QUALITY ASSURANCE MECHANISMS FOR QUALITY RESEARCH OUTPUTS OF STEM LECTURERS IN UNIVERSITIES IN RIVERS STATE: ISSUES ON PLAGIARISM

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Abstract
This study was aimed at investigating the quality assurance mechanisms for managing the research outputs of STEM lecturers in universities in Rivers State. The study is a descriptive survey with a population of 993 lecturers and a sample size of 160 STEM lecturers obtained through purposive and simple random sampling techniques. The instrument used for data collection was a self-structured questionnaire tagged "Quality Assurance Mechanisms for Research Outputs Questionnaire" (QAMROQ). The instrument was designed after the modified 4-point Likert rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with numerical values of 4, 3, 2, and 1 respectively. The instrument was face validated by two experts. A reliability coefficient of 0.80 was established through Pearson Product Moment Correlation coefficient. Data collected was analysed using mean scores. While a mean value of 2.50 was used as benchmark for the interpretation of results. The result revealed among others the institutional mechanisms for managing STEM lecturers' research outputs as self-review, peer review, external quality assessment, and review panel. The technological mechanisms were identified as Computer-Based Plagiarism Detector, Turnitin, Copy-Catch-Gold, Quetext, and Word-Check. Based on the findings, it was recommended among others that Deans of faculties should ensure the effective use of quality assurance mechanisms in producing quality research outputs in their faculties.

Keywords: quality assurance mechanisms, plagiarism, research outputs, STEM lecturers

Introduction

Research is an essential aspect of the higher education system and a tool for advancing the frontier of knowledge. It plays a great role in identifying gaps in knowledge and learning and bridges the gap between what is and what is expected (Basu, 2020). It is also the systematic collection and analysis of data to investigate educational and societal problems and proffer solutions to them (Nzeneri, 2010). As a systematical investigation, it follows a series of steps to identify problems; specifies its objectives, uses a reproducible methodology; conducts a thorough literature search, and arrives at a logical conclusion through proper collection and analysis of available data (Nzeneri, 2010). Systematic researches are replicable, comprehensive, prolific, relevant, and well-executed (Shameem, 2017). The justification for systematic research is to improve teaching and learning and better the living conditions of people in society.

Research outputs are the products of carrying out a systematic investigation, results generated by an inquiry. Okafor (2011) sees it as the quantity of research in terms of publication outputs and supervision of students that a lecturer is able to carry out within a specified period. Publication output includes textbooks, book chapters, journals, monographs, conference proceedings, and bulletins.

Research output may also include theories, validated tests, curricula, techniques, program models, paradigms, postulates, generalizations, or findings discovered as a result of a scientific investigation (Edwards, 2020). In higher education, the research output of each individual lecturer is used in performance appraisal for promotion. It can therefore be said that the value of a lecturer hinges on his or her research outputs which are based on the number of citations receive in scientific articles, and the influence of the publication beyond the circle of the researchers (Zerbib, 2019). It is also needful to note that the ranking of world-class universities is also based on the research output of each university. Tertiary institutions are therefore expected to improve the standard of their research outputs through effective measures that can guarantee quality research work.

One such mechanism is quality assurance. A management strategy used to supervise and monitor educational inputs and output for the purpose of maintaining approved education standards. It ensures appropriate educational development of learners and provides public accountability and transparency (Law, 2020). Quality assurance also ensures the credibility and integrity of University research outputs (Law, 2020).

Lecturers in Science, Technology, Engineering, and Mathematics (STEM) at Rivers State University have been berated over the poor nature of their research outputs. Studies carried out by some of them have been marked with trivialities and do not add to knowledge. Thumser (2022) opined that poor research practices have created knowledge and skill gap in the teaching of STEM subjects. In the same vein, Prof. Soriyan in a seminar designed to deepen science and technology skills among lecturers in the South Eastern part of Nigeria remarked that STEM lecturers needed a change in their mindset to be able to teach STEM subjects in a relevant way and win back students to the classroom (Soriyan, 2019). Teaching in a relevant way means teaching what has been acquired through inquiry, observation, and investigation. In general, teaching what one has researched on, and it is one of the most effective ways of teaching. STEM subjects are unique because of their ability to transform society through creativity and innovation. Hence, STEM lecturers need to be thorough in the conduct of their research, they are advised to be highly objective, replicable, comprehensive, prolific, relevant, and empirical if they are to fill the gap of knowledge and meet the needs of society (Shameem, 2017). Thrumser (as cited in Payne, 2022) proposed that experienced lecturers should share best practices with those who may feel out of touch with innovations.

It is the researchers' observation, that universities have been laying more emphasis on research than teaching. The reason for this is not far-fetched; research outputs are needed for appraisal of lecturers and securing of grants. These have made lecturers with quality research outputs to be highly rated and valued. Moreover, research outputs are also a criterion in the performance ranking of universities globally. The webometric ranking (2022 edition) placed the University of Port Harcourt and Rivers State University in 15 and 42 positions respectively in Nigeria; while in the world ranking, the University of Port Harcourt was placed in the 1923 position and Rivers State University in the 4572 position. This ranking shows the sorry state of Universities in Rivers State in terms of research outputs and online visibility. Major reasons for such poor performance were discovered to be the prevalence of plagiarism among university lecturers and poor research funding by government and institutions. It is a known fact that plagiarism has become rampant due to the influx of content and accessibility of materials on the internet. It is quite easy nowadays for a lecturer to copy and paste content from the internet and submit it as original work. This act has hampered the effectiveness and resourcefulness of many STEM lecturers in Rivers State.

However, research evidence has shown that effective quality assurance practices by institutions will go a long way to ensure that research studies are properly monitored and effectively managed before publication. Hence the relevance of this study which is to find out the quality assurance mechanisms used in managing the prevalence of plagiarism in educational research outputs of STEM lecturers in Rivers State.

A major factor that has negatively influenced the research outputs of many Universities is plagiarism. The act of copying another person's work without proper acknowledgment or citation. It is described

as the practice of passing off someone's work, whether intentionally or unintentionally as one's own and for one's benefit (Carroll, 2007). It is believed to be a common practice by STEM lecturers in a bid to publish as many articles as possible to lazily engage in this offence. They plagiarize in various ways such as copying and pasting, paraphrasing other author's words, and using their old works for a new publication (Mansoor & Al-Tamimi, 2022). Through this means they flood the internet with works that have no value and do not add to knowledge, thereby destroying the main essence of research. In other to promote the academic integrity of the University and to help STEM lecturers develop proper critical thinking and writing skills, there is a need to prevent plagiarism through the use of institutional mechanisms and computer-assisted devices.

Tertiary institutions have well-established quality assurance practices that ensure that research studies are properly monitored and effectively managed (Kis, 2005; MacArther 2020). This practice is grouped under institutional mechanisms and technological mechanisms. Institutional quality assurance mechanism includes practices used by the school to monitor research processes and maintain high standard research outputs. Examples are self-review, peer review, external quality assessment, and review panel (Mac-Arthur, 2020). While technology mechanisms involve plagiarism detection techniques such as cross-language Plagiarism Detection, Computer-Based Plagiarism Detector, Turnitin, Evez, Copy-Catch-Gold, Word-Check, Glatt, Moss, Iplag (Lukashenko, Graudina, Grundspenkis, 2007).

Peer review is a quality assurance method used to assess the quality of an article before publication. The article is independently assessed by research experts in the same field for originality, quality, and suitability for publication (Basu, 2020). The idea is to encourage researchers or authors to meet acceptable high standards in their discipline and to ensure that published papers answer meaningful research questions and draw accurate conclusions based on research findings (Kelly, Sadeghieh, Adeeli, 2014). It engages scholars in peer feedback and improves writing skills (Wu, 2021). It is an indispensable tool in ensuring the quality of a scientific publication (Matsui, Chen, Wang and Ferrara, 2021)

A study by Biomed Centre (2020) identified four types of peer review used by institutions of higher learning: Single-blind, Double-blind, Open peer, and transparent peer. In single–blind review, the reviewers know the names of the authors or researchers; In double-blind, the reviews are not aware of the names of authors; In an open peer, the identity of the reviewers and authors are known by all the participants in the review process (Biomed, 2020). In transparent peer review, the reviewer's reports, authors' responses, and authors' decision letters are published alongside the published manuscript (Wiley, 2020). The purpose of a manuscript undergoing peer review is to identify and correct errors that could mar published papers and also to produce readable, and useful research papers. In addition, it gathers evidence for propounding theories, contributes to developing knowledge, and facilitates learning (Leann, 2022).

Self-review is the ability to assess one's effectiveness in research practices based on pre-determined standards and to find out how much progress made. It is also the unguided reflection on performance by a researcher for the purpose of generating an individual summary of his or her level of knowledge, skill, and understanding in the area of research (Eva & Regehr as cited in Andrade, 2019). It requires researchers to monitor their own abilities and evaluate observed strength and weaknesses based on standards (Thompson, 2021). Lecturers are encouraged to assess and evaluate their research abilities; update and seek help from senior colleagues who are savvy in research studies. The advantage of self-review or evaluation is that it empowers one to recognize acquired skills and to determine the steps needed to become an established scholar with critical research skills (Andrade, 2019). The review panel is made up of two or more experts with a chair tasked with reviewing some proposals and choosing some of them for funding and their choice is dependent on novelty, methodology, and impact (Feliciani, Morreau, Luo, Lucas and Shankar, 2022).

External peer review is a review of research work by academics from other universities. It is a process of ensuring that published manuscripts have undergone careful and open examination of the

theoretical background and models used (Flood, 2004). The purpose is to systematically and periodically evaluate research carried out in the universities and to recommend to the faculty strategies for enhancing the effectiveness of their research work (Duke, 2014).

Technological quality assurance mechanisms are devices used to detect instances of plagiarism in academic or research papers. They are also called plagiarism detection techniques. They work by distinguishing stolen materials from the original by identifying plagiarized sections (Mansoor & Al-Tamimi, 2022). This mechanism helps to deter lecturers from continuous acts of plagiarism by raising awareness among researchers (Awasthi, 2019). Some technological quality assurance mechanisms are cross-language Plagiarism Detection, Turnitin, Evez, Copy-Catch-Gold, Word-Check, Glatt, and Moss (Lukashenko, Graudina, Grundspenkis, 2007). Lastly, a Plagiarism scanner, Plag tracker, plag scan, and Dupli checker (Mansoor & AL-Tamim, 2022). The most common technology mechanism is Turnitins which compares text to a large database of other sources; flagging any similarities that come up (Koen, 2023).

The general purpose of this study is to investigate the quality assurance mechanisms used in managing the research outputs of STEM lecturers in Rivers State, Nigeria. Specifically, the study sets out to find out the:

1. Institutional mechanisms used in managing the research outputs of STEM lecturers in Rivers State.
2. Technological mechanisms used in managing the research outputs of STEM lecturers in Rivers State.

Research Questions

1. What are the Institutional mechanisms used in managing the research outputs of STEM lecturers in Rivers State?
2. What are the technological mechanisms used in managing the research outputs of STEM lecturers in Rivers State?

Methodology

The study adopted the descriptive research survey design and was carried out in two universities in Rivers State. These universities are Rivers State University (RSU), and University of Port Harcourt (UNIPORT). These two universities offer Science, Technology, Engineering and Mathematics courses. The population of the study was 993 lecturers in the two universities in Rivers State. A purposive sampling technique was used to select two STEM faculties (Engineering and Science) making a total of four faculties selected from two institutions. A simple random sampling technique was employed to select four Departments from each faculty making a total of 16 Departments that were used for the study. Finally, a purposive random sampling technique was used to select 10 lecturers with at least 10 years of teaching experience. Hence, a sample of 160 lecturers (RSU = 80; UNIPORT = 80) were selected for the study. The instrument for data collection was a self-structure questionnaire tagged "Quality Assurance Mechanisms for Research Outputs Questionnaire" (QAMROQ). The instrument was designed after a modified 4-point rating scale of agreement such that Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with numerical values of 4, 3, 2, and 1 respectively. The instrument was face validated by two experts. A reliability coefficient of 0.80 was established through Pearson Product Moment Correlation coefficient. Data collected was analysed using means cores. For research questions, an item with a mean value less than 2.50 was "Disagree" (D) while the item with a mean value equal to or greater than 2.50 was "Agree" (A).

Results

Research question 1: What are the institutional mechanisms used in managing the research outputs of STEM lecturers?

Table 1: Respondents' mean ratings on the institutional mechanisms used in managing STEM lecturers' research outputs.

S/N	ITEMS	SA (4)	A (3)	D (2)	SD (1)	Total	Mean	Remarks
1	Self-review mechanism	86 344	58 174	10 20	6 6	544	3.4	Agreed
2	Peer review mechanism	84 336	60 180	8 16	8 8	540		Agreed
3	External quality assessment mechanism	90 360	65 195	5 10	0 0	565	3.53	Agreed
4	Review panel mechanism	81 324	54 162	15 30	10 10	526	3.29	Agreed
	Grand Mean						3.4	Agreed

Results from Table 1 shows that STEM lecturers accepted all the items as the institutional mechanism used in the universities to produce quality research outputs. The grand mean of 3.4 indicates a high rating of the items. The above result reveals a unanimous acceptance of the items.

Research question 2: What are the technological mechanisms used in managing the research outputs of STEM lecturers?

Table 2: Respondents' mean ratings on the technological mechanisms used in managing STEM lecturers' research outputs.

s/n	Items	SA (4)	A (3)	D (2)	SD (1)	Total Resp.	Mean	Remarks
5	Cross language-Based Plagiarism Detector	43 172	32 96	40 80	45 45	393	2.46	Disagreed
6	Turnitin	134 536	26 78	0 0	0 0	614	3.83	Agreed
7	Word- Check	72 288	45 135	18 36	25 25	484	3.03	Agreed
8	Copy-Catch- Gold	68 272	35 105	27 54	30 30	461	2.88	Agreed
9	Evez	15 60	30 90	56 112	59 59	262	1.64	Disagreed
10	Glatt	20 80	24 72	62 124	54 54	330	2.06	Disagreed
11	Quetext	50 200	52 156	30 60	28 28	444	2.78	Agreed
	Grand Mean						2.66	Agreed

The results in Table 2 indicate a lot of variations in lecturers' rating of technological mechanisms used in producing quality research outputs. Items 6, 7, 8, and 11 were accepted. On the other hand, items 5, 9, 10 were rejected except. The grand mean of 2.66 indicates that the items are technological mechanisms used in the institution to manage the research outputs of STEM lecturers.

Discussion of Findings

Table 1 shows the institutional mechanisms used in managing the research outputs of STEM lecturers in Rivers State. The result obtained indicated that STEM lecturers' research outputs are managed by peer reviewing, self-reviewing, review panels, and external assessments. This finding is in agreement with the work of Thompson (2021) who observed that self-review is required for researchers to monitor their own abilities and evaluate observed strengths and weaknesses based on standards. External review is to ensure that published manuscripts have undergone careful and open examination of the theoretical background and models used (Flood, 2004). Peer reviewing is done by colleagues in the same department; self-reviewing by individual lecturers, and review panel by two or more reviewers with a chair; the reviews are done to judge the quality of research proposal. In addition, the findings also reveal that external quality review has very high rating. This could be as a result of frequent invitations made by faculties to external readers to evaluate research carried out in their universities and recommend strategies for enhancing their research outputs.

Table 2 shows the technological mechanisms used in managing the research outputs of STEM lecturers in Rivers State. The result obtained showed a grand mean of 2.66 which proves that technology mechanisms are used to manage research outputs in Universities in Rivers State. This assertion is in consonance with the findings of Awasthi (2019) who noted that plagiarism detectors such as Turnitin, word check, copy-catch-gold, Evez, and many others are the effective mechanisms that deter lecturers from a continuous acts of plagiarism and help in the production of high-quality research works. The use of these tools have raised awareness among researchers and created the need for properly reviewed work. The table also revealed that only Turnitin was rated very high amongst other tools. The reason for this result could be high awareness of Turnitin among researchers and low awareness of the other tools. This in effect indicates the underutilization of other plagiarism technological tools.

Conclusion

Quality assurance is a systematic method of ensuring that the research outputs of lecturers are properly monitored and managed in terms of novelty, originality, and clarity before publication. The essence of this process is to produce studies that are replicable, comprehensive, prolific, relevant, life-changing, and can solve societal problems. And, also to avoid doctored and manipulated research works. This study identified the various mechanisms for producing quality research work by STEM lecturers of the universities in Rivers State. The mechanisms were seen as tools that would reduce the act of plagiarism in institutions of higher learning. Plagiarized works do not add value to knowledge rather they destroy the essence of research and are breaches of academic integrity.

Hence, the awareness of these tools should be created among all the lecturers in the universities and the ability to use the tools should be developed among academic staff. By implication, if lecturers are not in the habit of using these tools to test their work definitely, their students will not. It therefore becomes expedient that lecturers know how to use anti-plagiarism tools and practice the act of submitting their works for comprehensive reviews before publication. This study also is insightful in that it reveals the need for studies to be carried out on the effective utilization of these tools by lecturers in tertiary institutions.

Recommendations

Based on the findings, the following recommendations were made:

1. Heads of Departments and Deans of faculties should ensure proper and effective utilization of institutional quality assurance mechanisms in assessing quality research outputs in the universities.
2. Lecturers should be trained on the use of the various technological mechanisms or tools for producing quality research studies.

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