends have shaped the last decade of publishing, motivating us all to create the high-quality work that drives progress. But these three trends will also be the building blocks of innovation in the decades to come. I firmly believe that KCSE will continue its great progress in raising the international prestige of Korean journals. Elsevier is committed to supporting South Korean researchers as a valued partner for ECSAC-Korea. Continued international collaboration like this will increase the profile of Korea's journals while ensuring they maintain the utmost quality. So, let's continue to work together to build on the advancements of the last decade so that we will have even more to celebrate at KCSE's 20th anniversary.

Conflict of Interest

Youngsuk Chi has been the chairman of Elsevier since December 2009. He has no financial interest with Netflix mentioned as an innovative company. No other potential conflict of interest relevant to this article was reported.

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Supplementary Material

Supplementary files are available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/SK8K5B

Suppl. 1. Number of gold open access documents in the Scopus database according to year

Suppl. 2. Number of open access documents and non-open access documents from South Korea in the Scopus database according to year

References


Fig. 6. Number of open access documents and non-open access documents from South Korea in the Scopus database according to year [cited 2021 Sep 8] (Suppl. 2).

Fig. 7. Open science pie including open access, open data, open metrics, research integrity and reproducibility, science and society, and open tools and softwares.
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Role of Crossref in journal publishing over the next decade

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Introduction

Global cooperation to improve scholarly research is critical, so it is great to have this opportunity to share information here. I do note that Crossref is very well represented and supported in Korea. We are delighted to have the Korean Council of science Editors as a Crossref member. Moreover, we have had the organization's support for many years. It is also significant that Kihong Kim has served on the Crossref board of directors since March 2021 [1]. In addition, Jae Hwa Chang has been a Crossref ambassador [2] since January 2018. I will be talking about Crossref’s role in journal publishing and some of the things we are looking forward to over the next decade.

Overview of Crossref

First of all, I want to give a quick overview of Crossref, what we do, and our current status. Crossref is a not-for-profit membership organization with the goal of making research outputs easy to find, cite, link, assesses, and reuse. The leading service that Crossref provides is a registry of metadata for scholarly content to enable reference linking. The metadata includes persistent identifiers, also referred to as PIDs for short. The persistent identifiers we assign are digital object identifiers (DOIs). Crossref DOIs are citation identifiers for scholarly content including grants, preprints, articles, chapters, proceedings, standards, reports, protocols, dissertations, reviews, comments (conferences, video, blogs soon). The majority of our content is scholarly journals, although that is changing. However, one of the things that has been changing, and will be changing even more over the next few years, is moving beyond a focus on getting persistent identifiers, and recognizing the larger value of metadata, and services to disseminate and reuse the metadata.

Some publishers come to Crossref and think that getting a DOI is the most important thing they need to do. They might see Crossref as a seller of DOIs. The DOI is important and part of the foundation of many of Crossref’s services, but it is not the most important thing that Crossref provides. We now regularly emphasize that Crossref is an open foundational infrastructure [3,4]. This means that our metadata is made available in a persistent, sustainable, open way and that others build on it and incorporate it into their services. So over the next ten
years, it is vital to have good quality metadata registered with Crossref. What is good quality metadata in the Crossref context? It is all about relationships and other identifiers in that metadata. This enables Crossref and others to connect many different content types and see how they relate to one another and the broader scholarly research ecosystem—we refer to this as the ‘research nexus.’ ‘Nexus’ is not a very common English word, but it is about a set of connections, a set of relationships.

**PIDs and Metadata Connections and Services**

To build the research nexus, Crossref is capturing the connections between authors, funding, funders, universities and research institutions, data, and publications—journals, journal articles, books, book chapters, conference proceedings articles, preprints, and other types of content. So I would like to show where things are now in terms of Crossref statistics. We have metadata for 126 million scholarly content items representing 10% growth from the middle of 2020 to 2021 (Table 1). As a result of the pandemic, we have seen an increase in the amount of content being published and registered with Crossref.

The number of journal articles has gone up 7.7% and that of books, 9.9%. A 64.8% increase to over 700,000 in preprints has been a big trend, and that trend is going to be continuing. In most cases, preprints are connected in the metadata to the published version of record related to the preprint. Making sure we reliably capture the preprint to version of record links is something we are working on improving. We have ORCID IDs to identify authors uniquely. That has been growing quite a lot, and readers can see also that we are collecting references and making those references openly available, and now abstracts have increased. This all helps fill in the research nexus and capture the scholarly record.

For journals, it is about more and better metadata going forward and registering it with Crossref. Korea is one of fastest-growing countries in terms of Crossref membership, although Indonesia was the fastest in 2020. Crossref started out being very focused on North America and Europe. However, now it is global, with many members in Asia and many other parts of the world. I will talk about our strategic goals for the next few years.

**New Public Roadmap**

We happily put out our first public roadmap; it is a Trello board and available openly on our website (https://bit.ly/crossref-roadmap) (Fig. 1). We have many things in progress, and the roadmap covers what Crossref will be doing over the next year or two years if anyone wants to see more detail. But, I wanted to talk now about looking forward to over the next ten years. Two of the big things I want to talk about, are principles of open scholarly infrastructure and come back to the re-

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**Table 1. Growth rate of the registered identifiers in Crossref from June 2020 to June 2021**

<table>
<thead>
<tr>
<th>Content</th>
<th>As of June 2020</th>
<th>As of June 2021</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total content items registered</td>
<td>114,895,544</td>
<td>126,512,688</td>
<td>10.1</td>
</tr>
<tr>
<td>No. of journals</td>
<td>79,771</td>
<td>92,347</td>
<td>15.8</td>
</tr>
<tr>
<td>No. of journal articles</td>
<td>82,272,390</td>
<td>88,596,671</td>
<td>7.7</td>
</tr>
<tr>
<td>No. of books</td>
<td>1,458,072</td>
<td>1,602,245</td>
<td>9.9</td>
</tr>
<tr>
<td>No. of book-related records</td>
<td>17,351,895</td>
<td>19,985,430</td>
<td>15.2</td>
</tr>
<tr>
<td>No. of conference proceedings</td>
<td>73,022</td>
<td>80,632</td>
<td>10.4</td>
</tr>
<tr>
<td>No. of conference papers</td>
<td>6,404,251</td>
<td>6,901,078</td>
<td>7.8</td>
</tr>
<tr>
<td>No. of preprints</td>
<td>429,210</td>
<td>707,546</td>
<td>65.0</td>
</tr>
<tr>
<td>No. of preprint-to-article links</td>
<td>95,231</td>
<td>141,827</td>
<td>48.9</td>
</tr>
<tr>
<td>No. of unique records with Funder IDs</td>
<td>4,025,618</td>
<td>5,295,718</td>
<td>32.0</td>
</tr>
<tr>
<td>Records with one or more authors with ORCID IDs</td>
<td>4,324,091</td>
<td>6,402,765</td>
<td>48.0</td>
</tr>
<tr>
<td>Total works auto-pushed to ORCID</td>
<td>3,863,327</td>
<td>6,695,714</td>
<td>73.0</td>
</tr>
<tr>
<td>Records with references</td>
<td>50,950,476</td>
<td>55,786,727</td>
<td>10.0</td>
</tr>
<tr>
<td>Members registering references</td>
<td>5,759</td>
<td>6,979</td>
<td>21.0</td>
</tr>
<tr>
<td>Members with open references</td>
<td>2,616</td>
<td>3,825</td>
<td>46.0</td>
</tr>
<tr>
<td>Records with abstracts</td>
<td>6,392,159</td>
<td>11,714,465</td>
<td>83.0</td>
</tr>
<tr>
<td>Members registering abstracts</td>
<td>5,543</td>
<td>10,737</td>
<td>94.0</td>
</tr>
</tbody>
</table>
search nexus that I was talking about before. Going forward, it is all about untangling complexity. By working with the whole community and our member publishers, Crossref wants to help untangle some of this complexity and highlight critical issues for journals over the next ten years.

**Key Issues for Journals from 2021 to 2031**

The key issues for journals are trust, integrity, and transparency. Good quality metadata helps people make their own assessments about how trustworthy content is and enables journals to demonstrate how they ensure that content is high quality. In terms of transparency, for instance, publishing peer review reports demonstrates that peer review was done and what the outcome was. Metadata is critical going forward particularly in demonstrating that funder and institutional mandates have been adhere to. There are many exciting developments. Preprints have grown in importance—but, it is important the preprint metadata includes a link to the version of record—and the version of record needs to link back to the preprint. I haven not mentioned machine learning and artificial intelligence (AI), but these will have significant impacts as well. For example, detecting image duplication and manipulation is becoming more important.

**Principles of Open Scholarly Infrastructure**

Rather than talk about the technology changes, I am going to focus on a couple of key areas of the principles of open scholarly infrastructure. Crossref is moving beyond talking exclusively about persistent identifiers, which are important but are only part of the equation. Crossref has adopted a set of principles and best practices and is working with other organizations to adopt and generate a discussion about how open scholarly infrastructure organizations and projects should operate. There is a class of open foundational scholarly infrastructure, for example, Crossref, DataCite and ORCID, and we think it is essential to be clear about how we operate and what our principles are. Thus, we feel that these principles are taking us forward and important to making our vision become a reality within the next ten years. We want a rich and reusable network of relationships, captured in metadata, connecting research organizations, people, and actions. A scholarly record should be built on forever for the benefit of society. To be clear, Crossref is open and nonprofit, but many commercial services build on and incorporate Crossref metadata into their services. Commercial services are valuable but the open infrastructure should be non-profit. We need an open layer to enable many different services. Therefore, we want to capture more information about research activities and out-

Fig. 1. Screenshot of Crossref’s Trello on the Crossref roadmap. Source: https://bit.ly/crossref-roadmap.
puts, and organizations, and we want them to all have persistent identifiers and open, standardized metadata that is available through human and machine interfaces, and we think that the principles of open scholarly infrastructure help achieve this. There are 16 principles and best practices divided into a couple of different areas. We think it is essential that there are open, sustainable services that open research is based upon.

Fig. 2. Seven organizations who have adopted the principles of open scholarly infrastructure: Crossref, DataCite, OpenCitations, OurResearch, Journal of Open Source Software Blog, Dryad, and ROR (Research Organization Registry).

Fig. 3. Research nexus that links a variety of formats of articles. Source: https://www.crossref.org/blog/the-research-nexus-better-research-through-better-metadata/.

Fig. 4. Crossref’s metdata APIs. Source: https://www.crossref.org/services/metadata-retrieval/.
going forward. We have had seven organizations (Fig. 2) now who have adopted these principles, and we are hoping to have more, and we are in discussions with other organizations about it. It has been going well, and there will be more happening about this over the next few years.

**Research Nexus**

So I do also now want to come back to the research nexus. Metadata helps journals deal with critical issues such as data reproducibility, research and editorial integrity, reporting, and assessment. Journal articles are connected to lots of other things, and there are many other research outputs, and we want to link it all up. Video, data, software, preprints, and protocols all need to be identified; they are part of the scholarly record (Fig. 3). We are going to be working to help capture that information, and it does mean that journals and organizations that publish the journals need to have metadata and persistent identifiers. We are very interested in encouraging that and making sure this happens because, of course, it improves scholarly research and benefits society. We have this chart that shows the different aspects of the scholarly ecosystem (Fig. 4).

Crossref is working to go beyond basic bibliographic metadata. We have added funding and licensing information and this helps determine if something is open access or whether it meets a mandate from a funder or institution. We have full-text URLs for Text and Data Mining and offer Similarity Check, a service for screening manuscripts for possible plagiarism and we track updates, corrections and retractions through Crossmark. Most recently, we added grant identifiers and funders are joining Crossref to register grants with us. We also work with DataCite and the California Digital Library on ROR (Research Organization Registry), which provides persistent identifiers for scholarly organizations.

**Conclusion**

We are asking our members, our publishers, which includes journals, to collect a lot of information, and we are developing tools to help that happen. Crossref was originally set up to make reference linking between journals easier but we have grown into an open, enabling infrastructure connecting many different stakeholders to enable open research. This will accelerate over the next 10 years. We want an integrated, efficient, sustainable, comprehensive open scholarly infrastructure. All research outputs and activities should be identified and connected with metadata expressing these relationships and making them available through the machine and human interfaces. The ultimate goal is to help researchers focus on their research and advance human knowledge.

**Conflict of Interest**

Ed Pentz has been an Executive Director of Crossref since 2000. No other potential conflict of interest relevant to this article was reported.

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**References**

Diplomacy in six patterns of reviewers’ queries during manuscript revision in scholarly publishing

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Introduction

Background: More often than expected or desired, manuscripts submitted to scientific journals are returned to their authors with the decision “accept after revision” or “revise and resubmit.” Obviously, the rate of “revise and resubmit” decisions varies greatly between journals: 25% for some [1], but 50% for others [2]. A number of observers have estimated that the actual rate might be much higher, but accurate, documented, and reliable statistics are lacking because of the unknown rate of false new submissions that previously received “revise and resubmit” decisions [3]. Regardless, as previous pointed out, “the probability of a ‘revise and resubmit’ decision is strongly increasing in the recommendation of any one referee” [4], most likely because “revise and resubmit” decisions help editors delay resolutions of tough cases [3].

The “revise and resubmit” decision upsets most authors because they feel they have to re-open old files and have discussions with unseen meticulous reviewers and editors about unexpected issues regarding a manuscript written months ago. Unless guided by experienced authors, beginners often give in to panic because they feel unable to satisfy all reviewers’ requests in the “point-by-point” manner required. They might have read the following by Klingner et al. [5]: “For a ‘revise and resubmit’ decision to become an acceptance, the revisions must respond constructively to the reviewers’ concerns (…). The most certain way to move from the ‘accept with revision’ category to ‘accept’ is to make each and every revision requested and then detail how you addressed those revisions in a cover letter that accompanies the resubmission” [5]. These are certainly wise recommendations and ideal solutions. Nevertheless, because this project appears to be huge, authors might rapidly choose to submit the very same manuscript to another journal in the hope of skipping difficult, unpleasant, or time-consuming tasks, although they know this is never guaranteed; on the contrary, new reviews may come with harsher comments.

Objective: This essay aims to help authors deal diplomatically with six of the most difficult reviewers’ queries.
The Decision to Revise Is Made

Let us now consider the case where the authors decide to revise their manuscript in accordance with the reviewers’ wishes to avoid another lengthy round of peer review and give their manuscript a chance of acceptance in the initial target journal. In that case, most writers who have addressed this topic agree that the authors will have to respond to three categories of reviewers’ queries: minor amendments, major revisions, and additional material. Minor amendments and short additions to a manuscript are not problems; they may be made with little effort and within a reasonable amount of time. In my opinion, the major problems stem from three types of comments (ambiguous, contradictory between reviewers, and irrelevant to the topic) and three types of requests for additional material (checks for unlikely sources of bias, pushing the work further, and performing the whole work again on the basis of other hypotheses or with other methods). Fortunately, Klingner et al. [5] added, “You do not necessarily have to make every change suggested.”

In 2012, Shaw [6], a previous editor of The Academy of Management Journal, wrote, “The initial submission of a manuscript begins a conversation with reviewers (…). The key, then, is to keep the conversation flowing.” Thus, as in any serious and peaceful conversation, diplomacy counts.

Six Patterns of Reviewers’ Queries and Authors’ Diplomatic Responses

Here are six examples of when and how diplomacy may prevent conflicts of ideas and rigid positions, instead facilitating concessions and solutions.

Ambiguous comments

It is certainly puzzling and irritating to read a comment repeatedly without understanding its exact meaning or intention and feel unable to provide an answer. Here, avoid unnecessary stress. Let a colleague read and try to interpret the comment. In most cases, your colleague might find a plausible explanation. If this manoeuvre fails, refrain from answering: “I/We did not understand that point.” That answer is often sincere but not diplomatic. If sufficient time is available, you may discuss the point with the editor or the associate editor, who would reach out to the reviewer and then get back in touch with you [7]. If a clear answer is not obtained, a helpful strategy is to address the reviewer’s comment like: “If you mean X, then…; but, if you mean Y, then…” This demonstrates that you (the authors) have made an effort.

Contradictory comments between reviewers

This is also bewildering because the authors cannot satisfy two or more reviewers with contradictory answers. Here too, the above referral to the editor remains a valid option [8]. Regardless, an essential point of diplomacy is never to tell a reviewer about the opposite position of another reviewer regarding a specific point. The contrary is objectively and fully logical and, above all, a convenient or expedient easy answer—but definitely not a diplomatic one. Here, instead of exposing the opposition, it is better for the authors to search for and focus on the respective advantages of each position. The answer to each reviewer may come this way: “You pointed out that (…); however, one advantage of our position is that…” or “One opinion is that (…), but we believe that… because…” (see other interesting suggestions in [9]).

Comments irrelevant to the topic

This is an annoying situation because, though the authors may refer to the editor, the latter might not be of great help and the authors still have to answer the reviewer’s comment. In most cases, assuming the manuscript is well written, the reviewer’s position might stem either from a quick reading of part of the manuscript or from an erroneous understanding or interpretation of a given section. Here, the authors should refrain from suggesting that the reviewer paid insufficient attention to the manuscript or inviting the reviewer to read again or more carefully the section under debate, but instead could make an effort to reformulate or enrich the whole idea or paragraph. Thus, the authors may answer: “To clarify the point, we have rewritten the whole paragraph as follows: …”

Checks for unlikely sources of biases

This is undoubtedly an unpleasant query. The authors are confident in the theoretical foundations and/or model design and appropriateness and have already considered a sufficient number of sources of bias. Still, the authors are asked for more checks that feel useless. Here, diplomacy calls for…patience. Reexamine the theory and the model-building conditions and ask for the opinions of peers or external experts [10]. If something may be added to reassure the reviewer (more theory, more references, more calculations), then add it. Otherwise, take more time and place to present and support tactfully the authors’ arguments without being dogmatic. This is somewhat time-consuming but should not be very demanding.

Further developments of the authors’ analyses

Here too, consider seriously the relevance of the required developments with regard to the authors’ chosen objective. If the authors sincerely feel that these developments would unnecessarily lengthen or complicate the manuscript, then express
this response politely. Today, most journals limit the length of submitted manuscripts and insist that authors avoid dealing with several objectives within a single manuscript. Make these conditions the authors’ main argument (“These developments are not within the scope of the current study…”) and promise sincerely to deal with the required developments in future manuscripts in the same research field (“...these developments are underway and will be the object of future publications”).

Redo the work on other hypotheses or with other methods
This is something that most, if not all, authors would fiercely refuse, and for good reason—the submitted manuscript reflects the investment of time, money, and moral resources that would be difficult to repeat. If the authors feel that the query stems from a complete ignorance of the subject, that its sole reason might be the satisfaction of a reviewer’s curiosity, or is abuse or vexation from an ill-intentioned opponent, then the authors may be “hard on the issue and soft on the person” [11]. Take two steps: first, answer by politely saying that the suggested hypothesis or method was not within your initial motives or foundations for carrying out the study; and second, discuss the issue separately with the editor [8,10]. Otherwise, inform the editor that the authors have decided to retract the submission because of a fundamental disagreement with one of the reviewers. It is very unlikely that the same query will come from another reviewer.

The Editor’s Role in Handling Reviewers’ Comments
Finally, remember that “You do not necessarily have to make every change suggested” [5,12,13] and that “Referees are not gods (…)”. You are always entitled to disagree with a referee’s criticism and not do what they suggest. In such cases though (…) make at least a token improvement to a criticized passage (…) to show that you have taken the criticism into account” [14]. In fact, editors do not always send back the revised manuscripts and the answers to the comments to the reviewers; instead, they might examine the revisions themselves and decide on the appropriateness of the amendments and the adequacy of the revised manuscript for the journal. Concurrently, serious reviewers that consider their task as a contribution to science would not put authors in any kind of dead-end but show they are keen to ensure some degree of completeness because perfection does not exist.

There were two opinions on “revise and resubmit.” Shaw [6] said, “The draft of responding to reviewers effectively takes practice. It takes a great deal of effort, some creativity, and importantly, also the right attitude (…). What is important is that authors carefully manage the disagreement.” Liu [10] wrote, “I frame the process of ‘revise and resubmit’ as an integrative negotiation where the authors collaborate with the reviewers and editors to reach a mutually agreeable outcome—a publishable manuscript (…). In most cases, the editorial review process involves a combination of complying with and persuading the reviewers and editors. I propose that we can apply strategies for integrative negotiation in the revision process to clarify and satisfy the needs of all parties—authors, reviewers, and editors—yielding a final version of the manuscript that represents an outcome better than any individual party’s single contribution (…). Negotiation research teaches us that the combination of an open mind, cooperative spirit, optimism, and gratitude for the value added by others, results not only in tangible benefits for the manuscript itself, but also in profound learning experiences.” [10].

Conclusion
Often, the answer to a scientific manuscript submission by an editorial office is “revise and resubmit.” This decision is sometimes based on reviewers’ comments that require difficult or long work and some other times on unnecessary, conflicting, or even irrelevant demands for extra material. The authors might then feel trapped and unable to provide convenient “point-by-point” answers to all reviewers’ comments. Six patterns of reviewers’ queries and authors’ responses are presented in this essay. According to the above responses, carrying out an “integrative negotiation,” showing “creativity,” having the “right attitude,” and “managing the disagreement” are components of diplomacy when handling these situations.

Conflict of Interest
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Increased number of Scopus articles from Indonesia from 1945 to 2020, an analysis of international collaboration, and a comparison with other ASEAN countries from 2016 to 2020

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Introduction

Background: The government of the Republic of Indonesia has set a target for the international publication of 31,159 papers in 2024, according to the 2020–2024 National Medium-Term Development Plan [1], since international publications are acknowledged as an indicator of increased productivity and competitiveness in the field of science and technology. In addition, in the 2017–2045 National Research Master Plan, the Indonesian government has set a productivity target for 2,045 of 22 reputable international scientific publications for every 100 science and technology human resources [2]. Thus, the Indonesian government has implemented reputable international scientific publications as an output indicator for this policy.

This choice was based on the consideration that an increasing number of reputable international scientific publications reflects the ability to create science and technology-based inventions as the upstream facilitators of innovative products with high economic value. This view is also in accordance with previous research results pointing out that the “Circular No. 08” policy in Vietnam has played an essential role in accelerating the productivity of scientists in the country by generating an increasing number of international publications [3]. In addition, the formation of international collaborations in Iran has been acknowledged based on its international publications [4].

Objectives: This essay aimed to explore the research output of Indonesian researchers in international publications from 1945 to 2020, with a particular focus on international collaborations of Indonesian authors. A comparison was also conducted using data from five other Association of Southeast Asian Nations (ASEAN) countries (Singapore, Malaysia, Thailand, the Philippines, and Vietnam) from 2016 to 2020.
Data Sources and Queries

This study utilized data from the Scopus database, accessed on November 25, 2021. Furthermore, to enrich the analysis, comparisons were conducted with data from Singapore, Malaysia, Thailand, the Philippines, and Vietnam. To identify research output from a country, the following query was used (with Indonesia as an example): (AFFILCOUNTRY(“Indonesia”) AND PUBYEAR > 2015 AND PUBYEAR < 2021) (Suppl. 1). Raw data from the search are available in Dataset 1.

International publication trends from Indonesia from 1945 to 2020

The search results demonstrated that authors with Indonesian affiliations since independence (1945) have generated 217,974 publications in Scopus (Fig. 1), comprising 160 publication sources. Since 2005, Indonesia’s international publications have annually experienced significant increases of 10% to 40% on average. Of particular note, 2020 had 50,868 publications, reflecting a dramatic increase from the previous year (2015), which had 8,577 publications. Indonesia recorded a significant increase in international publications in the 2016 to 2020 period, with 167,707 publications, corresponding to 584% increase compared to the previous 5-year period (2011–2015), which had 28,703 publications.

An analysis according to the subject area found that engineering was the field in which researchers with Indonesian affiliations were most prolific during 1945 to 2020, with 55,604 publications (Fig. 2), followed by physics and astronomy (38,936 publications), computer science (36,228 publications), environmental science (34,999 publications) and social sciences (26,067 publications).

The distribution of the subject areas of international publications from Indonesia was analyzed (Table 1). The early period (1945–1964) was dominated by publications in fields including agricultural and biological sciences, chemistry, and medicine. In particular, medicine dominated Indonesian international publications in 2005 to 2020. This finding indicates that areas such as medicine, agricultural and biological sciences, engineering, and physics and astronomy have become the focus of Indonesian researchers’ attention from independence to the present day. The social sciences have also received considerable attention, as shown by their presence among the top five fields of Indonesian international publications in the periods of 1965 to 1994 and 2005 to 2014. Throughout 1945 to 2020, authors from Indonesia have collaborated with authors from 159 countries. The top 10 collaborating countries (Fig. 3) were predominated by Asian countries (Japan, Malaysia, Thailand, and South Korea). Indonesian authors have most frequently collaborated in publishing international scientific articles with authors from Japan (12,902 articles), Malaysia (11,363 articles), and Australia (8,021 articles).

Indonesia in comparison with other ASEAN countries

In comparison with other ASEAN countries (Singapore, Ma-
Malaysia, Thailand, the Philippines, and Vietnam), Indonesia showed a striking trend of increasing publications in the 2016 to 2020 period. In 2019 and 2020, Indonesia led ASEAN countries in the number of publications (Fig. 4).

When comparing the subject areas of Indonesia’s international publications to the other five ASEAN countries (Table 2), it was noted that the engineering field predominated among publications from Indonesia in the 2016 to 2020 period, as well as in Malaysia, Singapore, Vietnam, and the Philippines. Meanwhile, in Thailand during that period, the subject area of medicine was predominant and engineering ranked in second place. Thus, these findings indicate that in the 2016 to 2020 period, researchers in these six ASEAN countries published more papers in the engineering field than in other subjects.

Japan, Australia, the USA, and the UK were the most com-
mon collaborating countries for the publication of international scientific articles with researchers from the six ASEAN countries, including Indonesia (Table 3). The USA was the most common country of collaboration with authors from Vietnam, Thailand, and the Philippines. Meanwhile, authors from Indonesia mainly collaborated with authors from Malaysia and Japan. Authors from Singapore mainly collaborated with authors from China and the USA. Furthermore, authors with Malaysian affiliations also tended to collaborate with authors from the UK and Australia.

The number of Indonesian authors collaborating with authors from Japan in the 2016-2020 period was relatively reasonable, as indicated by the funding sponsorship for published articles, many of which reported receiving funding.

![Fig. 3. Top 10 collaborating countries with Indonesian authors from 1945 to 2020.](image1)

![Fig. 4. Comparison of Indonesia’s international publications with those of other ASEAN (Association of Southeast Asian Nations) countries from 2016 to 2020.](image2)
Table 2. Top 10 subject areas of Indonesian international publications compared to those of other ASEAN countries from 2016 to 2020

<table>
<thead>
<tr>
<th>Rank</th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Vietnam</th>
<th>Thailand</th>
<th>Philippines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Engineering</td>
<td>Medicine</td>
<td>Engineering</td>
</tr>
<tr>
<td>2</td>
<td>Physics and astronomy</td>
<td>Computer science</td>
<td>Medicine</td>
<td>Computer science</td>
<td>Engineering</td>
<td>Computer science</td>
</tr>
<tr>
<td>3</td>
<td>Environmental</td>
<td>Materials science</td>
<td>Computer science</td>
<td>Physics and astronomy</td>
<td>Science</td>
<td>Medicine</td>
</tr>
<tr>
<td>4</td>
<td>Computer science</td>
<td>Physics and astronomy</td>
<td>Materials science</td>
<td>Mathematics</td>
<td>Agricultural and biological sciences</td>
<td>Social sciences</td>
</tr>
<tr>
<td>5</td>
<td>Earth and planetary sciences</td>
<td>Medicine</td>
<td>Physics and astronomy</td>
<td>Materials science</td>
<td>Materials science</td>
<td>Agricultural and biological sciences</td>
</tr>
<tr>
<td>6</td>
<td>Social sciences</td>
<td>Environmental science</td>
<td>Biochemistry, genetics and molecular biology</td>
<td>Medicine</td>
<td>Biochemistry, genetics and molecular biology</td>
<td>Environmental science</td>
</tr>
<tr>
<td>7</td>
<td>Materials science</td>
<td>Social sciences</td>
<td>Chemistry</td>
<td>Agricultural and biological sciences</td>
<td>Physics and astronomy</td>
<td>Biochemistry, genetics and molecular biology</td>
</tr>
<tr>
<td>8</td>
<td>Medicine</td>
<td>Agricultural and biological sciences</td>
<td>Social sciences</td>
<td>Environmental science</td>
<td>Chemistry</td>
<td>Mathematics</td>
</tr>
<tr>
<td>9</td>
<td>Agricultural and biological sciences</td>
<td>Chemistry</td>
<td>Mathematics</td>
<td>Chemistry</td>
<td>Social sciences</td>
<td>Physics and astronomy</td>
</tr>
<tr>
<td>10</td>
<td>Business, management and accounting</td>
<td>Mathematics</td>
<td>Chemical engineering</td>
<td>Biochemistry, genetics and molecular biology</td>
<td>Environmental science</td>
<td>Arts and humanities</td>
</tr>
</tbody>
</table>

ASEAN, Association of Southeast Asian Nations.

Table 3. Comparison of the top 10 collaborating countries with Indonesian authors in international publications among the six ASEAN countries from 2016 to 2020

<table>
<thead>
<tr>
<th>Rank</th>
<th>Indonesia</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Vietnam</th>
<th>Thailand</th>
<th>Philippines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Malaysia</td>
<td>UK</td>
<td>China</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
</tr>
<tr>
<td>2</td>
<td>Japan</td>
<td>Australia</td>
<td>USA</td>
<td>Japan</td>
<td>Japan</td>
<td>Japan</td>
</tr>
<tr>
<td>3</td>
<td>Australia</td>
<td>Indonesia</td>
<td>UK</td>
<td>South Korea</td>
<td>UK</td>
<td>Australia</td>
</tr>
<tr>
<td>4</td>
<td>USA</td>
<td>USA</td>
<td>Australia</td>
<td>Australia</td>
<td>China</td>
<td>China</td>
</tr>
<tr>
<td>5</td>
<td>UK</td>
<td>India</td>
<td>Germany</td>
<td>China</td>
<td>Australia</td>
<td>UK</td>
</tr>
<tr>
<td>6</td>
<td>Netherlands</td>
<td>China</td>
<td>India</td>
<td>France</td>
<td>India</td>
<td>Taiwan</td>
</tr>
<tr>
<td>7</td>
<td>Germany</td>
<td>Pakistan</td>
<td>Japan</td>
<td>UK</td>
<td>France</td>
<td>Germany</td>
</tr>
<tr>
<td>8</td>
<td>Taiwan</td>
<td>Saudi Arabia</td>
<td>Canada</td>
<td>Germany</td>
<td>Malaysia</td>
<td>Malaysia</td>
</tr>
<tr>
<td>9</td>
<td>South Korea</td>
<td>Japan</td>
<td>Hong Kong</td>
<td>Iran</td>
<td>Malaysia</td>
<td>South Korea</td>
</tr>
<tr>
<td>10</td>
<td>Thailand</td>
<td>Iran</td>
<td>France</td>
<td>India</td>
<td>South Korea</td>
<td>India</td>
</tr>
</tbody>
</table>

ASEAN, Association of Southeast Asian Nations.

from Japan Society for the Promotion of Science (1,783 articles) and the Japanese Ministry of Education, Culture, Sports, Science and Technology (1,478 articles). A similar pattern occurred in authors from Singapore collaborating with authors from China from 2016 to 2020, which corresponded to funding sponsorship from the National Natural Science Foundation of China (13,823 articles), Ministry of Education of the People’s Republic of China (1,909 articles), Ministry of Science and Technology of the People’s Republic of China (1,193 articles), and the China Scholarship Council with 1,321 articles.

**Indonesian Government’s Policy to Encourage International Publications**

The significant increase in Indonesia’s international publications has been a direct consequence of national policy, particularly the National Standards for Higher Education, which have been stipulated since 2015 through the Regulation of the
Ministry of Research, Technology and Higher Education Number 44 of 2015, and further updated through the Regulation of the Ministry of Education and Culture Number 3 of 2020. In addition, Law Number 12 of 2012, regarding higher education, stipulates in article 12 paragraphs 2 and 3 that a lecturer serving as a scientist is mandated to develop and disseminate science and/or technology through scientific reasoning and research. Lecturers are also required to publish scientific publications as a source of learning. In fact, since January 27, 2012, there has been a provision for graduates of doctoral programs to produce papers accepted for publication in international journals. This provision is contained in the Circular Letter of the Director General of Higher Education, Ministry of Education and Culture, Number 152/E/T/2012 (Concerning the Publication of Scientific Work). Furthermore, policies concerning international publications in functional research positions are stipulated through the Ministry of State Apparatus Empowerment and Bureaucratic Reform Regulation Number 34 of 2018.

The obligation of international publications in Indonesia is actualized through a number of regulations implemented by the government through various acceleration programs, with publication incentives such as (1) incentives for articles in international scientific journals since 2014, by providing incentives for 125 lecturers/researchers in 2017 whose scientific articles have been published in international journals, with a maximum incentive of 35,000,000 Indonesian rupiah (approximately 2,500 US dollars). This program is implemented by the Directorate General of Research and Development, at the Ministry of Research, Technology and Higher Education [5]. (2) The 2020 Scientific Journal Quality Improvement Incentive Program, organized by the Ministry of Research and Technology/National Research and Innovation Agency, aims to encourage the publication of scientific journals in order to improve journal quality and to help journals become internationally reputable [6]. This program is in accordance with the obligations of journal accreditation in Indonesia [7]. (3) In addition, there are other incentives for international publications at the university level in Indonesia [8,9].

Conclusion

Researchers from Indonesia have published 217,974 international publications from 1945 to 2020 in the Scopus database. The quantity of publications has increased in the eight decades since the independence of the Republic of Indonesia. In 2019 and 2020, Indonesia had the highest number of publications among ASEAN countries. Subject areas including medicine, agricultural and biological sciences, engineering, and physics and astronomy have been the most dominant fields in publications by researchers from Indonesia in international journals. Researchers from Indonesia have collaborated with authors from 159 countries, which are predominated by Asian countries (Japan, Malaysia, Thailand, and South Korea). Indonesia’s international publications have also been influenced by funding sponsorship from Japan, as evidenced by the Japan Society for the Promotion of Science, the Ministry of Education, Culture, Sports, Science and Technology, the Japan Science and Technology Agency, the Japan Agency for Medical Research and Development, and the Japan International Cooperation Agency, which provided financial support for 3,793 publications during the 2016 to 2020 period. In 2020, authors from Indonesia were able to publish 50,868 publications in the Scopus database. The target set by the government of Indonesia in the National Medium-Term Development Plan 2020–2024 to achieve 31,159 international publications in 2024 should be updated to reflect these circumstances.

Conflict of Interest

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

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Data Availability

Dataset file is available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/ISWZXH

Dataset 1. Search results according to search terms including country, year, and subject areas in Scopus

Supplementary Material

Supplementary file is available from the Harvard Dataverse at: https://doi.org/10.7910/DVN/ISWZXH

Suppl. 1. Query terms

References

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Reflections on 4 years in the role of a Crossref ambassador in Korea

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Infolumi, Seongnam, Korea

Introduction

Crossref is a non-profit membership organization with the mission of contributing to the development of scholarly communities by making it easy to find, cite, link, assess, and reuse academic works. Currently, it has metadata on 130 million scholarly works [1]. It works with over 16,000 member organizations from over 140 countries. Publishers are prominent members of Crossref, and other institutions such as funders and repositories are also working together with this organization. Crossref is a DOI registration agency, but it also provides a variety of services to register, connect, and distribute scholarly work metadata [2], including data citation [3] and research funders [4]. When members register content, its metadata is collected in Crossref to be connected among publications, people, institutions, and other related publications. The collected metadata is preserved, and the community can use it through open APIs or search functions [5]. Participation Reports show the key metadata elements that Crossref members register to make their content more useful [6]. A survey was conducted to evaluate where Crossref stands with scholarly communities. In total, 437 survey respondents and 41 interviewees said that Crossref helped them support scholarly work and pointed out that if Crossref did not exist, the manual labor required to recreate the collaborative nature of Crossref services would impose a large overhead for individual organizations [7].

Fig. 1 shows the somewhat complex communities of Crossref. Over 16,000 members from over 140 countries, as mentioned above, form the member community. Crossref also works with sponsors and service providers, especially sponsors who independently support small publishers that find it difficult to join or work with Crossref. The most extensive community is the metadata user community, which uses Crossref metadata for various purposes. It is necessary to support these diverse communities. Crossref wants to make sure it can reach members around the globe, and to achieve this goal, it requires a wide team of people who are knowledgeable in the languages, cultures, and member needs in a variety of countries. This reason is why Crossref launched its ambassador program [8]. In this essay, I would like to describe this program and present my reflections on the 4 years I have spent in the role of a Crossref ambassador in Korea from 2018 to 2021.
Crossref Ambassador Program

As the Crossref community expanded, more efficient community management measures were sought. For example, Crossref hopes that local experts can make immediate contributions whenever necessary to provide educational opportunities in the local language at a local time; thus, the organization would like to have a representative of the Crossref team in the region who can serve as a channel for local members and stakeholders. This program was officially launched in January 2018. The primary objectives were as follows: “first, to gain a deeper understanding of certain audiences or countries; second, to increase outbound education, with both existing members and new audiences; third, to improve communication with and between non-English speaking communities; and fourth, to empower Crossref members to help and advise one another” [8]. I was one of the first three ambassadors in January 2018. Even before the ambassador program was established, some volunteers translated documents into local languages, conducted education, and gave lectures on Crossref. The ambassador program teamed them up officially and supported their activities. The ambassadors and Crossref were satisfied with the first year of the ambassador program [9].

Who Are Crossref Ambassadors?

As of January 2022, there are 29 ambassadors, who are experts in various fields, including publishers, editors, librarians, system engineers, and researchers (Fig. 2). They are from 17 countries, including Korea, China, Mongolia, Taiwan, Singapore, Malaysia, Indonesia, Ukraine, Uzbekistan, Turkey, Australia, Russia, the United States, Mexico, Colombia, Brazil,
and Nigeria. Although more global supporters are needed, Crossref tries to balance the number of ambassadors from all over the world because the initial goal was to maintain personal relationships within the ambassador team on a small scale. In the early days of the ambassador program, there were fewer than 10 people, including myself, and at that time, I was able to maintain close relationships with the other team members. However, as the scale of the ambassador program grew, I could no longer remember everyone’s names.

The Role of Crossref Ambassadors

The ambassador program strives to create a place for members to help and advise each other to reach a deeper understanding of a particular audience or country, providing educational opportunities for existing and new members and smooth communication with non-English-speaking communities. To this end, the work of ambassadors is as follows: to participate in ambassadors’ meetings twice a year, to participate in education, to receive the latest news about Crossref and share news in the region, to translate materials, to participate in the community forum, to conduct beta testing for new services, to provide feedback for Crossref-related events or webinars in the region, and to participate in working groups or committees. Of course, not all of this is mandatory; instead, the choice of activities can depend on the situation according to one’s competence.

What Is Necessary to Become an Ambassador?

In my case, I became an ambassador through the recommendation of a board member of the Korean Council of Science Editors (KCSE). He had maintained a close relationship with Crossref staff even before the establishment of the ambassador program. In the early days of the program, Crossref appointed ambassadors mainly in countries with large or rapidly increasing membership; however, there are ways to voluntarily submit applications to the Crossref website along with recommendations (available from: https://www.crossref.org/community/ambassadors/). When an application is received, it is reviewed by Crossref staff. They interview the applicant to see if he or she is suitable as an ambassador. Applicants who pass are trained through a new education program. Once every 6 months, official catch-up meetings of ambassadors are held. Additionally, regular updates or opinions are shared through email, Slack messages, and Community Forums. The ambassador’s status is determined through surveys and evaluations at the end of each year.

How Does Crossref Support Ambassadors as Volunteer Workers?

Crossref introduces ambassadors through newsletters or websites, provides the ambassador logo to be used, and gives a certificate. Souvenirs and gifts with the Crossref logo are also offered, including T-shirts, hoodies, mugs, diaries, badges, stickers, and ballpoint pens. The 2021 year-end gift was unique (it gave a 1-year TED subscription and a GlobalGiving gift card). For reference, GlobalGiving provides sites for those who want to donate to non-profit organizations. One finds donation projects by subject and region on the site, contributes as much as one wants, and the person who donated continues to receive emails on the project’s progress. With the gift card I received, I made donations to programs that support girls’ education in underdeveloped countries and projects related to welfare for the elderly. Ambassadors can use first when developing a new service, and Crossref supports ambassadors’ expenses when participating in related events. In the past, I received support for flight and hotel expenses when attending an annual meeting held overseas. Since February 2020, it has been impossible to travel for Crossref meetings because all meetings have been held online due to the COVID-19 pandemic.

Reflections on My Work as a Crossref Ambassador in Korea

Starting in 2012, I began to translate the Crossref Quarterly Newsletters into Korean and propagate them to Korean editors as part of my voluntary work for the KCSE. I also frequently met with Crossref staff at conferences or workshops held by the European Association of Science Editors and the KCSE and communicated with them. On June 12, 2017, a Crossref Live event was held in downtown Seoul. I met some Crossref staff at the meeting. On June 20, 2017, I received an email from the Crossref staff about the launch of the ambassador program. After a discussion about the role of the ambassador, I decided to participate in this program. The suggested tasks were not mandatory but voluntary, according to the competency of the ambassador. The following are my achievements as an ambassador since 2018: first, translation of the script of nine video slides on Crossref’s work about Metadata Search, Reference Linking, Metadata APIs, Crossmark, Similarity Check, Funder Registry, Cited-by, and Content Registration, which were released on January 16, 2018 and are available from https://www.youtube.com/watch?v=Q_yXjijnHGG&list=PL-e_-TawAgQj2pHlyo0XzR-WcTa-ac_hUcVx; second, operating the Content Registration webinar in Korean held on September 22, 2020, available
from https://www.youtube.com/watch?v=ofvu_LY05-U&list=PLw-1TawAvQI2pHiy0XZRwT-A-ac_hUcVx&index=9; and third, publishing meeting reports on the Crossref LIVE17 annual meeting in Singapore [10] and the Crossref LIVE19 annual meeting in the Netherlands [11].

Additionally, I gave presentations on the topic of “Crossref ambassador program and new services” at the 8th annual meeting of the KCSE and “the future of Crossref” on January 17, 2020, at the pre-conference workshop of the 10th annual meeting of the KCSE. Both presentations in Korean are available from https://www.kcse.org/bbs/workshop.php.

Besides the above achievements, I have delivered questions and answers about Crossref services between Korean editors and Crossref staff.

My work as a Crossref ambassador aligned well with my work as a member of the KCSE. KCSE has provided me with frequent opportunities to meet Crossref staff at the meetings. In addition to being the organization that dispatched a Crossref ambassador, the KSCE became a board member of Crossref from March 2021 to February 2024 [12]. This may also have been a result of the KCSE’s contribution to scholarly communities in Korea through the dissemination of information about Crossref services.

Due to personal reasons, I left the Crossref ambassador program in January 2022. I initially struggled due to a lack of knowledge about Crossref’s work and language barriers. However, through solving various problems, I continuously learned and grew. I was able to open my eyes to a vast world of persistent identifiers and XML and broaden my understanding of other cultures by interacting with ambassadors from various countries. This personal growth was significant, but above all, I am proud that I have had this opportunity to contribute to the development of Korea’s scholarly publishing community.

**Conclusion**

Crossref is now an essential organization in scholarly publishing. Without Crossref services, including DOI, Crossmark, Funder Registry, Similarity Check, DataCite, the Cited-by function, Text and Data Mining, Crossref Metadata, and Participation Reports, it would be impossible to imagine the present global network of scholarly work. I am happy to have contributed to propagating Crossref’s services in Korea by translating the essential content into Korean, operating webinars, publishing meeting reports, and presenting at editors’ conferences. It was my honor to communicate with Crossref staff and other ambassadors in the world. I did my best as an ambassador, but I am not sure if my role satisfied Crossref’s initial expectations. Furthermore, I have had a chance to broaden my competency as a manuscript editor and editorial consultant. It was a successful experience for me from the standpoint of personal development. I appreciate all my colleagues and the Crossref staff for their support during the period when I served as an ambassador.

I would recommend that anyone apply to be a Crossref ambassador if he or she has a certain level of understanding of the Crossref organization and its services, can communicate in English, and is passionate about contributing to the development of the global scholarly publishing industry.

**Conflict of Interest**

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

**Funding**

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**References**

Meeting Report

Scopus, cOAlition S, and Crossref’s views on scholarly publishing in the next 10 years

Tae-Sul Seo
Korea Institute of Science and Technology Information, Seoul, Korea

Meeting: The 10th Anniversary Conference of the Korean Council of Science Editors session B
Date: September 8, 2021
Venue: Zoom
Organizer: Korean Council of Science Editors
Theme: The next decade of scholarly publishing

In the afternoon on September 8, 2021, a conference commemorating the 10th anniversary of the Korean Council of Science Editors was held online through Zoom, with the theme of ‘The next decade of scholarly publishing.’ Ninety-nine members attended the conference (Fig. 1). The program consisted of a plenary session and two parallel sessions. Here, I introduce session B, which I attended. Session B was chaired by Hyungsun Kim, professor emeritus of Inha University, who was also the third president of Korean Council of Science Editors and the current president of the Council of Asian Science Editors. During the session, three presentations were given by Elsevier, cOAlition S, and Crossref.

The first presentation was given by Wim Meester, Director of Product Management of Elsevier, on the topic of ‘Evolution of Scopus over the next decade.’ He started by looking back at the 17-year history of Scopus, and then presented information on the number and volume of Scopus’ scholarly journals, the contribution of Scopus to the research community, and how to select journals. In his presentation, he also cited data from Scopus to highlight Korea’s research achievements. Regarding the prospects of Scopus over the next decade, he said that its vision is to “help the world of research makes high-value decisions with confidence,” and some of the key challenges are discovering the most relevant research, identifying experts and collaborators, evaluating and demonstrating impact, making decisions on research strategies, and applying and analyzing funding. To this end, the author profile of Scopus includes preprints and relevant funding information. Ultimately, he hoped that Scopus People Finder would help recruit reviewers and discover collaborators.

The second presentation was given by Johan Rooryck, Executive Director of cOAlition S, on the topic of ‘Plan S: estimating future developments.’ He explained that the plan’s goal is to promote open access (OA). cOAlition S is composed of 27 global funders and has published 150,000 papers with annual research funding of 40 billion US dollars. Plan S is a policy prepared as part of an effort to give more researchers and artificial intelligence models immediate
and free access to articles funded by member institutions. To comply with Plan S, researchers should publish in OA journals (route 1), upload author-accepted manuscripts to the repository through an agreement with the publisher (route 2), or belong to an institution that has entered into an OA transformative agreement (route 3). In addition, cOAlition S is conducting research on OA Diamond Journal publication, improving the transparency of publication costs, and supporting new publication models. Over the next 10 years, OA will use a mix of commercial and institutional publishing service providers, with a strengthened role of academic organizations. The fragmentation of publishing services was mentioned as a key challenge in this regard.

The third presentation was made by Ed Pentz, Executive Director of Crossref, on the topic of ‘The role of Crossref in journal publishing over the next decade’ [1]. He said that Crossref is a non-profit organization whose mission is to make research results easy to find, cite, link, assess, and reuse, as well as to improve scholarly communications. Crossref makes it possible to identify and cite research funds, preprints, journal articles, monographs, proceedings, standards, reports, dissertations, and review reports through the use of digital object identifiers (DOIs). The number of DOI registrations on Crossref is continuously increasing, with approximately 88 million
registered journal articles. Crossref considers transparency, new OA models, preprints, data, and artificial intelligence to be key issues for scholarly journals in the next 10 years. To this end, it is involved with the principles of open scholarly infrastructure. In addition, the Research Nexus is also being promoted to support reproducibility and discoverability through various metadata collected using DOIs.

In summary, the use of artificial intelligence based on scholarly paper data and the development of a new publishing model that enables open science are envisioned as drivers that will lead to changes in the publishing market in the next 10 years. In Korea, scholarly publishing is still conducted based on the traditional publishing model, but we must inevitably join global trends in the near future. Before doing so, it would be preferable for us to build a new publishing model reflecting future trends and to use artificial intelligence to make the scholarly publishing process more efficient.

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Local editors have no time to lose for building their journals’ reputations

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Meeting: The 10th Anniversary Conference of the Korean Council of Science Editors session A
Date: September 8, 2021
Venue: Zoom
Organizer: Korean Council of Science Editors
Content of Session A
Manuscript editors’ role for the next decade: Duc Le (senior executive editor, The Lancet)
How can local publishers survive in 10 years: Younsang Cho (CEO, M2PI)
Preparation of Korean journal editors for the next 10 years: Cheol-Heui Yun (professor, Department of Agricultural Biotechnology, Seoul National University)

In my role as the editor-in-chief of Brain & NeuroRehabilitation, I have been overwhelmed by the changing speed and breadth of the academic journal publishing environment and have felt frustrated more than once. As a researcher seeking new knowledge and understanding—even beyond my role as a journal editor—difficulties are also multiplying. To compensate for the imperfections of existing general knowledge, the process of hypothesizing, measuring, and analyzing results and summarizing the results into a single paper should be delightful and rewarding. However, many people now feel that this process is laborious, without any sense of fun whatsoever. In addition, so-called predatory journals intercept the results of this hard work. With awareness of the problem, I participated in session A of the 10th Anniversary Conference of the Korean Council of Science Editors.

The first lecture in session A was given by Dr. Duc Le, a senior executive editor at The Lancet. It was a well-organized lecture reaffirming the ABC’s of the editor’s role. The Lancet, as a prestigious journal, still follows the editorial workflow closely and leads in a sense, so Dr. Le did not seem to worry much about the future. In general, his talk emphasized the editor’s responsibilities in manuscript assessment. While listening to the presentation, the phrase “the composure of the strong (a Korean idiom referring to the ability for people in a position of strength to approach a problem in a considered and unhurried way)” came to mind. Rather than urgent concerns about survival, I could infer that Dr. Le’s approach involved preparing for the future by sticking to the basics more closely.

In contrast, the second lecture, conducted by Mr. Younsang Cho, CEO of M2PI, a domestic
company in Korea, was full of crisis awareness and concerns about survival. Amid the continued expansion of the market dominance of large multinational publishers, domestic publishers have been making various efforts to survive. For example, their role is not limited to editing and production; they are busy meeting the diverse needs of their customers (i.e., journal editors).

Professor Cheol-Heui Yun’s lecture discussed the ever-changing open-access movement, increasing social standards for editors’ social responsibilities, and the role of artificial intelligence. With the development of digital tools that can replace simple tasks, it was interesting to view statistics showing that the total number of editors is gradually decreasing.

Session A articulated the expectation for journal editors to meet higher standards for research integrity, transparency, and trust over the next decade. Editors are also expected to use and rely more often on various artificial intelligence-based tools. In addition, just as the value of Mozart’s melodies doubles in a world full of noise, academic journals are expected to suffer from the phenomenon of the “rich becoming richer and the poor becoming poorer” amid the increasing trend of noise in the academic world. Editors must strive to build a reputation for operating a scholarly journal that is faithful to basic skills and prioritizes scientific value in the field. Local editors have no time to lose.

Conflict of Interest

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The evolution, benefits, and challenges of preprints and their interaction with journals

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Abstract
This article presents the growth and development of preprints to help authors, editors, and publishers understand and adopt appropriate strategies for incorporating preprints within their scholarly communication strategies. The article considers: preprint history and evolution, integration of preprints and journals, and the benefits and disadvantages, and challenges that preprints offer. The article discusses the two largest and most established preprint servers, arXiv.org (established in 1991) and SSRN (1994), the OSF (Open Science Foundation) initiative that supported preprint growth (2010), bioRxiv (2013), and medRxiv (2019). It then discusses six different levels of acceptance of preprints within journals: uneasy relationship, acceptance of preprint articles, encouraging authors to preprint their articles, active participation with preprints, submerge by reviewing preprints, and finally merger and overlay models. It is notable that most journals now accept submissions that have been posted as preprints. The benefits of preprints include fast circulation, priority publication, increased visibility, community feedback, and contribution to open science. Disadvantages include information overload, inadequate quality assurance, citation dilution, information manipulation and inflation of results. As preprints become mainstream it is likely that they will benefit authors but disadvantage publishers and journals. Authors are encouraged to preprint their own articles but to be cautious about using preprints as the basis for their own research. Editors are encouraged to develop preprint policies and be aware that double-blind review is not possible with preprinting of articles and that allowing citations to preprints is to be encouraged. In conclusion, journal-related stakeholders should consider preprints as an unavoidable development, taking into consideration both the benefits and disadvantages.

Keywords
Open science; Preprints; Publishing; Scholarly communication

Introduction

Background: Preprints are versions of articles made publicly available before traditional jour-
Preprints have been part of the publishing landscape for over 30 years, but only recently have become a common means of communication for life science and medical authors. The year 2020 was a watershed period when the principle of publishing by preprint became a normalized process for research on the coronavirus disease 2019 (COVID-19) pandemic. However, many editors, publishers, and journals have viewed preprints with suspicion. It is reported from a survey in 2020 that only 28 of the 383 Asian academic society journals from 22 countries accept submissions that have already been posted on preprint servers. Equally only eight journals allow preprints to be cited in reference lists [1]. The study also found that half of the 118 Korean editors disagreed with the need for preprints. The concerns over preprints included a lack of scientific integrity, stealing ideas/scooping data, priority issues regarding research ideas, and copyright problems [2]. However, although there remains some resistance, there has been a growth of participation, experimentation, and integration of preprints within journals.

**Objectives:** This article aims to present the current advances in preprint-related developments to help journal stakeholders understand those issues and find a way to adapt to the growing preprint culture. Specifically, the article will present: how preprint servers have evolved; how journals are integrating with them; the benefits and disadvantages of preprints; and the opportunities and challenges that preprint posting poses for research, publishing, and the public.

### How Preprint Servers Have Evolved

The principle of preprints is to allow researchers to share their work before formal publication and digital means of sharing have been in operation since the 1960s [3]. However, the first official preprint server was arXiv.org, launched in 1991 at Los Alamos National Laboratory in the USA by Paul Ginsberg. The initiative followed other sharing initiatives between scientists, mostly in the discipline of physics, and the new service was designed to take advantage of the new World Wide Web, which was only a few years old [4,5]. Its focus was high energy physics when first launched. This repository has grown and developed over time into new areas, including economics, and articles on mathematics now comprise the largest part of its database. Currently, arXiv.org is based at Cornell University and hosts over two million articles with 16,000 new submissions each month. As with other preprint servers, it does not operate peer review, but it does scan each submission for suitability. This used to be done manually, but it now uses artificial intelligence to evaluate all submissions prior to posting on the server.

The second preprint server to launch was SSRN which was launched in 1994 and now contains over one million articles (https://www.ssrn.com). This server was established by a pair of financial economists but was purchased by Elsevier in 2016. The purchase by a commercial publisher was criticized by the research community, who had previously considered it a community initiative, not appreciating that it had been run as a private enterprise for several years before the sale.

Since 2010 there have been many new preprint servers launched, several supported by the Center for Open Science which launched the OSF initiative (Open Science Foundation, https://osf.io) as a platform to support the hosting of preprint collections. The largest change in the history of preprint servers came in 2013 with the launch of bioRxiv, followed by medRxiv in 2019. Both are hosted at Cornell alongside arXiv.org. Although very much smaller than SSRN and arXiv with approximately 200,000 articles, they both experienced tremendous growth during the pandemic as researchers used preprints as a rapid means of sharing research on COVID-19. The statistics of uploads and downloads can be found at https://rxiv.org/stats.

It is worth noting that although preprint servers do not undertake peer review, they each operate a screening procedure before adding articles to the sites. This ranges from a scant check, performed by an individual or using artificial intelligence, to a fuller check performed by medRxiv, which operates probably the most stringent checks before posting, since it is aware of the potential dangers of making available misleading or inaccurate medical research (https://www.medrxiv.org/submit-a-manuscript).

Research suggests that not all preprints are finally published in peer reviewed journals (or other accredited outlets), although it is impossible to accurately assess the number that are. A 2021 article suggested that 60% of preprints are never published and that preprints represent 4% of the published literature [6]. Other research suggests that 30% of preprints from bioRxiv remain unpublished [7].

### How Journals Are Integrating with Preprints

The relationship between journals and preprints is extremely varied, and has been divided into six steps to acceptance.

**Uneasy relationship:** The Ingelfinger rule was named in the late 1960s after the editor in chief of the New England Journal of Medicine. Franz Ingelfinger stated that the journal would only publish items that were entirely new, novel, and had not previously been published or where a press release about the research findings had been made. His argument was that the journal wanted all rights of first publication. Many journals still feel this way, although in recent years it is notable that many have changed their opinions. Of interest, although
many journals now accept preprints, the research community appears to be somewhat unaware of this, and in 2013 it was reported [8] that 60% of German scientists believed that no journal would accept a submission that had appeared in a preprint server. This data is now quite old, and it would be interesting to run the same survey to see if opinions have changed alongside journal policies.

**Acceptance:** While individual publishers and journal editors may still feel somewhat uncomfortable with preprints, there has been a general policy change, and many now accept these articles—whether willingly or not. Several publishers have made statements saying that journals should allow submissions of preprints (for example, https://authorresources.wiley.com/author-resources/Journal-Authors/open-access/preprints-policy.htm).

**Encouragement:** Moving further, several journals now actively encourage authors to preprint their articles—going one step beyond stating that preprints are accepted. Some journals even offer to upload articles to preprint servers on behalf of the authors following submission. For example, PLOS authors are asked if they have uploaded onto a preprint server and, if not, if they would like the journal to do this on their behalf. In this case, articles are uploaded onto bioRxiv or MedRxiv (https://journals.plos.org/plosone/s/preprints).

**Participation:** In a linked-in world, there is increased collaboration between different services, which is the same within the journal landscape. Some journals have changed from “opt in” (i.e., “would you like us to upload your article onto the preprint server?”) to opt-out (i.e., “we will upload your article onto the preprint server unless…”). For example, the *Lancet* family of journals upload all submissions, unless the author opts out with a valid reason, onto SSRN—the preprint server owned by its parent, Elsevier (https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31125-5/fulltext). In another example, the journal *eLife* will only accept submissions that have already been made available on a preprint server such as medRxiv or bioRxiv (https://elifesciences.org/inside-elife/002f185/preprints-and-peer-review-at-elife). Allied to this approach is a linking service introduced onto the preprint server ResearchSquare affiliated with Biomed Central (BMC) journals. This service, called “In Review” links with the submission system used by BMC. As articles go through peer review, they are tracked and the status of the article is reported against the preprint on ResearchSquare (https://www.researchsquare.com/publishers/in-review).

**Submerger:** An extension of participation is a close alliance of preprint servers, journals, and the peer review service. “Review Commons” was launched as a partnership between ASAPbio and the journal EMBO. Authors who upload their articles onto bioRxiv can request a review from the EMBO editorial office. EMBO manages peer reviews to obtain two reviews which are posted against the article on bioRxiv. Once the reviews have been received, authors can revise and submit to one of 17 participating journals which use the reviews as the basis for accepting or rejecting the revised article (https://www.reviewcommons.org). This service is limited as it relies on the goodwill and the capacity of both EMBO editorial offices, and so is not ultimately scalable.

**Merger and overlay:** The final step in acceptance between journals and preprint servers is merger. There are a few examples of these. *F1000 Research*, now owned by Taylor & Francis, was the first journal to create a model that merged both the immediacy of the preprint server with the selectivity of journals. Submitted articles are published immediately after a quick evaluation, including a plagiarism check, etc. Reviewers are then invited, and their reviews are posted against the article. The reviewers make the publishing decision, and if there is sufficient consensus, the article is considered “Accepted” or “Rejected.” If accepted, the article goes into various indexes, including Scopus and MEDLINE (https://f1000research.com/about). Authors can revise their articles at any point, and all revisions are linked to previous and subsequent versions—each undergoing the same check and review process.

Another model is that of an overlay journal, and there are a few of these—mostly linked to arXiv. Under this model as used by the *Open Journal of Astrophysics*, authors whose works are on arXiv can submit to the journal which provides traditional peer review. If the article is accepted, it is considered a published article within the journal. However, only a summary is provided on the journal site, and the final article must be posted onto arXiv. In this way, the journal accredits the articles it “accepts” but leaves all articles on arXiv as the preferred host.

**Benefits and Disadvantages of Preprint Servers**

**Benefits of preprints**

There are several benefits of preprints, many of which have been extensively discussed [9,10] and which include the following.

**Fast circulation:** When results are needed quickly, preprints will always be a faster means of communication than journals that have more stringent—and time consuming—checks, including peer review before publication.

**Priority publication:** Posting a preprint gives authors priority over ideas and results, which may be important if there is competition between different laboratories or departments.

**Increased visibility:** Preprints are currently all free to view and published under open access licences which enables greater dissemination without any access barriers. They also often have greater visibility on search engines than other
smaller platforms such as institutional or personal websites. **Community feedback:** Most preprint repositories allow for feedback, and in some communities this is a valuable means of obtaining community comments. **Author publication control:** Authors decide where and when to post their research without having to hope that editors will accept their articles, thus giving them greater control over their own work. **Open science:** Preprints support open science in several ways: not only do they currently publish under open licenses, but they also allow for different versions to be posted, including linking to data sets, working papers, and other documents to help ensure that the complete picture of research can be obtained.

**Democratic process:** There is a history of bias within journal publications [11] and discrimination regarding which articles are published; however, preprint servers are not subject to such selectivity and offer a more democratic publishing process. **Version access:** It can be important in some areas to see the history of an article and how it has developed through different iterations. Preprints can provide this history by providing access to the original submission before peer review and final publication.

**Disadvantages of preprints**

Although there are obvious benefits to preprint publication, there are counterbalancing challenges that should be considered [12,13]. These include the following. **Information overload:** There is concern that the increase in scientific literature is causing problems for researchers due to the amount of time required to sift and discover relevant quality information. Preprints increase the volume of publications and, therefore, the information overload. **Quality assurance and trust:** There is no scrutiny of preprints such as peer review before posting, they therefore cannot provide any quality assurance or trust signaling regarding the content of articles. This lack of quality control may not be appreciated by some people to whom a preprint site such as bioRxiv appears to be the same as a journal and to whom, therefore, the same quality and trust values are applied. **Reputation damage:** It can be argued that authors are protected by the peer review system since it hopefully prevents the publication of poor quality articles and helps authors improve their articles before they are made publicly available. Preprints provide no such protection and allow the publication of very poor quality articles that may harm an author’s reputation. **Corrections to the scholarly record:** Journals are usually good at correcting errors via errata and retractions. Still, these corrections are frequently not communicated in the preprint, and people are likely to remain unaware that an article has been corrected or retracted.

**Citation dilution and problems:** Journals may find that their citations are reducing as people read and cite the preprint in preference. Equally, some journals may experience an increase in citation even when their readership has not increased. This variation can happen because some journals do not permit citation to preprints, so the author will cite the journal publication when they have read and used the preprint to support their assertions. **Promoting bad science and political influence:** Because of the lack of quality control and validation of articles before posting, there is the opportunity for bad actors to use preprint servers to post misleading, possibly fraudulent, science. This may be a simple error and mistake, but it could also serve political aims rather than objective science. **Inflation of results and impact:** Related to the problem of promoting bad science is the potential for authors to use preprint servers to inflate their research. This can be done by salami publications—deliberately creating multiple articles from a single piece of research, each one of them only incrementally adding to the others. Some authors may also use inflated language and skew the discussion and key findings to make a small discovery appear to be more important. Journal editors often moderate this type of inflation, but preprint servers have no such checks in place. **Version control:** The articles appearing on preprint servers are usually the first version which is changed and hopefully improved and clarified through peer review before final publication. However, readers may not appreciate the changes wrought by the journal and assume that the version in the preprint server is a final—or adequate—version for future research.

**Opportunities and Challenges among Stakeholders**

2020—a watershed year?: From the launch of the World Wide Web, there has been concern about the proliferation of poor-quality science, readily available without the filter provided by journals. For example, in 2016, the *New England Journal of Medicine* published an editorial stating “On the Internet, speed and simplicity often displace depth and quality, especially on complex subjects” [14]. These concerns led to reluctance in the life sciences and biomedical area to adopt preprints, worried about the potential for dubious findings being made available to the public in a way that made them appear credible. There was also concern that some factions could use preprints to promote particular viewpoints without valid scientific evidence.

However, the pandemic has changed this viewpoint and has increased acceptance of preprints as a valid means of rapid
communication. At the end of 2020, JAMA issued an editorial considering the benefits and disadvantages of preprints and concluded that they provide greater benefits to scholarly communication than challenges [15].

Therefore, it can be assumed that preprints are here to stay and that they will become embedded within the scholarly landscape. However, it is important that all stakeholders are fully cognizant of the challenges that remain, and make informed decisions about engagement with preprints.

**Authors and researchers:** Authors must ensure that their use of preprints does not undermine their own reputations. However, the use of preprints is unlikely to prevent acceptance in a journal although they should check if the journal has a stated policy. Preprints usually provide more benefit to authors than problems. Although peer review is an imperfect system and allows for errors to be published [16], researchers need to be fully aware of the lack of quality control over anything appearing in a preprint server, and to use such publications with caution. They should also ensure correct citation to their sources whether they are grey literature (e.g., preprints) or peer reviewed publications.

**Editors:** Journal editors need to have a policy regarding their interaction with preprint servers. There are a few issues to take into account: first, double-blind review is impossible to maintain if authors have posted their article in a preprint server; second, authors should be allowed to cite preprints—to prevent inaccurate citations; and third, editors need to consider what value they add to submissions and how they can differentiate what is published in their journal from the preprint server.

**Publishers:** The existence of preprints leads to the question of how journals will continue when preprint servers are likely to play a greater role in the dissemination of scholarly information. Therefore, it is important for journal publishers to closely consider their own financial and publishing models and how these will change in a world where preprints may become the publication of choice for authors and readers—and increasingly supported by grant funders.

**Conclusion**

It has been 31 years since the launch of arXiv.org in 1991. Although this preprint server was confined to the physics and mathematics fields, there are now preprint servers in all academic fields. Preprint servers are popular as preparatory work before submission to journals. Journals adopt a range of attitudes to preprint ranging from uneasy relationships to final merger and overlay. Preprints can benefit authors and editors, but they also have some disadvantages, including information overload, insufficient quality assurance, political influence, and outsized impact. Since the explosion of use during the COVID-19 pandemic, preprints have become more accepted and mainstream. All journal-related stakeholders need to recognize the challenges that preprints pose and make informed decisions about engagement with them. Journal editors and publishers should have a publicly-available preprint policy. Editors should consider two critical challenges before accepting preprint submissions. First, a double-blind review is impossible because reviewers can find the manuscript and authors on preprint servers. Second, authors should be allowed to cite preprints to maintain a more accurate citation of their sources.

**Conflict of Interest**

Pippa Smart has been an editorial board member of *Science Editing* since 2014. She was not involved in the review process. Otherwise, no potential conflict of interest relevant to this article was reported.

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**References**


https://www.escienceediting.org
How to share data through Harvard Dataverse, a repository site: a case of the World Journal of Men’s Health

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Abstract
Data are a highly valuable asset for researchers. Earlier, researchers who conducted a study permanently owned their data. Currently, however, these data can be used as a source for performing further research. In 2018, the International Committee of Medical Journal Editors presented data sharing statements for clinical trials. Although this recommendation was limited to clinical trials published in medical journals, it is a meaningful change that formalized the concept of data sharing. However, the trend of data sharing is expected to spread beyond medical journals to include a wider range of scientific journals in the near future. Correspondingly, platforms that provide storage and services to share data will gradually diversify. The World Journal of Men’s Health has adopted a clinical data sharing policy. The data deposit process to Harvard Dataverse, a well-known data repository, is as follows: first, select the type of article for data sharing; second, create an account; third, write a letter to the corresponding author; fourth, receive and validate data from the authors; fifth, upload the data to Harvard Dataverse; and sixth, add a data sharing statement to the paper. It is recommended that scientific journal editors select an appropriate platform and participate in the new trend of data sharing.

Keywords
Data sharing; Statements; Publication; Harvard Dataverse

Introduction
It is very rewarding for researchers to inform their colleagues and the public about their research achievements through various channels of communication. The scientific advances achieved by researchers have often led to various studies on similar subjects and follow-up studies, thereby resulting in advances in the corresponding research field. By using data from previous studies, fellow researchers have the opportunity to achieve more advanced results.
through research building upon earlier results. Therefore, research data are regarded as a valuable asset that can be shared by all researchers, including those who conduct the research. In 2018, the International Committee of Medical Journal Editors presented data sharing statements for clinical trials [1]. Although this recommendation was limited to clinical trials published in medical journals, it is a meaningful change that formalized the concept of data sharing. Although many journal websites contain a data sharing policy, few journals actually apply a data sharing policy. Furthermore, several journals have not yet adopted a policy. I would like to introduce the data sharing implemented by the *World Journal of Men's Health* (*WJMH*) [1-3]. *WJMH* uses the Harvard Dataverse repository (https://dataverse.harvard.edu). Although this is just one example of a data sharing method, I hope that it can alleviate some of the technical difficulties that the readers of this article may experience.

**How to Deposit Data to the Harvard Dataverse Repository**

**Step 1. Select the type of article for data sharing**

Although the International Committee of Medical Journal Editors recommends sharing data for clinical trials, data sharing is possible for any paper, including basic research and meta-analyses, according to the decision of the journal’s editorial committee. Therefore, the first step is to select the types of papers to which the data sharing policy is applicable. *WJMH* currently recommends data sharing for all types of papers, except for narrative reviews and case reports.

**Step 2. Create an account**

Access https://dataverse.harvard.edu/ and create an account under the name of the editor-in-chief who is in charge of the journal or editorial office staff. It is important to ensure that the account can be maintained even if the editor changes. The name of the newly created Dataverse account should preferably be the same as the name of the journal (Fig. 1). Currently, the service is free to use and each account is allocated 1 TB of storage.

**Step 3. Write a letter to the corresponding author**

After a paper submitted to the journal undergoes peer review and is accepted, the editor sends a letter to the corresponding author requesting data to be provided. If the authors do not wish to share the data, they are instructed to state the reason. The letter sent by *WJMH* provides an option for the authors to indicate their reasons for not sharing the data (Fig. 2). However, a letter to the corresponding author is not necessary.
We are going to upload the data to our space in Harvard Dataverse. So, you don’t need to upload the file yourself. If you agree, please just send your data to me via e-mail.

However, if your data cannot be publicized, you can choose one of the reasons below.

1. The data that support the findings of this study are available from the corresponding author upon reasonable request.

2. The data required to reproduce these findings cannot be shared at this time due to legal and ethical reasons.

3. The data required to reproduce these findings cannot be shared at this time due to technical and time limitations.

4. The data required to reproduce these findings cannot be shared at this time as the data also forms part of an ongoing study.

5. The data required to reproduce these findings cannot be shared at this time due to personal information protection policy.

Thank you for your fine contribution.

We are looking forward to your submission to our journal in the future.

Best regards.

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Fig. 2. An example of a letter.

Fig. 3. Adding a new dataset.
Fig. 4. Filling out the form to upload data.
if the journal editor receives data during the submission process as part of the journal’s mandatory data sharing policy.

**Step 4. Receive and validate data from the authors**
When data are obtained from the author, they are temporarily stored for each paper in the editorial office. This is the point when data verification is required. Whether personal information is included or exposed is the most important factor to evaluate. Data should be in a format that can be used in statistical programs, unlike texts, graphs, figures, and tables provided as supplements to a paper.

**Step 5. Upload the data to Harvard Dataverse**
When the accepted paper is fully edited, the previously received data file is uploaded to Harvard Dataverse. Access the Harvard Dataverse webpage and select ‘add data’ and ‘new dataset’ (Fig. 3). On the screen for uploading data, fill in all of the following items as instructed on the webpage (Fig. 4) [2].

- **Title**: write the title of the article;
- **author, contact**: enter the corresponding author’s information;
- **description**: write a brief summary of the content of the article. The abstract of the article is usually included in this section;
- **subject**: choose the field of study;
- **related publication**: enter the article’s DOI, expected publication date, journal name, the ISSN (International Standard Serial Number) of the journal, and web page address. When this process is completed, data sharing is completed, and the DOI is assigned to the shared data.

**Step 6. Add a data sharing statement to the paper**
Add the data sharing statement to the final proof of the edited paper (Fig. 5) [4].

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**Fig. 5.** Data sharing statement added to the manuscript note.
Conclusion

For editors and publishers, sharing data can be a cumbersome process. However, data sharing provides opportunities for new research through the collaborative use of existing data. It may also increase the likelihood that the paper will be cited. The trend of data sharing is expected to spread widely across scientific and medical journals in all fields. Accordingly, platforms that provide storage and services for sharing data will gradually diversify. Therefore, in the field of scientific journal publication, it is recommended that editors select an appropriate platform and participate in the new trend of data sharing.

Conflict of Interest

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References

Events in 2022

The Korean Council of Science Editors announces the schedule of the events in 2022. Precise schedule and registration of above workshops were or will be available from: https://www.kcse.org.

| Table 1. Schedule of the events by the Korean Council of Science Editors in 2022 |
|----------------------------------------|-------------------------------------|----------------|-----------------|-----------------|-----------------|
|                                        | January                             | February       | March           | April           | May             | June            |
| Science Editing (twice a year)         | Vol.9 No.1 (20)                     |                | No. 41 (31)     | No. 42 (30)     |                 |                 |
| Newsletter (4 times a year)            |                                     |                |                 |                 |                 |                 |
| International Conference               |                                     |                |                 |                 |                 |                 |
| Editor’s Workshop                      | 2022 Post-conference Workshop (22)  |                | Basic Manuscript Editing (10, 17, 24, 31) | Basic Manuscript Editing (7, 14, 21, 28) |                 |                 |
| Manuscript Editor’s Training & Workshop|                                     |                |                 |                 |                 |                 |
| Publication Ethics Workshop            |                                     |                |                 |                 |                 |                 |
|                                        | July                                | August         | September       | October         | November        | December        |
| Science Editing (twice a year)         | Vol.9 No.2 (20)                     |                | No. 43 (30)     | No. 44 (31)     |                 |                 |
| Newsletter (4 times a year)            |                                     |                |                 |                 |                 |                 |
| International Conference               |                                     |                |                 |                 |                 |                 |
| Editor’s Workshop                      | Scopus Workshop (20)                | Scopus Workshop (27–28) | Editor’s Workshop (24) |                 |                 |                 |
| Manuscript Editor’s Training & Workshop| Examination for Korea Manuscript Editors Certification (15) |                 |                 | Manuscript Editor’s Workshop (3) |                 |                 |
| Publication Ethics Workshop            | Publication Ethics Workshop (1)     |                |                 |                 |                 |                 |

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Declaration of conflict of interest for editorial board members’ articles

Editorial Office, Korean Council of Science Editors

The journal’s policy in handling editors’ or in-house staff’s manuscript was posted on July 7, 2018 and printed on February 20, 2019 at the “principles of transparency and best practice” section as follows:

All manuscripts from editors, employees, or members of the editorial board are processed the same as 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.

Therefore, the conflict of interest declaration of the following three articles are added as follows:

Habeeb Ibrahim Abdul Razack, Sam T. Mathew, Fathinul Fikri Ahmad Saad, Saleh A. Alqahtani. Artificial intelligence-assisted tools for redefining the communication landscape of the scholarly world. Sci Ed 2021;8(2):134-144. https://doi.org/10.6087/kcse.244

Conflict of Interest

Sam T. Mathew has been an editorial board member of Science Editing since 2014 but has no role in the decision to publish this article. Except for that, no potential conflict of interest relevant to this article was reported. The opinions provided in this manuscript reflect the authors’ personal views and do not represent that of their affiliated organizations.


Conflict of Interest

Dong Soo Han has been an editorial board member of Science Editing since 2014 but has no role in the decision to publish this article. Except for that, no potential conflict of interest relevant to this article was reported.

Conflict of Interest

Cheol-Heui Yun has been an editorial board member of Science Editing since 2014 but has no role in the decision to publish this article. Except for that, no potential conflict of interest relevant to this article was reported.
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).

2. COPYRIGHTS AND CREATIVE COMMONS ATTRIBUTION LICENSE

A submitted manuscript, when published, will become the property of the journal. Copyrights of all published materials are owned by KCSE. The Creative Commons Attribution Non-Commercial License available from: http://creativecommons.org/licenses/by-nc/4.0/ is also in effect.

3. RESEARCH AND PUBLICATION ETHICS

The journal adheres to the ethical guidelines for research and publication described in Guidelines on Good Publication (http://publicationethics.org/resources/guidelines) and the ICMJE Guidelines (http://www.icmje.org).

1. Authorship
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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2. Originality and Duplicate Publication
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. If 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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3. Secondary Publication
It is possible to republish manuscripts if the manuscripts satisfy the conditions of secondary publication of the ICMJE Recommendations (http://www.icmje.org/urm_main.html).

4. Conflict of Interest Statement
The corresponding author must inform the editor of any po-
tential 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 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.

6. 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.

7. 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.

5. SUBMISSION AND PEER REVIEW PROCESS

1. Submission

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

2. Peer Review Process

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.

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. Abbrevia-
tions 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 different 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 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:

### Books and book chapters:

Online sources:

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.

Scientific and technical reports:

News articles:

Dissertations:

- 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, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract equal to or less than 200 words. 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.

8. Correspondence
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*.

10. Commissioned or Unsolicited Manuscripts
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>
<thead>
<tr>
<th>Type of article</th>
<th>Abstract (word)</th>
<th>Text (word)</th>
<th>References</th>
<th>Tables &amp; figures</th>
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<tbody>
<tr>
<td>Original article</td>
<td>250</td>
<td>2,500</td>
<td>20</td>
<td>10</td>
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<tr>
<td>Review</td>
<td>200</td>
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<td>Case study</td>
<td>200</td>
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<td>Essay</td>
<td>No</td>
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<td>Editorial</td>
<td>No</td>
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<td>Book review</td>
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<td>Correspondence</td>
<td>No</td>
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<td>Letter to the editor</td>
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<td>Video clip</td>
<td>No</td>
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*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 post-
3. Galley Proof
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
No page charge or article processing charge applies. There is also no submission fee.

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NOTICE: These instructions to authors will be applied beginning with the February 2014 issue.
☐ Manuscript in MS Word (docx) or RTF format.

☐ Double-spaced typing with 11-point font.

☐ 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).

☐ Covering letter signed by the corresponding author.
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Co-authors

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Signed
Date

Print name
Signed
Date

Print name
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Date

Print name
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Date
As the corresponding author, I declare the following information regarding the specific conflicts of interest of authors of our aforementioned manuscript.

Examples of conflicts of interest include the following: source of funding, paid consultant to sponsor, study investigator funded by sponsor, employee of sponsor, board membership with sponsor, stockholder for mentioned product, any financial relationship to competitors of mentioned product, and others (please specify).

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Corresponding author (name/signature)

Date