

# Cybermetrics Higher Educational Institution (HEI) Ranking Strategies: Useful Lessons for HEI's in Ghana to Adopt

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## Abstract

Statistics from top world University and higher educational institution ranking agencies including Cybermetrics Lab reveal Ghanaian universities ranking relatively low among their African counterparts in particular and the world at large. To understand this trend of occurrence an online survey was conducted for an in depth study of Cybermetrics Lab ranking methodology to help create awareness of strategies Ghanaian universities can adopt to improve their ranking positions. This study, which employed the Review Research Method, brought to the fore, three key ranking indicators as bases for its rankings "Visibility, Transparency and Excellence". Again, the best practices of the three topmost higher institutions on its ranking list were also examined to understand the secret behind their impressive performance. This paper reports on this study and proposes three strategic schemes that when considered effectively can help Higher Educational Institutions in Ghana improve their ranking standings. Firstly, the adoption of problem-based learning pedagogies, secondly, fostering of e-learning systems in tertiary institutions and thirdly, the promotion of open-access institutional repositories to publish and share high impact scientific, technological and cultural knowledge generated by the lecturers of the institutions.

## Keywords

Cybermetrics Lab, Ranking Indicators, Problem-Based Learning, E-Learning Systems, Open-Access Institutional Repositories

## 1. Introduction

One of the major expectations of the Ministry of Education in Ghana is for academic programmes and research activities in Higher Educational Institutions (HEI)

to be of much greater relevance to national development and poverty reduction (MOE, 2003). This has compelled HEI's in Ghana to create conducive learning environments for students, support quality teaching, fund research/publication and render service to community. There is therefore the constant need to evaluate performance of these HEI's of learning on the three mandatory core aspects of academic activities (*teaching, research and service to community*) to ensure that they carry out the purpose for their establishment.

Laudably, some organisations have set the stage for ranking HEI's although critical issues to buttress reasons why many observers have serious reservations about the ranking methodology have been raised to threaten the credibility of the entire exercise (Damtew, 2015). This notwithstanding, ranking exercises have become a major source of influence on university administrators to set strategic policy frameworks and priorities for enhancing standards in their institutions.

Ranking statistics from top world University and higher educational institution ranking agencies including Webometrics, reveal Ghanaian universities ranking relatively low among their African counterparts in particular and the world at large. The essence for conducting in-depth review of Webometrics ranking methodology was to investigate, analyse and establish credible facts about the key indicators, which account for its ranking, to create awareness on the appropriate strategies Ghanaian universities should adopt in order to improve their positions on of the ranking ladders of the top ranking agencies in the world. The choice of Webometrics was because it considers all the universities of the world, and not only a few hundred institutions from the developed world.

Universities generally have teaching, research work and service to community as core aspects of their mission even though research and publication have been given more prominence hence the impression that failure to research and publish is a sign of non-performance. In academia, the axiom "publish or perish" is often stated to drum home the importance of research and publication as a tool for giving direction to industry on how to resolve scientific and technological problems. Despite its derision and the reason for the flooding of email inboxes with invitations from all manner of weird journals to publish with them, the phrase has positively become a source of motivation for whipping up research activities among faculty members in various HEIs.

Many academicians are now enthusiastic about reporting on their research findings, and evidential theories relevant for the progress of work in the sciences and humanities. Undoubtedly, academic journals remain the most preferred platform by which researchers report on the details of their research findings. Again, many authors desirously seek to publish in what they describe as top-notch high impact journals because many assessors use that as a yardstick for endorsing applications for promotion in HEI.

Research publication is a good strategy for connecting academia to the community and industry, making known the endeavours of institutions in meeting socio-political, scientific and technological needs of society. Research activities help to provide a bank of scholarly information for broadening the frontiers of

learning. Clientele from both industry and commerce derived their sustenance from the body of theoretical knowledge of researchers. A neglect of research activities therefore is an obvious recipe for eroding intellectual foundations.

People of the learning community, commerce and industry have become more comfortable with online search for solutions to medical, agricultural, domestic and even religious problems. The most active work force today as well as students of all categories are accustomed to internet learning materials especially with the proliferation of laptops, Ipads, tablets and smart phones. This implies that the more quality content materials become visible on the internet, the higher their impact will be felt by people who access the internet for solutions to their problems. It is not surprising that visibility of high impact intellectual content materials on the internet has become a major key indicator for ranking HEI's by all the top ranking agencies in the world.

## 2. Literature Review

### Development of Webometrics Ranking

The emergence of ranking systems can be traced back in 1865 to European studies that aimed to define whether environment or heredity was the determining factor in producing man of genius. The purpose was to examine the quality of institutions and affiliated scholars in science and medicine whereby the results influenced the thinking of educators regarding quality assessment. During the twentieth century several evaluation and ranking systems for educational institutions appeared from time to time emerging with different aims and objectives (Khamala et al., 2018).

The logic of the metric was derived from the importance of citations in journal impact factors although web impact factor had the advantage of easily being calculated using the new advanced search queries introduced by AltaVista. Webometrics subsequently rose to become the large coherent field within information science from the bibliometric perspective (Zhao & Strotmann, 2008), encompassing link and web citation analysis as well as range of other web-based quantitative techniques. Modern form of educational ranking was originally introduced by United States News and World Report over two decades ago in order to publish transparent comparative data about the institutions.

"Webometrics ranking", as it is well known, considers all the universities of the world, and not only a few hundred institutions from the developed world. It is an initiative of the Cybermetrics Lab, a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain with credible strategies for ranking Universities and HEI's. CSIC is among the first basic research organizations in Europe consisting of 126 centres and institutes distributed throughout Spain. It is a Spanish National Research Council devoted to the quantitative analysis of the Internet and Web contents especially those related to the processes of generation and scholarly communication of scientific knowledge (Webometrics, 2022).

University rankings differ immensely from one another with each ranking sys-

tem having different weights of measures in determining the performance. It was the International Ranking Expert Group (IREG) which established in Berlin, guidelines for university rankings known as the “Berlin Principles” with the aim of supporting continuous improvement and refinement of the methodologies used to conduct the process. Well known Global ranking systems include the Shanghai, Quacquarelli Symonds, Times Higher Education, Higher Education Accreditation and Evaluation Council of Taiwan region. Generally, Universities are ranked by several indicators of academic or research performance including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in the journals “Nature” and “Science”, papers indexed in major citations, and the per capita academic performance of the institution (Khamala et al., 2018).

### 3. Methodology of the Study

This research was conducted based on the review research methodological scheme, a scheme, which helps researchers to bring meaning to a subject matter of great importance to them by examining or reviewing research papers and impactful documents on similar issues that other researchers have investigated and published.

Rowley & Slack (2004), has Intimated that literature review should distil existing literature in a subject field purposely to summarize the state of the art in that subject field by which the researcher can identify specific areas in which further research would be beneficial. The review must help to define research propositions and methodologies. Review research must as a matter of importance, avoid the popular textbook-like review approach, but succinctly focused on supporting the identification of a research topic, research question or hypothesis and identify the literature to which the research will make a contribution, and contextualising the research within that literature.

According to Abdullah et al. (2014), reviews from scholarly articles, research journals, books, computers and vast electronic sources, should bring to readers content and quality knowledge already available, to impact on a current field of study. It should serve as the theoretical foundation for a subject under study. One of the purposes for undertaking literature review is to elicit information for developing theories, policies and evidence-based care for an academic assessment. Review research becomes useful when a research objective focuses on providing an overview of a certain issue or research problem as well as when investigating to evaluate the state of knowledge on a particular topic (Snyder, 2019).

The above submissions are in consonance with the basis for which this review was conducted to highlight from other experts sources, the strategies for improving university rankings, which has become a major criteria for assessing the performance of higher educational institutions on the global stage.

In this study therefore, relevant reports and research papers were reviewed and relevant information were extracted and analysed to provide the alternative solution to the subject matter of the study. Information from Webometrics, a

ranking institution initiated by Cybermetrics Lab, a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain with credible strategies for ranking Universities and HEI's was the focus of the study.

## 4. Discussion

### 4.1. Webometrics Ranking Indicators (Aguillo, 2022)

Webometrics does not just evaluate university websites, their design or usability or the popularity of their contents according to the number of visits or visitors. It aims at ranking all the universities in the world, promoting their academic web presence, supporting the open access initiatives for increasing significantly the transfer of scientific and cultural knowledge generated by the universities to the whole society. It considers Web indicators as proxies in the correct, comprehensive, deep evaluation of the university global performance, taking into account universities' activities and outputs and their relevance and impact. It evaluates every university's global performance taking into account its web presence that reflects accurately its academic activities in terms of the volume and quality of its electronic publications as well as the relevance and impact of the publications. Webometrics ranking correlates well with the quality of education the university provides as well as its academic prestige. It also measures, in an indirect way, other missions like teaching, considering not only the scientific impact of the university's academic activities, but also the economic relevance of the technology transfer to industry, the community engagement (social, cultural, environmental roles) and even the political influence. On the topic of Research output, it does not only evaluate formal (e-journals, repositories) publications but also informal scholarly communication.

Currently, Webometrics ranking uses a composite indicator of Visibility, Transparency (Openness) and Excellence (Scholar) related variables to evaluate and assess a university's global performance. Visibility represent 50%, Transparency represent 10%, and Excellence represent 40% of the total weighting as defined in

**Table 1.**

**Table 1.** Webometrics description of ranking indicators.

Indicators	Meaning	Methodology	Source	Weight
<b>Visibility</b>	Web contents Impact	Number of <b>external networks</b> (subnets) linking to the institution's webpages (normalized and then the maximum value is chosen)	<i>Ahrefs Majestic</i>	<b>50%</b>
<b>Transparency (or openness)</b>	Top cited researchers	Number of <b>citations</b> from <b>Top 210 authors</b> (excluding top 20 outliers)	<i>Google Scholar Profiles</i>	<b>10%</b>
<b>Excellence (or scholar)</b>	Top cited papers	Number of <b>papers</b> amongst the top 10% most cited in each one of the all 27 disciplines of the full database Data for the five year period: <b>2016-2020</b>	<i>SCImago</i>	<b>40%</b>

Source: <https://www.webometrics.info/en/Methodology>.

By Webometrics methodology, published values on their ranking tables only show individual HEI performances. The values are actually not used in the calculations but by its calculation schemes, the lower the value, the better the performance.

Pelgen (2015), a Sunshine Coast-Based Search Engine Optimisation (SEO) expert, SEO agency founder and former Head of “Search” for one of Australia’s leading Digital Marketing Agencies and an owner and investor in a variety of businesses, offers meaningful explanations regarding the online visibility. Significant among his submissions is that when people have problems that need solving and they go online to do their research, the website that is easily found for the keywords and phrases best related to the problem, is said to have online visibility.

Since research is one of the cardinal activities of lecturers, Pelgen’s submission becomes vital for consideration in enhancing online visibility. By Pelgen’s explanation, visibility criteria can be met if lecturers research into pertinent issues bordering on problems of society, industry and commerce and publish them in high impact journals. This is because when people have problems that need solving and they go online to do their research, such research papers would easily be found. Online Visibility is about being found across online channels for a given search query including keyword(s) and phrases best related to critical issues.

#### 4.2. Performance of HEI’s in Ghana as at January 2022

There are about ninety (90) HEI’s in Ghana. University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Cape Coast (UCC) and University for Development Studies (UDS) are currently the four (4) topmost HEI’s ranked among the top one hundred higher institutions in Africa by webometrics 2022 ranking (Webometrics, 2022a) (Table 2).

Ghana Institute of Management and Public Administration (GIMPA) is ranked at the 127<sup>th</sup> position whilst University of Education Winneba (UEW) is at the 146<sup>th</sup> position. University of Mines & Technology Tarkwa (UMAT) and Kumasi Technical University (KTU) are ranked 229 & 254 respectively. Ashesi University (AU) occupies the 307<sup>th</sup> position, Ho Technical University at the 348<sup>th</sup> position, Ghana Communication Technology University (GCTU) at the 369<sup>th</sup> position and University of Health and Allied Sciences at the 396<sup>th</sup> position. Performances of the rest of the seventy-eight HEI’s in Ghana are not very impressive. Eight are in the 401 and 500 bracket, five are between 501 and 600, six are between 601 and 700, whilst the rest of the fifty-nine HEI’s are in various positions between 701 and 2039. These placements represent their performance as at January 2022. This unimpressive performance calls for the adoption of best practices to help them optimise their activity and visibility across online channels.

The 2022 results (Webometrics, 2022a) has University of Cape Town as the only African University to place among the first 300 universities in the world,

**Table 2.** Four top ranked HEI's in Ghana.

Ranking	Africa Rank	World Rank	University	Impact Rank	Openness Rank	Excellence Rank
1	15	1121	University of Ghana	2007	906	1202
2	28	1508	Kwame Nkrumah University of Science & Technology	3481	1121	1499
3	70	2475	University of Cape Coast	5727	1440	2613
4	74	2517	University for Development Studies	4674	2131	2831

(Source <http://www.webometrics.info/en/Africa/Ghana>).

placed at the 240<sup>th</sup> position. South Africa continued its dominance in Africa with eight of its universities in the first ten followed by Egypt with two universities. The unimpressive performance of HEI's in Ghana is a situation that necessitates the adoption of best practices of top ranked institutions and even countries.

The International Consultants for Education and Fairs (ICEF), which is a global market leader in business-to-business networking events and services in the international education sector, highlighted eight nations that occupy the position as topmost online education countries. They are United States, India, China, South Korea, Malaysia, United Kingdom, Australia and South Africa (*ICEF Monitor*, 2012). According to the report, the US is the undisputed leader in online education in the world today, with hundreds of online colleges and thousands of online courses available to students. The report emphasise that about 6 million students in the US have taken at least one online course, nearly one third of all those enrolled in higher education. South Africa, which is the eighth, was recorded as one nation that has capitalised on all the benefits that digital education can offer. They have developed nationwide online resources like EduNet and Thutong and offer online courses at both the high school and college levels through institutions all over the country. This is a useful lesson worth emulating by HEI's that want to rank among the top class universities.

## 5. The Way Forward for Achieving Good Results

Based on the best practices of the top ranked HEI's on Webometrics' ranking table (*Webometrics*, 2022b), this paper proposes three strategic schemes worthy of adoption to bring innovation into teaching pedagogy and enhance excellent research output, which can help improve online visibility, transparency and academic excellence. These are:

- 1) The adoption of Problem-based Learning pedagogies to foster impactful academic activities and excellence.
- 2) The adoption of electronic learning systems to increase academic web presence.
- 3) The promotion of open-access institutional repositories to publish and share high impact scientific, technological and cultural knowledge generated by lecturers in the various universities to society, to enhance visibility.



### 5.1. The Adoption of Problem-Based Learning

Universities are unquestionably established to help solve scientific and socio-cultural problems hence courses run in the universities are tailored to meet specific needs of society. Problem-based Learning (PBL) is an instructional (and curricular) learner-centred approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop valuable solution to a defined problem. Critical to the success of the approach is the selection of ill-structured problems (often interdisciplinary) and a tutor who guides the learning process and conducts a thorough debriefing at the conclusion of the learning experience (Savery, 2006).

PBL engages students to actively participate in lessons whilst expressing their skills and ideas freely to solve problems. They are challenged as a way of motivation to explore existing relevant technologies and appropriate them in confronting specific tasks. In most cases, every student will want to be identified with the solution to a defined problem and this incentivises high participatory experience. Assiduous approach to PBL activities will result in more research reports on effective skills for resolving scientific and technological problems. These findings can be published in institutional open access repositories, high impact electronic journals or any relevant electronic learning platform that has large reading audience to be sourced for through Google search engines. It is important for institutions to regard openness of repositories as paramount for wider accessibility. As more knowledge seekers land on such publications, the relevance and impact of the content material increases. As more writers also cite the paper or author, it eventually increases their institutions transparency or excellence results respectively to improve its ranking performance.

### 5.2. The Adoption of Electronic Learning Systems (E-Learning)

E-learning system is the vehicle that brings the community, industry and students close to PBL outcomes. Existing research on “Analysis of e-learning Impacts & Best Practices in Developing Countries” (Olson et al. 2011), throws a searchlight on the impact of e-learning on students, teaching, the economy and society. This in-depth research work spelt out the positive impact of e-learning as a pedagogical system that enables teachers to share information and resources to the global community when delivered through appropriate ICT tools.

Evidence from this survey about teaching and learning activities in the three topmost Universities on Webometrics world ranking list; *Harvard University, Stanford University and Massachusetts Institute of Technology* clearly shows that PBL and electronic learning pedagogies that openly avails solution-based content materials to the outside world are strategies that can bring desired impact and visibility to HEI's academic activities.

#### Evidence from the Three Topmost HEI's on Webometrics Ranking Table

Harvard University (HU) (<http://www.harvard.edu/>), which is ranked first on



webometrics world ranking list, has PBL and electronic learning as a key driving force in the university's Initiative for Learning and Teaching (HILT) (<http://hilt.harvard.edu/>). HU Library Office for Scholarly Communication operates an open access repository called DASH (<https://dash.harvard.edu/>). DASH is a central, open-access repository of research by members of the Harvard community. It is purposed to enlarge the audience and impact of authors who deposit in DASH and such authors have access to on-demand metrics and receive monthly reports about their readership. Deposited works receive persistent URLs, are comprehensively indexed by search engines, including Google and Google Scholar, reach academic and non-academic readers who may not have access to the original publications, and are preserved by the Harvard Library. This indeed opens accessibility to publications thereby enhancing the institutions online visibility.

HU also offers unparalleled excellent online learning opportunities to knowledge seekers (<http://online-learning.harvard.edu/>) and an interactive experience from podcasts and lectures to fully interactive courses and programmes. The HILT website also compiles teaching and learning resources across the University, from profiles featuring effective practices to grant-funded projects to larger initiatives and organizations (<https://hilt.harvard.edu/teaching-learning-resources-overview/>). These are e-learning strategies, which indeed enhance the university's online visibility and activity to justify its foremost position on most of the top ranking organisations in the world.

Stanford University (SU), which is ranked second on webometrics world ranking list, adopts Problem-Based and electronic Learning as the centre of its academic activities. This is evident by the detail description of the academic life of the seven schools of the university (<https://www.stanford.edu/academics/schools/>). The focus of the schools is about developing students' ability to think critically, creatively and productively about problems and their solutions, whilst their research aims at developing breakthrough solutions, which are published with accessibility to the public. The Stanford Centre for Professional Development (SCPD) (<https://scpd.stanford.edu/>), a pioneer in online and extended education, works with Stanford Faculty, Departments, Schools, and Centres to develop and deliver engaging, high-quality online, in-person, and blended learning experiences to learners around the world. SCPD operates and manages the university's online learning platform, where it offers learners' access to Stanford's extended education and lifelong learning opportunities both on campus and around the world. Under SCPD, is also the evidence of the SU's pioneering role in the advancement of learning innovative pedagogy, geared towards developing problem solving abilities to the learning audiences around the world (<https://scpd.stanford.edu/learning-innovation>). This obviously increases their visibility as far as impactful output is concerned.

In Massachusetts Institute of Technology (MIT) (currently ranked third on webometrics world ranking list), Case Study and PBL pedagogy is central to

most of their graduate programmes. In these programmes, students brainstorm to identify a range of problems related to scenarios and choose which of them they want to investigate and report on. Positive outcomes from students' project activities and results become resource materials, which are generated for the benefit of the global community. MIT pursues a permanent OpenCourseWare (OCW) system which is web-based that publishes virtually all MIT course materials used in the teaching of MIT's subjects on the Web (MIT OCW, 2016), to make it open and available to the world. MIT does this to empower minds and support educators to improve their courses and curricula and make their schools more effective. It is also meant to help students to find additional resources to help them succeed in academia. Independent learners also rely on MIT content materials to tackle some of the world's most difficult challenges, including sustainable development, climate change, and cancer eradication (<https://ocw.mit.edu/about/>). This obviously is a strategy that enhances the online visibility of a university.

### 5.3. Promotion of Open Access Institutional Repository

Publishing and sharing of high impact scientific, technological and cultural knowledge generated by lecturers in institutional repositories of various universities is one of the important channels for enhancing web visibility. The visibility indicator, which is measured by results from the *impact* of academic performance as well as the quality of content materials in a web page, renders it imperative for lecturers to share *openly*, their quality intellectual research outputs that border on skills and technological knowledge. This can also be done on e-learning platforms that have large reading audience. Electronic learning resource materials are included in this category of academic papers. They have to highlight the parent institution, to give credence to the resource material. When such materials gain more usage, they will show up on the first page of Google during online search, and that will imply receiving exponentially, high online visibility.

### 5.4. DANIDA's Collaborative Strategies (Madsen, 2022)

BSU, was the initiative of the Danish Development Agency (DANIDA) to Build Stronger Universities in developing countries. It is a partnership between research and HEI in developing countries and Danish universities.

1) It is an initiative with a long-term objective to make the participating institutions stronger in playing an increasing role in the economic, social and political development of the societies in which they are located. The universities were also to function as nodes of innovation and knowledge production, providing solutions to local/domestic and global challenges; produce skilled and motivated graduates that can contribute to the further development of the societies and address the challenges they face.

2) A collaborative project activity between five (5) European and five (5) African Universities including KNUST has aimed at Enhancing Entrepreneurship,

Innovation and Sustainability in Higher Education in Africa (EEISHEA). Through this project, training workshops in selected European universities have been organised to help build capacity for improving learning material delivery and increase equitable access to high quality tertiary education that provides relevant courses to graduates to develop broad skills for future study and work.

This agenda called for the development of new curricula with Problem-based and Electronic learning pedagogies as the driving force to help foster student centred learning and academic research that focuses on professionalism; entrepreneurship, creativity, innovativeness and ingenuity in academic output as the motivation for finding solutions to problems and challenges of society. At KNUST, few departments have embraced this new direction of learning pedagogy and have therefore called for workshops to introduce their Faculty Members to these systems.

It is one thing getting the exposure to best systems and practices and another thing, getting results from its implementation. The onus lies on tertiary institutional managers in Ghana to admissibly set policy strategic frameworks that will enforce the adoption of the BSU agenda to help their institutions enhance their global academic prestige by focusing on research that provide solutions to local/domestic and global challenges. Problem-based learning & E-learning pedagogies must be holistically embraced to open up HEI and universities in Ghana to the global community of learners.

## **6. Conclusion**

Having been instrumental in the area of e-learning pedagogy under KNUST ERASMUS plus Programme of the European Union regarding Enhancing Entrepreneurship, Innovation and Sustainability in Higher Education in Africa (EEISHEA), the writer have been emphasising on the importance of e-learning pedagogy in curriculum development as a strategy for gaining web visibility that can immensely improve an institution's ranking status.

In this paper, lessons from Cybermetrics Lab ranking methodology of 2022 rankings, highlighting three key indicators, visibility, transparency and Excellence' as paramount in their ranking schemes have been drawn. Best practices of the three topmost HEI's in the world that seek to justify PBL and e-learning as the way forward for improving ranking positions of Ghanaian HEI's have also been highlighted as lessons for replication. DANIDA's aims and objectives for pursuing the agenda of BSU in HEI's in developing countries has been outlined as a step in the right direction to foster academic research activities that can enhance social life of the people and improve universities and HEI's ranking performance.

As the world today rank tertiary institutions by their performance on the virtual environment, it behoves on Ghanaian universities to perform in consonance with modern trend of happenings in the world of academia. It is certainly imperative that Ghanaian researchers in the sciences and the humanities increase

their research activities, write high impact papers that border on societal problems and increase publications in high impact electronic journals and institutional repositories in order to gain international recognition and prestige. It is also essential for individual scholars to openly share valuable academic information that emanates from their research activities through the most vibrant learning space of this contemporary age (the internet) and on learning platforms that have large reading audience like Google Scholar and Academia Edu.

It is the expectation of every university to be ranked among the best in the world, regional as well as country rankings. Ranking results are therefore wakeup calls on HEI's in Ghana to conduct an introspection of their teaching, research and service activities and adopt best practices within the international academic fraternity so that they can also perform to meet the ranking criteria.

### Subject Matter of Paper

This is a Review Research Article on Cybermetrics Lab Higher Educational Institution ranking strategies, and lessons that higher Educational Institutions in Ghana can derive from, to help them improve on their positions on ranking tables.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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