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Scopus weighted CiteScore: A better alternative to plain CiteScore

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ABSTRACT

Objective. CiteScore has become a widely used tool for assessing journal performance in recent years. This paper aims to show the limitations of the plain CiteScore and propose a better alternative: the weighted CiteScore, which captures the percentage of publications cited and improves journal ranking.

Design/Methodology/Approach. Using an exploratory research methodology, we show the limitation of a plain CiteScore, calculated by dividing the past four years' citations by publications in the past four years. We demonstrate how a plain CiteScore can convey misleading results about the overall quality of a journal based on one or a few high-performing publications. Using the Wilcoxon signed-rank test, we prove that the journal Citescore ranking changed significantly using a weighted CiteScore method.

Results/Discussion. The analysis shows how a single open-access paper's citation can significantly swing the overall ranks and percentiles in a specific domain due to plain CiteScore. Weighted CiteScore better represents the journal's performance, considering the number of publications cited.

Conclusions. Results of ranking journals based on plain CiteScore can be misleading. Our hypothetical and empirical analysis shows the need for a weighted CiteScore methodology. There has to be a level playing field by factoring in the percentage of publication citations.

Originality/value. The paper makes a novel contribution by suggesting an accurate and fair performance metric. It will be of significant value to libraries and researchers when assessing the quality of a publication

Keywords: plain CiteScore; weighted CiteScore; Scopus journals; citation impact; research evaluation; journals ranking; education journals.

INTRODUCTION

ELSEVIER established the Scopus CiteScore, a journal performance indicator recently gaining popularity among scientists. Compared to Clarivate Analytics' Journal Impact Factor (JIF), it has been assigned to more journals, such as those listed in Scopus, but does not have a JIF (Teixeira da Silva, 2020). Introduced in December 2016 as a JIF substitute, the Scopus database made CiteScore's extensive journal evaluation coverage possible. CiteScore was allocated to 22,000 journals, whereas JIF examined approximately 11,000 journals (Van Noorden, 2016). CiteScore for over 46,000 journals is available in the Scopus database as of September 29, 2024, when this paper was written (Scopus, 2024). Since its debut, the CiteScore methodology has evolved. Citations and publications from 2017 to 2020 are included in the four-year time frame considered by the 2020 approach. This methodology has also been applied retroactively to the CiteScore from prior years. According to Scopus (2024), the new technique guarantees a consistent, reliable, and all-inclusive statistic representing the journals' impact factor (IF).

An example is provided to help understand how CiteScore is calculated. The 2023 CiteScore for the journal *Computers and Education* is 27.1. It has been calculated using the total number of papers published by the journal over the 2020-2023 period and the number of citations for the publication's documents during that same time. There are 20,486 citations for *Computers and Education* publications from 2020-2023 compared to 757 journals published during that time. Consequently, 27.1 (20,486/757) is the CiteScore. With 18,818 citations for 2019-22 and 791 total documents published during 2019-22, the same journal had a CiteScore 23.8 in 2022 (18,818/791 = 23.8) (Scopus, 2024). It would be pertinent to note the role of zero-citation papers in the context of journal rankings. While they form part of the denominator of the CiteScore formula, the absence of their citations in the numerator leads to a dilution of the CiteScore. Thus, zero-citation papers hurt the CiteScore and ranking of the journals.

There have also been some criticisms of the new strategy, as it incorporates more factors that reflect early citations. The updated CiteScore formula is biased in favor of journals with many early citations within four years after publication (Fang, 2021). Despite some of these complaints, CiteScore has received praise for being open, thorough, current, and free of charge (James *et al.*, 2018). According to the authors, the CiteScore journal rating metrics data can support librarians' strategic activities to support faculty and university libraries' joint decision-making processes (Torres, 2022). Experimentation with CiteScore involves discovering its prediction possibilities (Croft & Sack, 2022; Kumar *et al.*, 2023).

This paper aims to show the limitations of the plain (non-weighted) methodology for calculating CiteScore and the superiority of a weighted method for arriving at journal ranks. We hypothesize that the journal ranking will change significantly if a weighted Citescore methodology is used instead of the plain Citescore methodology. The changed ranking will better represent the journal's quality standing. To prove our point, we compare the CiteScore-based ranks of the top 10 journals in the Scopus Index's education domain using the two methods (plain and weighted CiteScores). Weighted calculation has been strongly hailed as a superior method compared to plain calculation in various contexts (Ahn, 2011; Ramentol *et al.*, 2015; Hidouri & Rebai, 2019; Stanley & Doucouliagos, 2015; Dana & Dawes, 2004; Graham *et al.*, 2011; Yadlowsky *et al.*, 2024; Colson & Cooke, 2017; Tarvainen & Valpola, 2017; Xi *et al.*, 2008). When all the numbers in a data collection are given the same weight, a simple average may not be as accurate as a weighted average. The weighted average considers how frequently, or essential certain aspects are within a data set.

This paper has an interesting background. As education is the authors' focus area of research, we looked at the CiteScore and patterns of a few top journals in this domain. The journal *Higher Education for the Future* caught our attention due to its phenomenal rise in the education domain's CiteScore performance over the past six years. Table 1 presents its CiteScore performance from 2019 to 2024.

Year	Citations for a four year-window	Publications during the four-year window	CiteScore	CiteScore Percentile	CiteScore Rank
2019	0	12	0	1st	1214
2020	8	24	0.3	15th	1115
2021	139	38	3.7	81st	257
2022	640	52	12.3	99th	14
2023	1251	52	24.1	99th	3
2024#	1474	46	32.0	99th	1

Table 1. CiteScore performance of *Higher Education for the Future* from 2019 to 2024.
Note: The number of citations, published documents, and CiteScore were updated as of
September 5, 2024; the percentile and Rank are authors' projections (Source: Scopus, 2024).

The numbers in Table 1 are quite interesting. They show how a journal with a CiteScore of 0 was in the 1st percentile, was ranked at the 1,214th position, and has dramatically risen to the 99th percentile and 3rd rank in 2023. We saw the CiteScore Tracker 2024 (as of 5th September 2024) scores for the top three journals in education, and they are 18.7 for the 1st-ranked journal *Computers and Education,* 17.1 for the 2nd-ranked journal *Review of Educational Research*, and 32.0 for the 3rd ranked journal *Higher Education for the Future*. Based on these numbers, we might expect that *Higher Education for the Future* will be the 1st ranked journal in 2025.

Given this fascinating case, we decided to probe further the progress of the journal *Higher Education for the Future*. The first abnormal thing we noticed was that, against the percentage of cited documents of around 90 for other journals, *Higher Education for the Future* has a percentage cited documents of only 60 percent. Table 2 shows the percentage of papers cited for *Higher Education for the Future* in recent years.

Year	CiteScore	Rank based on CiteScore	Percent documents cited
2023	24.1	3	60
2022	12.3	14	54
2021	3.7	257	53

Table 2. Percentage of documents cited for *Higher Education for the Future* (Source: Scopus, 2024).

This low percentage did not please us; the authors felt it needed to be examined in greater detail. Before doing this, we reviewed the literature on various aspects of CiteScore, including its comparison with similar journal quality metrics. The review went into some detail to determine if the percentage of publications cited has been previously investigated.

LITERATURE REVIEW

The JIF, another popular journal citation metric, has been criticized by several authors due to its lack of transparency (Archambault & Larivière, 2009). According to the study, measures were all created haphazardly or for objectives unrelated to those regulating the JIF's current usage. The outcomes are a flawed approach easily manipulated by journal editors and abused by those lacking critical thinking skills. Martin (2016) found that editors have devised creative ways to improve a JIF over time without seemingly breaking any restrictions. As a result, the JIF indicator has lost its credibility. Matthews (2015) states that editors might attempt to "coerce" authors to include citations in their journals in exchange for inclusion. The author also criticizes the "online queue," a relatively recent tactic in which journals post several papers online without publishing them. Although this enables them to increase the number of citations they acquire, these papers do not contribute to the denominator by which the citations are divided because articles are not counted until published. Vanclay (2012) finds several flaws in this widely used indication of journal standing. An analysis of Garfield's journal impact factor and its implementation as the Thomson Reuters impact factor reveals some main drawbacks. These include the lack of confidence intervals, the misleading display of three decimals that conceal the true precision, and the discrepancy between the citing and cited papers.

CiteScore has been regarded as a transparent, thorough, up-to-date, and free-access methodology to assess the impact factors of journals in contrast to the JIF (James *et al.,* 2018). Once the industry standard, Clarivate Analytics' JIF is losing ground to Scopus

(Elsevier) CiteScore, a journal-based metric (JBM) gaining more popularity quickly. The possibility that CiteScore, which is currently applied to more than 41,000 journals or other sources that Scopus index, could be "hijacked" to produce a false or misleading metric is one issue that doesn't seem to have been resolved yet. This tendency in "predatory" open-access publishing is already well-known to affect JIF. Still, predators in academic publishing are constantly seeking ways to increase the number of writers they may recruit as "prey." (Teixeira da Silva, 2021). Rajkumar *et al.* (2018) posit that CiteScore is a more accurate method of assessing the impact of citations on sources, including journals. It is an Elsevier metrics product that ranks journals based on citation information from the Scopus repository. CiteScore is a thorough, up-to-date, and cost-free assessment for source titles in Scopus. From the perspective of assessing metrics for all journals, Cite-Score is becoming more significant in addition to the Impact factor. Further, Ali (2021) states that CiteScore is the best indicator to replace the JIF. All parties involved should analyze the correlations between the different variables to gauge the scientific quality of library and information science (LIS) publications. Additionally, they can trust the CiteScore as a suitable substitute for the JIF.

An appealing substitute for the Clarivate Analytics impact factor is CiteScore, a Scopus/ Elsevier open journal statistic. The formula for calculating CiteScore was modified in the middle of 2020 to consider a four-year data frame instead of the prior three-year data set. To understand how CiteScore has changed, the authors extrapolated CiteScore data from Scopus for the top 1000 journals. It was discovered that between 2015 and 2019, the CiteScore grew yearly on average from 13.877 to 16.536. This usually indicates a continuous rise in citations over time, with more citations in each publication. Scholars should acknowledge this increase as evidence of improved quality (Okagbue *et al.,* 2021).

Comparative studies between CiteScore and JIF are on record. CiteScore and JIF are known to be positively connected. However, it is still up to question whether the latter can be used to forecast the former, particularly for journals classified according to the Science Network by subject. Okagbue *et al.* (2019) found notable positive connections between CiteScore and JIF. Predictors of CiteScore have been studied. The following factors or parameters positively correlate with a journal's CiteScore: Scimago Journal Rank, H-index, English papers, publication of review papers, and journal age. To improve the journal's visibility, it must be included in global repositories, particularly EMBASE, Web of Science (WoS), and PubMed. A journal's CiteScore can rise by publishing review papers that are frequently cited because they are thorough information sources. Additionally, the quantity of journal paper citations is increased by publishing more papers in English (Zolfaghari *et al.,* 2022).

CiteScore has been researched in specialized domains, such as computer science, theory, and methods journals (Okagbue *et al.,* 2020). Research on CiteScore has been conducted for a particular publication group. For instance, a study examined CiteScores of over 150 journals from the Hindawi publisher (Okagbue *et al.,* 2018). Research has shown a relationship between prestigious LIS publications' Impact Factor and CiteScore. According to the study, the CiteScore and the JIF have a significant positive association (r=0.787; rs=0.828) (Okagbue and Teixeira da Silva, 2020). Research assessing one journal's performance (Ambiente & Água Journal) using CiteScores is observed. An indicator of the effectiveness of the journal's plan to raise its profile in the global scientific community is an improvement in the CiteScore (Dias, 2021). According to the Henao-Rodríguez *et al.* (2019) analysis of over 100 publications CiteScore from 2014 to 2016, the journals with the most significant influence include those in the domains of finance, immunology and microbiology, econometrics, economics, business, administration and accounting, arts and humanities, and medicine.

In June 2020, a modification to the CiteScore methodology was declared. The impact of these modifications was assessed for forty journals selected from the top five and middle five journals (CiteScore) in the domains of general physics and astronomy, medicine, material science, and social sciences. They were compared to their impact factors. It was discovered that the new methodology tended to favor publications with rapid citations but was less susceptible

to the influence of a journal's editorial content proportion (Trapp, 2020). There is research that contrasts CiteScore with JIF. Salisbury (2020) has emphasized the methodologies' parallels and contrasts. Variations in how journals are categorized in CiteScore and JIF methodologies lead to disparities in the results. Pharmacy has been combined with pharmacology in Journal Citation Reports while listed as a separate topic in CiteScore. In contrast to more accurate CiteScore scores, this merging necessitates greater clarity (Fernandez-Llimos, 2018).

CiteScore has made it feasible to compare the impacts of open access and subscription journals. The CiteScore of 15,040 subscription-based and 2542 open access publications indexed in Scopus between 2014 and 2016 were shown and examined based on five inclusion criteria (Atayero *et al.,* 2018). Similarly, Li *et al.* (2018) examined how open access affected the journals' CiteScore. While generally beneficial, the impact varied depending on the kind of journal. Two distinct forms of non-homogeneous usage effects were specifically investigated: (1) varied treatment effects between publications categorized by publisher, level, and academic discipline, and (2) differential impacts of open access on treatment tendency. A study on journal quality (Erfanmanesh, 2017) found that, across all academic disciplines except for nursing and the health professions, non-open access publications achieve statistically significantly higher average quality than open access journals as measured by CiteScore, Scimago Journal Rank (SJR), and Source Normalized Impact per Paper (SNIP).

Suggestions for improvement in CiteScore are seen. Scholars have called for greater clarification on "N/A" ratings rather than the CiteScores given to LIS journals (Krauskopf, 2020). CiteScore should be restricted to assessing the effect of citations of publications within similar disciplines. The citation impact of titles across various domains is compared using the CiteScore percentile. The metrics basket encourages responsible and significant decision-making input (Colledge *et al.,* 2017). Results regarding Citescore, Eigenfactor Score (EFS), SNIP, SJR, Internal Impact Factor (IIF), Article Influence Score (AIS), and JCR IF scores for the top six English occupational therapy journals point to the need for a robust evaluation of publication

and paper ranks, as opposed to the current and common practice of using IF scores alone over several domains (Brown & Gutman, 2018).

CiteScore related to the conference has also been researched. When used to assess the caliber of computer science conferences, the CiteScore approach works exceptionally well as a standard for assessing and contrasting computer science publication sites. While the CiteScore approach has become a standard tool for evaluating conference quality, Scopus still has to enhance a few indexing methods as the database (Meho, 2019). A system for rating conferences could assess the caliber of important conferences across numerous domains. CiteScore from Scopus is a well-known evaluation metric. Computer science might cover a tiny percentage of conferences —roughly 180 out of thousands— across all industry sectors (Wahakit, 2021).

A review of 150 journal articles written in second languages found numerous common statistical violations. These included concluding descriptive data, failing to account for multiple comparisons, effect sizes, inconsequential results, insufficient reporting of validity, and assumption checks. Journal statistical quality was assessed using Scopus citation analysis metrics and journals indexed in the Social Sciences Citation Index (SSCI) database. According to Al-Hoorie and Vitta (2019), no convincing evidence was found to support the recently adopted CiteScore over SNIP or SJR.

More comparative studies are seen. The bibliometric indices EFS, CiteScore, SNIP, and SJR are alternative bibliometric indices that journal editors have chosen to publish in the past ten years in parallel to the IF; however, the relationships between them are poorly understood. The results lend credence to the theory that when compared to other measures, IF does not show the best correlation. Radiologists, interventional radiologists, or nuclear medicine practitioners should thoroughly understand the connections between journal bibliometrics while making decisions during the manuscript submission phase (Villaseñor-Almaraz *et al.,* 2019). A bibliometric examination of forty-four typical family studies journals examined the relationships between the bibliometric metrics of the two-year and five-year latest CiteScore, the H-index, and the JIF. The citation data

were sourced from Google Scholar, Scopus, and Journal Citation Reports. Using correlation analysis, strong positive associations were identified between the measures. Despite the high relationships, inconsistencies in journal rankings were discovered (Liu, 2021).

Citation inequalities are a natural phenomenon and have been of research interest. For instance, Ghosh *et al.* (2014) have drawn a parallel between social inequalities among nations based on unequal income or wealth distribution and inequality in citation distributions. Based on Gini-index (g), authors have devised a K-index to reflect citation inequalities. Further, Chatterjee *et al.* (2016) have found that it is possible to rescale the probability distributions of citations for specific institutions to a common shape by scaling the citations by the average number of citations for that institution, even when the average number of citations varies significantly among institutions worldwide. Regardless of the average number of citations per piece, this trait appears consistent across various institutions. Ghosh and Chakrabarti (2021) hypothesize that the limiting (effective saturation) value of the Gini (g) and Kolkata (k) indices is approximately 0.865 based on certain analytic structural aspects of these indices for social inequality, as derived from a generic form of the Lorenz function. In highly competitive settings, such as markets, universities, or wars, this, along with some additional recent findings on the citation statistics of individual authors (including Nobel laureates), indicates that roughly 14 % of people, papers, or social conflicts tend to earn or attract or cause about 86 percent of wealth or citations or deaths, respectively.

The review shows that CiteScore methodology is an emerging and appealing area of research. However, comparing a plain CiteScore with a Weighted CiteScore reveals a clear research gap.

METHODOLOGY

The methodology is designed to compare two models of CiteScore – plain and weighted. Scopus currently uses the plain version. It calculates CiteScore by simply dividing the citations for the journals during four years by the total number of documents published during the same period. The weighted version proposed in this paper applies weights of percentage documents cited to the plain CiteScore and then divides the weighted CiteScore by the total number of publications. Both models eventually led to journal rankings. However, the weighted model leads to a better representation of the ranks.

We applied the exploratory research method. Taking cues from broader indicators, we investigated finer details related to citation of publications for the journal *Higher Education for the Future* as a case study to prove the point that we want to make in this paper, that a weighted CiteScore is a better alternative to a plain CiteScore. The research was based on published secondary data related to CiteScores from the education domain with some focus on the metrics of the journal *Higher Education for the Future*. The steps are outlined below:

1. Observe abnormal variations in the percentage of documents cited for the top education domain journals based on their 2023 CiteScores. This step was done by observing the "% Cited" column of the top 10 journals in the education subject area on the Scopus' Sources page (Scopus, 2024).
2. Similar percentages for a few more years confirmed the abnormality. To do this, the year in the "View metrics for year" tab on the Scopus' Sources page was changed from 2023 to 2022 and 2022 to 2021.
3. Construct a hypothetical example to highlight the anomaly resulting from ignorance of the percentage document cited in the CiteScore interpretation. Ten journals named A to J were taken and hypothetically assigned citations of 1,000 each, and documents published 100 each, leading to a plain CiteScore of 10.0 each with an equal rank of 1 for all the ten journals. However, to highlight the anomaly, Percent Documents Cited were taken as 1 for Journal A, 10 for Journal B, and so on, up to 90 for Journal J (please refer to Table 3 for details).
4. Zero in on the finer details of the journal *Higher Education for the Future* to support the hypothetical example. The journal *Higher Education for the Future* was clicked in the Scopus Sources list, and the CiteScore Tracker 2024 (updated as of 5 September

2024) was seen. It showed 1,474 citations for the 46 documents published by the journal. Next, we visited the journal's website (Higher Education for the Future, 2024) and checked the latest 46 publications for their citations from the "Metrics and citations" tab (please refer to Table 5 for details).

5. Suggest an alternative weighted method of computing the CiteScore. The alternative method used "percentage documents cited" as the weight to recalculate the plain CiteScore into a weighted CiteScore. Ranks were assigned based on the weighted CiteScore (please refer to Table 4 for details).

6. Compare the plain CiteScore and weighted CiteScore method results. The plain CiteScores and weighted CiteScores for the top ten journals from the education subject area were compared using the Wilcoxon signed-rank test to determine whether the difference between ranks based on plain CiteScores and weighted CiteScores differ and whether the difference is statistically significant at a 95 percent confidence level (please refer to Tables 6 and 7 for details). The hypothesis

that the ranks under the two methodologies do not differ significantly was tested.

7. Justify the merits of the weighted CiteScore method over the plain CiteScore method. This was done based on the results of the hypothesis testing.

RESULTS AND DISCUSSION

We recapitulate the results of our preliminary data analysis presented in Tables 1 and 2. Table 1 points out that the journal *Higher Education for the Future* has shown a meteoric rise within a short span in the CiteScore-based evaluations of the education domain journals. However, Table 2 shows that the percentage of documents cited is relatively low (< = 60 percent) compared to the other top journals (around 90 percent), prompting us to investigate the matter in greater detail. Further, the literature review pointed to a clear research gap. Table 3 presents a hypothetical example of ten journals ranked as per the CiteScores, assuming that the hypothetical ten journals are the only journals in a specific domain.

Journal	Citations	Documents Published	Plain CiteScore	Percent documents cited	Rank as per plain CiteScore
A	1,000	100	10.0	1	1
B	1,000	100	10.0	10	1
C	1,000	100	10.0	20	1
D	1,000	100	10.0	30	1
E	1,000	100	10.0	40	1
F	1,000	100	10.0	50	1
G	1,000	100	10.0	60	1
H	1,000	100	10.0	70	1
I	1,000	100	10.0	80	1
J	1,000	100	10.0	90	1

Table 3. A hypothetical example of the top ten journals ranked as per the CiteScore (Source: Authors own work).

Table 3 looks all right and quite weird as well. It seems all right, given the equal plain CiteScores leading to first rank for all the ten journals. It looks strange when we consider the percentage of documents cited. Currently, citation inequalities are not impacting the journal rankings. Journal A, with a mere one percent of documents cited, is sitting at an equal position with journal J, which has 90 percent of documents cited, which is unfair. We argue

that weights should be assigned given the fair representation they give to results (Ahn, 2011; Ramentol *et al.,* 2015; Hidouri & Rebai, 2019; Stanley & Doucouliagos, 2015; Dana & Dawes, 2004; Graham *et al.,* 2011; Yadlowsky *et al.,* 2024; Colson & Cooke, 2017; Tarvainen & Valpola, 2017; Xi *et al.,* 2008). Table 4 is reconstructed by applying the percentage of publications cited as weights to the plain CiteScore, and the ranking is reworked accordingly.

Journal	Plain Citations	Documents Published	Percent documents cited used as weights	Weighted Citations (Citations x Weights)	Weighted CiteScore (Weighted Citations / Documents Published)	Rank as per weighted CiteScore
A	1,000	100	1 (0.01)	10	0.1	10
B	1,000	100	10 (0.10)	100	1.0	9
C	1,000	100	20 (0.20)	200	2.0	8
D	1,000	100	30 (0.30)	300	3.0	7
E	1,000	100	40 (0.40)	400	4.0	6
F	1,000	100	50 (0.50)	500	5.0	5
G	1,000	100	60 (0.60)	600	6.0	4
H	1,000	100	70 (0.70)	700	7.0	3
I	1,000	100	80 (0.80)	800	8.0	2
J	1,000	100	90 (0.90)	900	9.0	1

Table 4. A hypothesized example with weighted CiteScore (Source: Authors own work).

Look at how the ranks based on weighted CiteScores change radically and, more importantly, logically. Based on Table 3 and Table 4, we posit that a plain CiteScore can produce misleading rank results. Which is why, it is important to factor in the percentage of publications cited to have an accurate, and correct representation of the journal's overall quality. The plain CiteScore misses the variation in the percentage of publications cited, leading to an inaccurate measurement of the journal's overall quality. Table 3 shows how a journal (journal A) with barely one percent publication citation can distort the results. It stands at par with a 90 percent publication citation journal (journal J) due to a plain CiteScore, which is quite unfair. Few papers attracting high citations do not represent the journal's overall quality. On the other hand, the higher percentage of papers getting cited is a fair and accurate indicator of the journal's overall quality. Just because a single paper out of the 100 publications (journal A) has been cited 1,000 times, it cannot put the journal at par with another journal whose 90 percent papers have collectively fetched 1,000 citations. This is an illogical, unfair, and incorrect representation of the quality of a journal. It is precisely to handle such anomalies that weights come into the picture.

Next, we zero in on the finer details of the journal *Higher Education for the Future* to support the hypothetical example. CiteScore Tracker 2024 for this journal (as of 29th September 2024) shows 1,474 citations for the 46 indexed documents. We went to the journal's website (Higher Education for the Future, 2024) and compiled citations for each of its 46 publications that constitute the denominator in the calculation of the plain CiteScore. Table 5 details the 46 publications of *Higher Education for the Future*.

The total citations as per the Scopus CiteScore Tracker 2024 and those as per the journal's own metrics and citations records for the 46 publications do not match with a difference of 161 citations (1,474 citations as per Scopus and 1,313 citations as per the journal record). The investigation of this difference is outside the scope of this paper. We use the journal's citation record for our analysis and show some highly startling facts. There is one paper (serial number 45 in Table 5) published by the journal "A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning" (Pokhrel & Chhetri, 2021) that has a whopping 1,373k views and 1,060 citations. The paper is an open access publication, thanks to the free open access policy announced by Sage Publications for all Covid-19 publications (Sage, 2020). One paper, a single paper from the journal with 1,060 citations out of 1,313 citations (per the journal's record), represents 81 percent of the total citations! As per the journal's record, out of the 46 publications, there are as many as 22 papers with no citations (48 percent), which means that there are only 24 papers that have one or more citations (52 percent). Of these cited 24 papers, only one paper (Pokhrel & Chhetri, 2021) has as many as 1,060 citations; the second highest is a paper (Kapilan *et al.,* 2021) with just 83 citations per the journal record. This is also an open access publication. Riding on the 1,060 citations of one paper, the journal is all set to grab the first rank in the education domain in

Sr. No.	Title Number	Year of Publication	Citations
1	Title Number 1	2024	0
2	Title Number 2	2024	0
3	Title Number 3	2024	0
4	Title Number 4	2024	0
5	Title Number 5	2024	0
6	Title Number 6	2024	0
7	Title Number 7	2023	1
8	Title Number 8	2023	0
9	Title Number 9	2023	1
10	Title Number 10	2023	1
11	Title Number 11	2023	0
12	Title Number 12	2023	0
13	Title Number 13	2023	0
14	Title Number 14	2023	1
15	Title Number 15	2023	0
16	Title Number 16	2023	1
17	Title Number 17	2023	0
18	Title Number 18	2023	2
19	Title Number 19	2022	5
20	Title Number 20	2022	3
21	Title Number 21	2022	0
22	Title Number 22	2022	0
23	Title Number 23	2022	0
24	Title Number 24	2022	0
25	Title Number 25	2022	0
26	Title Number 26	2022	2
27	Title Number 27	2022	0
28	Title Number 28	2022	0
29	Title Number 29	2022	2
30	Title Number 30	2022	2
31	Title Number 31	2022	1
32	Title Number 32	2022	9
33	Title Number 33	2021	2
34	Title Number 34	2021	0
35	Title Number 35	2021	1
36	Title Number 36	2021	21
37	Title Number 37	2021	4
38	Title Number 38	2021	19
39	Title Number 39	2021	83
40	Title Number 40	2021	0
41	Title Number 41	2021	27
42	Title Number 42	2021	26
43	Title Number 43	2021	0
44	Title Number 44	2021	12
45	Title Number 45	2021	1060
46	Title Number 46	2021	27
	Total		**1313**

Table 5. Citations for the latest 46 publications by *Higher Education for the Future* (Source: Higher Education for the Future, 2024).

2025, based on the plain CiteScore of 2024. It is an extraordinary yet genuine case of a single paper changing the entire dynamics in the plain CiteScore domain of education, leading to significant changes like a journal rising from 1214th in 2019 to the first in 2024. Readers will agree that Table 3, which gives a hypothetical example, can be a reality. We prove our claim of the fallacy in plain CiteScore calculations based on empirical evidence. The following questions come up for serious consideration by experts in the domain of assessing journal quality:

1. Does a single/few papers' quality (CiteScore) fairly represent the quality of the entire journal?
2. Is it fair to the other peer-reviewed journals with a sizable percent of publications cited to see a single/few papers' abnormal citations benefitting another journal?

Our answers to these questions are given below:

1. A single/few papers' quality (CiteScore) grossly misrepresents the entire journal's quality.
2. It is unfair to other peer journals with a sizable percentage of publications cited to see a single or a few papers' abnormal citations benefit another journal.

Next, we turn to our alternative mechanism of calculating a weighted CiteScore. Table 6 compares the plain CiteScore and weighted CiteScore for the 2023 CiteScore-based top 10 journals from the education domain.

Rank as per plain CiteScore	Citations	Publications	Plain CiteScore	Percent publication cited (weights)	Weighted Citations	Weighted CiteScore	Rank as per Weighted CiteScore
1	20486	757	27.06	0.92	18847	24.9	1
2	2242	93	24.11	0.92	2063	22.2	2
3	1251	52	24.06	0.60	751	14.4	9
4	3186	162	19.67	0.96	3059	18.9	3
5	3390	175	19.37	0.88	2983	17.0	7
6	4594	238	19.30	0.90	4135	17.4	6
7	1791	93	19.26	0.97	1737	18.7	4
8	2467	128	19.27	0.93	2294	17.9	5
9	19050	1062	17.94	0.90	17145	16.1	8
10	4095	242	16.92	0.80	3276	13.5	10

Table 6. Comparative analysis between plan and weighted CiteScore
(Source: Authors own calculation based on CiteScore data of 2023).

Ranked third in the list, the journal *Higher Education for the Future* is more correctly represented at the ninth rank due to weighted CiteScore because it has a much lower percentage of publication citations, 60 percent. Also worth noting is the case of the 7th ranked (based on plain CiteScore) rising to the fourth due to the weighted CiteScore because it has a much higher percentage of publication citations, 97 percent. To test the hypothesis that the ranks under the two methods do not differ significantly, the Wilcoxon signed-rank test was applied to the two sets of plain and weighted CiteScores, as shown in Table 6. The results obtained from the test are presented in Table 7.

Method	Mean	Standard Deviation	Variance (V)	p-value
Plain CiteScore	20.696	3.235	96.250	0.002**
Weighted CiteScore	18.110	3.391		

Table 7. Results of Wilcoxon signed-rank test. Note: *p<0.05. **p<0.01. ***p<0.001.
The hypothesis that journal ranks under the two methods differ significantly
was supported. (Source: Secondary data analysis).

Results of Table 6 and Table 7 make a strong case for using a weighted CiteScore methodology as it gives a fair representation of the percentage of publications cited, which correctly reflects the journal's overall quality. While the plain CiteScore has its merit in its simplicity and has been appreciated by researchers (Da Silva Teixeira, 2021; Rajkumar *et al.,* 2018; Teixeira da Silva & Memon, 2017; Ali, 2021), it has a flaw, as explained in this paper. Assigning weights to the citations in the percentage of publications cited is a better alternative. Our proposal for a weighted calculation is well in line with number of studies that have vouched for use of a weighted metric (Ahn, 2011; Ramentol *et al.,* 2015; Hidouri & Rebai, 2019; Stanley & Doucouliagos, 2015; Dana & Dawes, 2004; Graham *et al.,* 2011; Yadlowsky *et al.,* 2024; Colson & Cooke, 2017; Tarvainen & Valpola, 2017; Xi *et al.,* 2008).

What do the percentages of publications cited weight exactly do? It rewards journals that have a higher number of cited publications. The number of citations is maintained if the percent of publications cited is 100. It decreases as the percentage of publications cited decreases. It penalizes the journals for fewer numbers of percent of publications cited. This creates a level playing field when we compare ranks, especially in a tightly competitive space. An important consideration in the weighted CiteScore is that CiteScore metrics measure the quality of the entire specific journal and not the quality of one/few publications. The problem with a plain CiteScore is that it is highly skewed towards the quality of cited publications. However, it does not adequately consider the publications that are not cited, which also measures the quality of the journals. A weighted CiteScore, on the other hand, considers both cited and non-cited publications. It neutralizes the undue advantage a journal might get because of a single/few highly cited publications, as we have demonstrated hypothetically (Tables 3 and 4) and based on empirical evidence (Table 6).

The weighted CiteScore methodology has essential merits. When the percentage of publications cited is considered, journal editors will naturally be more alert when choosing publications with the potential for citations. In other words, the quality bar will be raised further. Editorial rigor will increase, leading to a direct impact on improved quality of publications. Because the weighted CiteScore penalizes the journal for papers that do not fetch citations. Authors will have to put more effort into reporting very high-quality research. If their paper remains non-cited, it will bring down the weighted CiteScore and adversely impact the journal's ranking. We have illustrated how a third-rank journal, *Higher Education for the Future,* slips significantly to the ninth rank due to a high percentage of non-cited papers. Weighted CiteScore methodology is all for fairness in quality assessment. It does not allow non-cited documents to enjoy the journal's high CiteScore because there are few highly cited papers. The proposed methodology thus has clear merits in the form of improved quality of research and research publications and a fair assessment of the quality of journals.

CONCLUSION

The results of the hypothesis testing led us to conclude that journal rankings based on plain CiteScore and weighted CiteScore differ significantly. Thus, when percentage cited factors are factored in, significant rank changes occur, and the ranking with a weighted CiteScore offers a more logical representation of the overall quality of journals. Our research is no rocket science. It suggests a simple, rational, and common-sense-based improvisation in the existing plain CiteScore methodology used by Scopus.

We conclude that results of ranking journals based on plain CiteScore are misleading, as illustrated through the case of a single highly cited paper (Pokhrel & Chhetri, 2021), which can cause significant swings in the overall rankings of the journals in a specific domain. Our hypothetical and empirical analysis shows the need for a weighted CiteScore methodology. Due to its significantly lower ratio of published citations (60 percent), the journal *Higher Education for the Future* ranked third on the list, and it is more accurately reflected at the ninth position by weighted CiteScore. It is also important to note how the weighted CiteScore, which has more published citations (97 percent), caused the seventh-ranked (based on simple CiteScore) to move up to the fourth rank. There has to be a level playing field by factoring in the percentage of publication citations. One paper alone should

not dictate the fortunes of an entire journal and the peer journals in the same domain.

We must understand the repercussions of the misrepresentation from the plain CiteScore. It can increase a journal based on single/few papers with high citations. At the same time, it can lead to a significant decline in the ranks of such journals in a short time. *Higher Education for the Future* is set to become the number 1 journal in the Education domain in 2025. However, it will see a significant decline in 2026. Because for the 2025 CiteScore computations, the 2021 paper (Pokhrel & Chhetri, 2021) will not be under consideration, and this would lead to a sudden sizable drop in its CiteScore and rank based on CiteScore — the weighted CiteScore moderates such wide fluctuations. The method we proposed is straightforward to apply. One has to calculate weighted citations using the percentage of published citations as weights and then work out the weighted CiteScore. The data of the weights that we have suggested is already available with Scopus, and it is displayed in a separate column in the CiteScore listings. Many users of the CiteScore would not understand the more profound repercussions of the percentage of published citations, as we have demonstrated through hypothetical and real-life examples. Hence, the percentage published citation column should be more effectively used.

Our study significantly contributes by highlighting a significant anomaly associated with plain CiteScores. We critically evaluate the plain CiteScore parameter through conceptual and empirical analysis and pitch a better alternative with a weighted CiteScore. It makes a unique addition to the LIS and Scientometrics literature by unfolding the misrepresentation that a plain CiteScore does. It creates a launching pad for further similar research in various domains (subject areas) of the Scopus index database. Like social inequalities, citation inequalities will be there. We have not made any attempt to mitigate these inequalities. Instead, we have attempted to address the unfair representation of journal rankings through a weighted methodology.

Our study implies that Scopus should seriously consider the alternative methodology of calculating a weighted CiteScore instead of a plain CiteScore. More research is invited on

the CiteScore methodology, gaining popularity among academicians, educational institutions, researchers, funding houses, and other stakeholders. The study should address any irrationalities and imbalances in the methodology. Researchers should suggest variants of CiteScore to reflect a more correct, accurate, and fair measurement of the overall quality of the journals.

The limitation of our study is that our analysis was restricted to a single domain of education. However, we looked at the percentage publication citations of 46,704 journals and found high variations in the top three journals. *Ca-A Cancer Journal for Clinicians,* the number one ranked journal on an overall basis, has a percentage publication citation of 95 percent; the second-ranked journal, *Nature Reviews Molecular Cell Biology,* has a percentage publication citation of 92 percent, but the third-ranked journal, *The Lancet,* and has a much lower a percentage publication citation of 74 percent. Thus, there is a possibility of such cases in several domains.

Conflict of interests

Authors have no competing or conflicting interests to declare.

Contribution statement

Conceptualization & Visualization: Atul Kumar
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Statement of data consent

The data generated during the development of this study has been included in the manuscript. ●

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